UDS-2022 * UDS-2021 Series PC-Sampling Oscilloscopes/ TDR/TDT

Features and Benefit

- DC to 20 or 12 GHz Bandwidth
- 2 Channels
- 1.6 % Vertical Gain Accuracy
- 14-Bit Vertical Resolution
- Dual Time Base 10 ps/div to 2 ms/div
- 100 fs Sampling Interval
- DC to 1 GHz Full-function Direct Trigger
- 12 GHz Prescaled Trigger
- Up to 2.7 Gbps Clock Recovery Trigger
- 100 ps / 400 mV internal TDR/TDT step
- 40 ps / 200 mV TDR/TDT with external UDX-G01 Pulse Head
- Up to 4 k-point record length per channel
- Normal, Infinitive, Variable Persistence and Color Graded Display Modes
- High Resolution Cursor and Automatic Waveform Measurements with Statistics
- Waveform Processing including FFT
- TDR NormaliztionStatistical analysis with Time and Voltage Histograms
- Automated Eye-Diagram Measurements for NRZ and RZ signal types
- Automated Mask test with Predefine Standard, and Custom Masks
- Familiar Windows Intuitive Graphical User Interface
- Built-in information system
- USB 2.0 (FS) or IEEE1284 (ECP mode) UDS-2000 to PC Interface
- Win95/98/ME/NT4/2000/XP Compatibility

Applications

- Electrical Standards Compliance Testing
- Semiconductor Characterization (Fast Logic Families, Step recovery Diodes, Tunnel Diodes, Analogue component pulse response (e.g. DACs and Op-Amps, High Speed Laser Detector Measurements)
- Telecom Service and Manufacturing, Wireless Carrier Analysis
- Timing Analysis

- Digital System Design and Characterization, High-Speed digital (pulse) measurements
- Electronic Mask Drawing and Display
- Automatic Pass/Fail Limit Testing
- Time Domain Reflectometry and Time Domain Transmission, Impedance and Cross-talk Characterization of Circuit Boards, IC Packages and Cables
- Nuclear Magnetic Resonance Carriers
- High Speed Serial Bus Pulse Response
- TDMA Power Ramp-Up Analysis

Product Description

The UDS-2000 is the world Faster Series 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-2000 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.

UDS-2000 instruments are PC-Sampling Oscilloscopes, or oscilloscopes for Personal Computer. They require 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.

An Informative Waveform Display with Grey Scaling

Both models use sequential equivalent-time sampling technology to achieve bandwidth of up to 20 or 12 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 GHz-bandwidth and the low-noise specifications allow very precise 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-2000 oscilloscopes are powerful and versatile instruments 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-2000 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.

Digital Communications Analysis

The UDS-2000 Oscilloscopes designed for communications applications. They provide solutions for design and evaluation of datacomm/telecomm components, transceiver subassemblies, and transmission systems. The UDS-2000 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 UDX-R01/R02/R03 Clock Recovery Heads, reliable parametric testing up to 2.7 Gbps bit rates becomes easy even when you do not have access to a clock signal trigger.
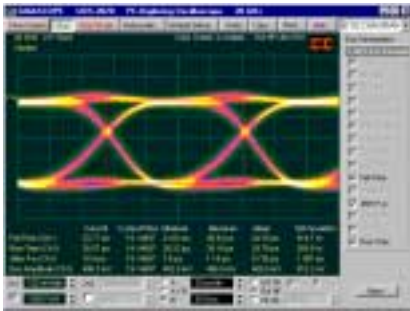
An example of 12-Gbit eye-diagram measurement

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-2000 were 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 and TDT

The UDS-2022 and UDS-2021 can be configured as a single-ended time-domain reflectometer. The step generator provides a >400 mV TDR step with typical system rise time of 100 ps. The system has the ability to normalize the TDR by applying a digital filter. Normalization removes errors caused by loss or imperfect launchers or cables. The rise time of the normalization filter may be varied to allow you to simulate the edge speeds found in your system. You may also push the rise time up to 10 ps. The vertical scaling allows scaling in volt, percent reflection or ohms. The horizontal scaling allows scaling in time or distance. Distance measurements are subject to the accuracy of the propagation velocity or dielectric constant that you enter.

Cursors will also read in voltage, percent reflection, ohms, time or distance.

TDR Normalization. The top waveform shows distortions caused by cables and connectors. The bottom waveform shows how normalization corrects for these distortions.

Familiar Windows-95/98/ME/NT4/2000/XP User Interface

The UDS-2000 Oscilloscopes have 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.

Built-in Information System

The UDS-2000 Oscilloscopes have 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 and Characteristics

Channel (Vertical)
Number of Channels — 2.
Bandwidth –
    UDS-2022: 20 or 12 GHz,
    UDS-2021: 12 GHz.
Rise Time (10% to 90%, calculated from Tr=0.35/BW) –
    UDS-2022: <17.2 ps or <29.2 ps
    UDS-2021: <29.2 ps.
RMS Noise (maximum) –
    UDS-2022: 2 mV @ 20 GHz, 1.5 mV @ 12 GHz,
    UDS-2021: 1 mV @ 12 GHz.
TDR/TDT Channels -

UDS-2022: Single-ended TDR/TDT with 100 ps / 400 mV internal step or 40 ps / 200 mV with external UDX-G01 Pulse Head.
UDS-2021: Single-ended TDR/TDT with 100 ps / 400 mV internal step or 45 ps / 200 mV with external UDX-G01 Pulse Head.
Scale Factors (Sensitivity) – 1 mV/div to 255 mV/div (Full scale is 8 divisions). Adjustable from 1 mV/div to 255 mV/div in a 1-2-5-10 sequence. Also adjustable in fine increments 0.5 mV to 2 mV.
DC Difference Voltage Accuracy - ±1.6 % of full vertical scale ± 2 mV.
DC Offset Range – Adjustable from -1 V to 1 V in a 25 mV increments (coarse). Also adjustable in fine increment 1 mV.
ADC - 14–Bits.
Vertical Resolution - 125 µV/LSB without averaging. Up to 16 bit with averaging.
Maximum operating input voltage - 1.0 V p-p at ± 1 V range.
Maximum Safe Input Voltage – 16 dBm, or ± 2 V (dc + peak ac).
Nominal Input Impedance – (50 ± 1) OHm.
Input Connectors – UDS-2030: K-type; UDS-2020 and UDS-2012: N-type (f).
Deskew (The difference in delay between channels) - Can be nulled out with 1-ps resolution to compensate for differences in input cables or probe length. Up to 100 ns of skew can be nulled out.
Attenuation - Attenuation factors may be entered to scale the oscilloscope for external attenuators connected to the channel inputs. Range: 0.00001:1 to 1,000,000:1. Units: Ratio or dB. Scale: Volt, Watt, Ampere, or Unknown.
Channel-to-channel isolation – > 40 dB.

Time Base (Horizontal)
Time Bases - Main, Intensified, two Delayed, Dual Delayed.
Scale Factors –
    Main Time Base: 10 ps/div to 2 ms/div (Full scale is 10 divisions).
    Delayed Time Bases: 10 ps/div to current Main Time Base setting. Adjustable in a 1-2-5-10 sequence. Also adjustable in fine increment 1 ps, or 0.1% and better.
Delta Time Interval Accuracy –
    ± 0.4% of reading ± 15 ps ± 100 ppm of delay setting (maximum);
    ± 0.4% of reading ± 10 ps ± 100 ppm of delay setting (typical).
    Note: Measured at a temperature within ± 3°C of horizontal calibration temperature.
Typical Timing Accuracy - The time base uses a series of 2-ns blocks. Time base linearity and small discontinuities across these blocks contribute to the 10-ps accuracy specification.

Variable Delay (Time offset relative to trigger) - Up to 1000 screen diameters of Delayed Time Base or 19.98 ms, whichever is smaller.

Minimum Delay (Minimum time offset relative to trigger) — ‹ 40 ns.

Display Units - Time or Bit Period.

Time Interval Resolution - Screen diameter / (record length) or 100 fs, whichever is larger.

Trigger

Trigger Sources - External (Direct Trigger), External HF with different trigger heads, Internal Clock trigger (internally connected to direct trigger).

Trigger Holdoff - Adjustable from 10 us to 30.72 ms in a 1-2-5-10 sequence, or in 2 ns increments.

Internal Clock Repetition Rate - 10 us to 2 ms in a 1-2-5-10 sequence, or in 125 ns increments.

Direct Trigger

Trigger Modes – Triggered: causes the scope to trigger synchronously to the trigger input signal. Freerun: causes the scope to generate its own triggers.

Slope – Positive: triggers on positive-slewing edge. Negative: triggers on negative-slewing edge.

Trigger Bandwidth and Sensitivity - 100 mV p-p DC to 100 MHz. Increasing linearly from 100 mV p-p at 100 MHz to 400 mV p-p at 1 GHz.

Pulse Width: 500 ps @ 400 mV p-p.

RMS Jitter–

   2.5 ps + 50 ppm of delay setting (maximum);

   2.0 ps + 30 ppm of delay setting (typical).

   Note: Measured at 1 GHz with the triggering level adjusted for optimum trigger.

Trigger Level Range - -1 V to 1 V.

Trigger Level Resolution - 1 mV.

Trigger Hysteresis — Normal: the trigger hysteresis is set so the instrument meets the trigger sensitivity specification. High Sensitivity: hysteresis is turned off to allow a best sensitivity to high-frequency signals. This mode should not be used for noisy lower frequency signals that may miss-trigger without hysteresis.

Maximum Safe Trigger Input Voltage - ± 2 V (dc+peak ac) or 16 dBm.

Nominal Input Impedance – (50 ± 1) OHm.

Trigger Coupling - DC coupled.

Trigger Input Connector – BNC (f).

External UHF Trigger

Several trigger heads enhance trigger possibilities of the UDS-2000 sampling oscilloscopes.

UDX-T01 - Countdown trigger up to 10 GHz.

UDX-P01 - Prescaled trigger up to 12 GHz.

UDX-P02 - Prescaled trigger up to 18 GHz.

UDX-P03 - Low-Jitter Trigger less than 300 fs up to 12 GHz.

UDX-R01 - Clock recovery trigger for fixed 622 Mbps data rate.

UDX-R02 - Clock recovery trigger for fixed 2.488 Gbps data rate.

UDX-R03 - Clock recovery trigger 10 Mbps to 2.7 Gbps continuous data rate.

See Data Sheet for details.

Acquisition

Number of Acquisition Channels - 2 (Simultaneous acquisition).

ADC Resolution - 14 -Bits.

Digitizing Rate - DC to 100 kHz. The signal is sampled and digitized at a rate dictated by the trigger repetition rate and the time base range. If data acquisition is not trigger rate limited, the maximum sample rate is 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 acquired over one or more acquisitions.

Peak Detect Mode - High frequency and short repetitive glitch capture. Captures glitches of 20 ps using acquisition hardware at al horizontal scales.

Data Record Length - 32 to 4096 points maximum per channel in x2 sequence.

Display

Display Resolution - Full: 640 points horizontally x 480 points vertically, Data: 501 points horizontally x 257 points vertically.

Display Style - Dots; Vectors; Variable Persistence: time that each data point is retained on the display, persistence time can be varied from 100 ms to 20 s; Infinite Persistence; Variable Gray Scaling: five color levels that are used are one color that is varied in saturation and luminosity levels (in other words, different shades of the same color), refresh time an be varied from 1 s to 100 s; Infinite Gray Scaling; Variable Color Grading: with Color Grading selected, historical timing information is represented by temperature or spectral color scheme providing "z-axis" information about rapidly changing waveforms. Refresh time can be varied from 1 to 200 s, Infinite Color Grading.

Graticule - Full Grid, Axes with tic marks, Frame with tic marks, Off (no graticule).

Screen - Single: all waveforms are superimposed and are eight divisions high. Dual: with two graticules all waveforms can be displayed separately or are superimposed with four divisions high. Quad: with four graticules all waveforms can be displayed separately or are superimposed with two divisions high. When you selected dual or quad screen display every waveform channels, memories, and functions can be placed on specified graticule.

Display Format - YT, XY or both YT & XY.

Colors - You may choose a Default Color selection, or select your own Set Color. Different colors are used for display selected Item: background, channels, functions, waveform memories, FFTs, TDR/TDTs, and histograms.

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. Storage capacity is limited only by disk space.

File extensions for waveform files - The following file extensions for waveform and setup files are used: Waveforms - .wfm for binary format, .txt for text format, .wfm, and .txt for both formats. Data base files - .cgs. Setup files - .set.

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. To save a waveform, use the traditional Windows "Save as"dialog box. From this dialog box you can create subdirectories, new waveform files, or overwrite existing waveform files. You can load file with a waveform or data base you have previously saved, into one of Waveform Memories, and then recall it on display.

Save/Recall Setups - The instrument may store 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. The Autoscale feature requires a repetitive signal with a frequency greater than 1 kHz, duty cycle greater than 1%, amplitudes greater

than 50 mV p-p (vertical) and 200 mV p-p (trigger). Autoscale is operative only for relatively stable input signals.

Marker

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

Marker Measurements - Absolute, Delta, Volts, Time, Frequency, Slope (Volts/Time).

Marker Modes - Independent: both markers can be adjusted independently. Paired: both markers can be adjusted together.

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

Measure

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

Automatic Parametric - 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.

Histicons - A miniature histograms of parameter measurements that appear in Measurement Area. These thumbnail histograms let you see at a glance the statistical distribution of each parameter.

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. Failure tolerances can be selected independently for each of the parametric tests. Limit test can be set to run continuously for a user-selected number of waveforms, or for a defined number of failures.

On failure actions - Beep, Save failed waveform to disk or Stop acquisition.

Mathematics

Waveform Math - Up to four math waveforms can be defined and displayed using math functions F1-F4.

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 simultaneously.

Frequency Span - Frequency Span = Sample Rate / 2 =Record Length / (2 x Time Base Range).

Frequency Resolution - Frequency Resolution = Sample Rate / Record Length.

FFT Windows - The built-in filters (Rectangular, Nicolson, Hanning, Flattop, Blackman- Harris and Kaiser-Bessel) allow optimization of frequency resolution, transients, and amplitude accuracy.

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.

Zoom

Zoom feature - The zoom feature allows waveforms (memories, functions, and spectrums) to be expanded and positioned in both vertical and horizontal axes. Allows precise comparison and study of fine waveform detail without affecting ongoing acquisitions.

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

Vertical expanding and positioning - Zoom provides a vertical dynamic range of 10 mln. divisions or 1 mln. screens.

Horizontal expanding and positioning - Zoom provides a horizontal dynamic range of 640 divisions or 64 screens.

Histogram

Histogram Axis - Vertical, or Horizontal. Both vertical and horizontal histograms, with periodically updated measurements, allow statistical distributions to be analyzed over any region of the signal.

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. You can set the size of the histogram window to be any size that you want within the horizontal and vertical scaling limits of the scope.

Eye Diagram

Eye Diagram - The UDS-2000s has ability to automatically characterize NRZ and RZ eye pattern. Measurements are based upon statistical analysis of the waveform.

NRZ Measurement Set - AC RMS, Area, Bit Rate, Bit Time, Crossing %, Crossing Level, Crossing Time, Cycle Area, Duty Cycle Distortion (%, s), Extinction Ratio (dB, %, ratio), Eye Amplitude, Eye High, Eye Width (%, s), Fall Time, Frequency, Jitter (P-p, RMS), Max, Mean, Mid, Min, Neg Overshoot, Noise P-p (One, Zero), Noise RMS, One Level, Peak-Peak, Pos. Overshoot, Period, Rise Time, RMS, Signal-to-Noise, Zero Level.

RZ Measurement Set - AC RMS, Area, Bit Rate, Bit Time, Contrast Ratio (dB, %, ratio), Cycle Area, Eye Amplitude, Eye High, Eye Opening Factor, Eye Width (%, s), Fall Time, Jitter (P-p, RMS), Max, Mean, Mid, Min, RMS, Rise, Fall, Neg Crossing, Noise P-p (One, Zero), Noise RMS, One Level, Peak-Peak, Pos. Crossing, Pos. Duty Cycle, Pulse Width, Rise Time, RMS, Signal-to-Noise, Zero Level.

Mask Test

Mask Test - Acquired signals are tested for fit outside areas defined by up to eight polygons. Any samples that fall within the polygon boundaries result in test failures. Masks can be loaded from disk, or created automatically or manually.

Mask Creation - You can create the following Mask: Standard predefined Mask, Automask, Mask saved on disk, Create new mask, Edit any mask.

Standard Mask - Standard predefined optical or standard electrical masks can be

created.SONET/SDH: OC1/STMO, OC3/STM1, OC9/STM3, OC12/STM4, OC18/STM6, OC48/STM16, FEC2666, OC192/STM64, FEC1066, FEC1071, FEC4266, FEC4302; Fiber Channel: FC133, FC266, FC531, FC1063, FC2125, FC4250, 10GFC; Ethernet: GB Ethernet, 2XGB Ethernet, 10GB Ethernet, 10GBE Ethernet, 10XGB Ethernet; INFIBAND, XAUI; ITU G.703: DS1, DS2, 8 Mb, DS3, 140 Mb; ANSI T1/102: DS1, DS1C, DS2, DS3, STS1 Eye, STS1 Pulse, STS3.
Mask Margin - Available for industry standard mask testing.
Automask Creation - Masks are created automatically for single-valued voltage signals. Automask specifies both delta X and delta Y tolerances. The failure actions are identical to those of limit testing.
Data collected during test - Total number of waveforms examined, number of failed samples, number of hits within each polygon boundary.

Internal TDR System
Step Polarity - Positive only.
Step Amplitude - >400 mV.
Incident Rise Time - ≤100 ps typ.
Reflected Rise Time - ≤120 ps typ.
Aberrations after step =
Overshoot: <10%,
For the first 5 ns following step transition: < ± 8%,
5 ns to 20 ns following step transition: < ± 4%,
20 to 100 ns following step transition: < ± 2%.
Normalized aberrations - <1%
Repetition Rate - 10 µs to 2 ms.

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 40-ps TDR/TDT.
See UDX-G01 Data Sheet for details.

Calibrators
Vertical Calibrator —
Modes: DC, Pseudo-meander, or Off.
Adjustable Output Range: -1.0 V to +1.0 V terminated into 50 OHm.
Output Voltage Accuracy: ± 0.25 % of Output Voltage ± 1 mV.
Horizontal Calibrator —
Waveform: Square-Wave.
Polarity: Positive from ground.
Adjustable Period: 80 ns to 2 ms.
Period Accuracy: ± 0.01 % of Period.
Output Voltage: >700 mV terminated into 50 OHm.

DSO to PC Interface
Type - USB 2.0 (FS) or IEEE1284 (ECP mode)ю

Environmental Characteristics

Temperature - Operating: + 5°C to + 40°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
P/N 070796 —
UDS-2022 PC-Sampling Oscilloscope/TDR/TDT, 20 GHz, Dual Channel, Single-ended TDR.
   Includes:
Installation CD with Online Help.
USB 2.0 or Centronix cable (optional).
Power Cord (Universal Euro Power Plug 230 VAC, 50 Hz).
One year of return repair (sampling diodes replacement) and calibration service.

P/N 070791 —
UDS-2022 PC-Sampling Oscilloscope/TDR/TDT, 12 GHz, Dual Channel, Single-ended TDR.
   Includes:
Installation CD with Online Help.
USB 2.0 or Centronix cable (optional).
Power Cord (Universal Euro Power Plug 230 VAC, 50 Hz).
One year of return repair (sampling diodes replacement) and calibration service.