



EQUIPAMIENTO ESPECÍFICO LABORATORIOS PARA LA ETSI

Departamento

**ANEXO B Lote: B-31
OSCILOSCOPIOS**

Espacio

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Lote	Partid.	Equipos	Ud	Precio Ud	Precio	ETP104	ETP108	ETP109	ETP201
31	31.1	OSCILOSCOPIO DIGITAL	1	450,00	450,00	1			
31	31.2	OSCILOSCOPIO	10	645,60	6.456,03		10		
31	31.3	OSCILOSCOPIO DIGITAL/ANALIZADOR LÓGICO DE 100 MHZ	10	1.200,61	12.006,13			10	
31	31.4	OSCILOSCOPIO DIGITAL DE ALTA PRECISIÓN	10	2.271,43	22.714,29				10

Importe Lote B-31 (ANEXO B) (IVA Incluido)

41.626,44 €



ANEXO B Lote: B-31

OSCILOSCOPIOS

Características Técnicas

Partid.	Equipos	Ud
31.1	OSCILOSCOPIO DIGITAL Osciloscopio Digital 2 canales 70-100 MHz LCD-TFT 10V vertical Con interfaz USB, 1-5ns a 10s	1
31.2	OSCILOSCOPIO Osciloscopio Deberán contar, como mínimo, con las siguientes características: <ul style="list-style-type: none">• 2 canales de hasta 100 MHz.• Máxima velocidad de muestreo 2 GS/s.• Trigger externo.• Memoria: 1Mpts.• Conectividad USB 2.0.• Equivalente al modelo DSOX1102A de la serie 1000-X del fabricante Keysight Technologies	10
31.3	OSCILOSCOPIO DIGITAL/ANALIZADOR LÓGICO DE 100 MHZ Osciloscopio digital/Analizador lógico de 100 MHz Este dispositivo permitirá monitorización de señales, tanto digitales como analógicas, para verificar el correcto funcionamiento de los montajes realizados en el entrenador, y de los sistemas implementados en las diferentes tarjetas de desarrollo existentes en el laboratorio. Debe ser equivalente al RIGOL MSO1104Z-S. Debe poseer las siguientes características: <ul style="list-style-type: none">• Osciloscopio digital de 4 canales con un ancho de banda de 100MHz.• Analizador lógico integrado de 16 canales.• Generador de formas de onda de 2 canales para frecuencias de hasta 25MHz.• Velocidad de muestreo máxima 1GSa/s.• Escala vertical ajustable entre 1mV/div y 10V/div.• Profundidad de memoria de hasta 12 Mpts (24 Mpts opcional).• Velocidad de captura de ondas de hasta 30.000 wfms/s.	10



	<ul style="list-style-type: none">• Grabación y reproducción de hasta 60.000 cuadros de formas de onda en tiempo real (opcional).• Pantalla LCD TFT WVGA de 7" (800x480), con 64 niveles de intensidad.• Hasta 15 funciones de activación de disparo, incluidos varios protocolos de disparo.• Medida automática de 33 parámetros de las forma de onda, con estadísticas.• FFT incorporada con elección de funciones de ventana.• Función de test pass/fail.• Servicio de ayuda integrado.• Conectividad: USB host & device, LAN (LXI), salida AUX, (USB-GPIB, opcional).• Tamaño compacto• 4 sondas pasivas (150 MHz), 1 sonda para el analizador lógico, 2 cables BNC, 1 cable USB, cables de red con conectores británicos y europeos, y guía rápida.	
31.4	OSCILOSCOPIO DIGITAL DE ALTA PRECISIÓN Osciloscopio digital de alta precisión Dispondrá el equipo de al menos las siguientes características técnicas: Overview Analog channels 4 Bandwidth 70 MHz Sample rate 1 GS/s Record length 20 M points Vertical system analog channels Hardware bandwidth limits 20 MHz Input coupling DC, AC, or GND Input impedance $1\text{ M}\Omega \pm 2\%$, $11.5\text{ pF} \pm 2.5\text{ pF}$ Input sensitivity range 2 mV/Div to 5 V/Div Vertical resolution 8 bits Maximum input voltage, $1\text{ M}\Omega$ 300 V RMS with peaks $\leq \pm 450\text{ V}$ Acquisition modes Sample Acquire sampled values. Peak Detect Captures glitches as narrow as 3.5 ns at all sweep speeds. Average From 2 to 512 waveforms included in average. Roll Scrolls waveforms right to left across the screen at sweep speeds slower than or equal to 40 ms/div (400 ms/div at 20M record length). Math modes All units: Ch 1 - Ch 2 Ch 2 - Ch 1 Ch 1 + Ch 2 Ch 1 X Ch 2 FFT 4 channel units: Ch 3 - Ch 4 Ch 3 + Ch 4	10



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<p>Ch 4 - Ch 3 Ch 3 X Ch 4 DC balance $\pm (1 \text{ mV} + 0.1 \text{ div})$</p> <p>DC gain accuracy $\pm 3\%$ 10 mV/div through 5 V/div- $\pm 4\%$ typical 2 mV/div and 5 mV/div</p> <p>Vertical system analog channels DC voltage measurement accuracy average mode Average of 16 waveforms $\pm[(\text{DC Gain Accuracy}) \times \text{reading} - (\text{offset} - \text{position})$ + Offset Accuracy + 0.11 div + 1 mV)</p> <p>Delta Volts between any two averages of ≥ 16 waveforms acquired with the same oscilloscope setup and ambient conditions</p> <p>$\pm[(\text{DC Gain Accuracy} \times \text{reading} + 0.08 \text{ div} + 1.4 \text{ mV})$</p> <p>Vertical position range ± 5 divisions Vertical offset ranges</p> <p>Analog bandwidth, DC coupled 100 MHz models: DC to ≥ 100 MHz for 2 mV/div through 5 V/div. 70 MHz models: DC to ≥ 70 MHz for 2 mV/div through 5 V/div.</p> <p>Common mode rejection ratio (CMRR), typical</p> <p>100:1 at 60 Hz, reducing to 10:1 with 50 MHz sine wave with equal Volts/div and coupling settings on each channel.</p> <p>Horizontal system analog channels</p> <p>Maximum duration of time captured at highest sample rate (all channels)</p> <p>1 ms</p> <p>Time base range 2 ns/div to 100 sec/div Time-base delay time range -15 divisions to 5000 s</p> <p>Deskew range ± 100 ns Time base accuracy ± 25 ppm over any ≥ 1 ms interval</p> <p>Trigger system Trigger modes Auto, Normal, and Single Trigger holdoff range 20 ns to 8 s</p> <p>Trigger types Edge Positive or negative slope on any channel. Coupling includes DC, HF reject,</p>	
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LF reject, and noise reject.

Pulse width Trigger on width of positive or negative pulses that are $>$, $<$, $=$, or \neq a specified period of time.

Runt Trigger on a pulse that crosses one threshold but fails to cross a second threshold before crossing the first again.

Trigger coupling analog channels DC, Noise Reject, High Freq Reject, Low Freq Reject.

Data storage

Nonvolatile memory retention time, typical

No time limit for Front Panel Settings, saved waveforms, setups, and calibration constants.

Real-Time clock A programmable clock providing time in years, months, days, hours, minutes, and seconds.

Waveform measurements

Cursors Time, amplitude and screen.

Automated measurements 32, of which up to six can be displayed on-screen at any one time. Measurements include: Period, Frequency, Rise Time, Fall Time, Positive Duty Cycle, Negative Duty Cycle, Positive Pulse Width, Negative Pulse Width, Burst Width, Phase, Positive Overshoot, Negative Overshoot, Peak to Peak, Amplitude, High, Low, Max, Min, Mean, Cycle Mean, RMS, Cycle RMS, Positive Pulse Count, Negative Pulse Count, Rising Edge Count, Falling Edge Count, Area, Cycle Area, Delay FR, Delay FF, Delay FR, and Delay RR.

Gating Isolate the specific occurrence within an acquisition to take measurements on, using either the screen, between waveform cursors or full record length.

Waveform math

Arithmetic Add, subtract, and multiply waveforms.

FFT Spectral magnitude. Set FFT Vertical Scale to Linear RMS or dBV RMS, and FFT Window to Rectangular, Hamming, Hanning, or Blackman-Harris.

Remote control software

LXI web page LXI Core 2011. Built-in web page enables remote control of horizontal and vertical scale, trigger settings, and measurements.

Allows waveform and image save to USB flash drive.

Display system

Display type 9 inch (228 mm) wide format liquid crystal TFT color display.

Display resolution 800 horizontal by 480 vertical displayed pixels (WVGA).

Waveform styles Vectors, Variable Persistence, and Infinite Persistence.

Graticules Grid, None.



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<p>Format YT and XY. Input output ports USB 2.0 high-speed host port Supports USB mass storage devices, Wi-Fi dongle, One port available on rear panel and one on front panel. USB 2.0 high-speed device port Device port Rear-panel connector allows for communication/control of oscilloscope through USBTMC or GPIB with a TEK-USB-488. Compatible USB-WIFI dongles TBS2xxx USBWIFI option TEK-USB-WIFI accessory TP-LINK TL-WN823N, NETGEAR WNA1000M, WNA3100M LAN port (Ethernet) RJ-45 connector, supports 10/100BASE-T.</p> <p>Probe compensator Amplitude 5 V Frequency 1 kHz</p>	
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