

VXI Waveform Analyzers

TVS621 • TVS625 • TVS641 • TVS645



Features

- 5 GS/s Single-shot Sample Rate
- 1 GHz Bandwidth
- 8-Bit Vertical Resolution (256 Digitized Levels)
- Record Lengths to 15 K
- High Throughput for Waveform Transfers, Settings Changes, and Measurements
- Extensive and Flexible Waveform Processing and Measurements
- FFT, Integration, and Differentiation
- Digital Filtering – Highpass, Lowpass, Bandpass, and Band Reject
- Auto-advance Acquisitions with Time Stamping
- "C" Size VXI
- Message Based
- VXI *plug&play* WIN Framework



Applications

- Manufacturing Test
 - Computers and Peripherals
 - Mil – Aero ATE Systems
 - Functional Board, Hybrid and Component Testing
 - Avionics
 - System and Device Characterization
- Research and Development
 - EMP and Radiation Simulators
 - Pulsed Power Sources
 - Electronic Warfare
 - Radar
 - Lidar
 - Accelerators
 - Intelligence Data Collection
 - Laser Induced Phenomena



TVS600 Series

These high performance waveform acquisition and analysis products are optimized for VXI system applications, in order to deliver on the promise of VXI.

- High Performance
- High Throughput
- Compact Physical Size
- Optimized for System Applications
- High Performance to Price Ratio

The Tektronix TVS600 Series of VXI Waveform Analyzer products delivers on the improved system performance promises of VXI.

HIGH PERFORMANCE INSTRUMENTS

High performance starts with acquiring the waveform. The TVS600 Series provides fast transient or repetitive events capture, with both high time and amplitude resolution.

Supporting this high resolution waveform capture capability are high fidelity input signal conditioning and analog to digital conversion.

The instruments' hardware and firmware flexibility assure successful waveform capture, thus delivering on the VXI promises of high performance instrumentation.

HIGH THROUGHPUT

The choice of VXI is a first step towards achieving high throughput, but the key to achieving success is an instrument optimized for VXI. The TVS600 Series uses throughput tuned capabilities such as Fast Data Channel, firmware and instrument architecture, and hardware to deliver on the VXI throughput promise.

COMPACT PHYSICAL SIZE

The TVS600 Series VXI "C" size format allows for high functional density, delivering on these promises of VXI.

OPTIMIZED FOR SYSTEM APPLICATIONS

VXI is a system environment. The TVS600 Series products are designed as system products. The use of industry standards, the attention to high throughput requirements, and support for VXI *plug&play* are examples of the way the TVS600 Series delivers on these promises of VXI.

HIGH PERFORMANCE-TO-PRICE RATIO

Please explore the following instrument specifications and characteristics to determine how well Tektronix has met these promises of VXI.



See Tektronix on the World Wide Web:
<http://www.tek.com>



For product detail, request a VXI Catalog by completing the business reply card in the back of this catalog.

VXI Waveform Analyzers

TVS621 • TVS625 • TVS641 • TVS645

Characteristics

VERTICAL

Input Channels – Single ended BNCs with Tektronix TEKPROBE® Interface supporting Active, Passive, and Optical Probes. Multichannel acquisitions are acquired simultaneously.

TVS645: 4 acquisition channels
TVS641: 4 acquisition channels
TVS625: 2 acquisition channels
TVS621: 2 acquisition channels

Bandwidth – DC coupled.

TVS645 and TVS625:

Full Scale Input	Bandwidth
100 mV to 10 V	DC to 1 GHz
50 mV to 99.5 mV	DC to 900 MHz
20 mV to 49.8 mV	DC to 700 MHz
10 mV to 19.9 mV	DC to 500 MHz
10.1 V to 100 V	DC to 500 MHz

TVS641 and TVS621:

Full Scale Input	Bandwidth
10 mV to 100 V	DC to 250 MHz

Input Ranges – 10 mV to 100 V full scale in 1400 steps.

Vertical Resolution – 8 bits (256 digitized levels) Resolution can be increased with averaging or signal processing.

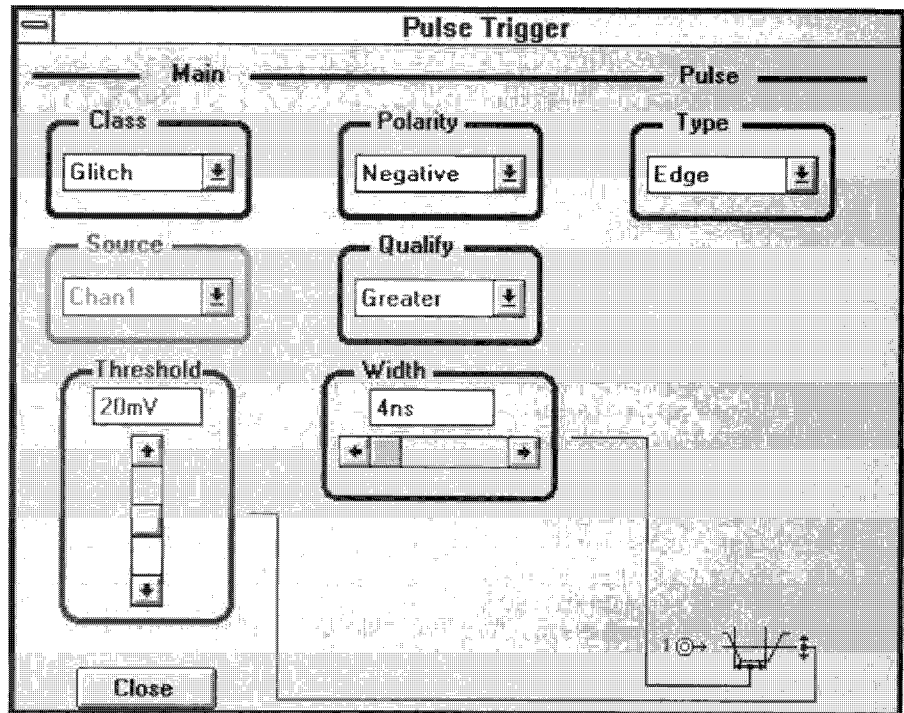
Input DC Gain Accuracy – 1.5% for input ranges ≥ 20 mV full scale. 2% for input ranges < 20 mV full scale.

Offset Range:

Full Scale Input	Offset Range
10 mV to 1 V	± 1 V
1.01 V to 10 V	± 10 V
10.1 V to 100 V	± 100 V

Offset Accuracy

10 mV to 1 V	$\pm(0.2\%$ offset setting + 1.5 mV + 0.6% full scale)
1.01 mV to 10 V	$\pm(0.2\%$ offset setting + 15 mV + 0.6% full scale)
10.1 V to 100 V	$\pm(0.2\%$ offset setting + 150 mV + 0.6% full scale)



TVS625/TVS645.

Input Impedance – 1M Ω – 50 Ω Switchable.

Input Coupling – DC, AC, or Off.

Input Noise Filter – Full, 250 MHz, and 20 MHz Bandwidth user selectable.

Delay Between Channels (at same input range and coupling) – ≤ 100 ps.

Fiducial Input – ≤ 2 ns rise time superimposed on channel 1 acquisition, for time aligning multiple acquisition units. AC coupled signal path. Highpass time constant 5 ns, attenuates signal below 100 MHz.

SAMPLE RATE

Maximum Single-shot

TVS645: 4 channels @ 5 GS/s
TVS641: 4 channels @ 1 GS/s
TVS625: 2 channels @ 5 GS/s
TVS621: 2 channels @ 1 GS/s

Real Time Acquisitions – From "Maximum Single-shot Sample Rate" to 5 samples per second in a 1, 2, 4 selection sequence.

Record Length Maximum –

TVS645: 4 channels to 15 K
TVS641: 4 channels to 15 K
TVS625: 2 channels to 15 K
TVS621: 2 channels to 15 K

30,000 points per channel for samples rates of 10 MS/s to 5 S/s.

Record Length Range – 256 points to maximum in sequence of 256, 512, 1024, 2048, 4096, 8192, 15000.

Internal Time Base Reference – 10 MHz ± 100 ppm.

External Time Base – 10 MHz over the VXI backplane CLK10 line.

Pre & Post Trigger Acquisition – Pre-trigger: (capture of data prior to the trigger event) 0% to $\approx 100\%$ of record length. Post-trigger: (capture of data after the trigger event) 0 seconds to 250 seconds.

Acquisition Modes – Normal, Average, Envelope, Auto-advance.

Auto-advance Acquisition – 1087 records of 256 points to 34 records of 15 K points. Each record is Time Stamped to 125 ns resolution.

TRIGGERING

Sources – Internal (any channel), external, or VXI TTL and ECL trigger bus.

Types – Main: Edge or Pulse (time qualified); Delayed; Delay by Time – 16 ns to 250 secs; Delay by Events – 1 to 10,000,000 events with a maximum rate of 250 MHz.

Modes – Normal, Single, or Auto.

Range Internal – $\pm 100\%$ of Full Scale Input Range settable in steps of 0.1%.



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Range External – ± 1 V settable in steps of 6 mV.

Sinewave Sensitivity Internal – 3.5% Full Scale DC to 50 MHz increasing to 10% Full Scale at 1 GHz.

Sinewave Sensitivity External – 0.25 V DC to 50 MHz increasing to 1 V at 1 GHz.

Trigger Coupling –

Internal: DC, AC, LF Reject, HF Reject, and Noise Reject. External: DC – 50 Ω .

Trigger Slope – positive or negative.

Pulse Triggering –

Width: Trigger event time either in or out (user selected) of user specified time window. Glitch: Trigger event either greater than or less than (user selected) of user specified time window. Minimum Trigger Event Width: 1 ns. Rearm Latency: 2 ns + 5% of setting. Range: 1 ns to 1 sec.

Arm Input – Internal, External, or from the VXI TTL or ECL trigger bus. External (front panel connector) is TTL compatible and arms on switch closure to ground or 0 V level. 1 K pull-up to +5 V provided.

OTHER FRONT PANEL CONNECTORS

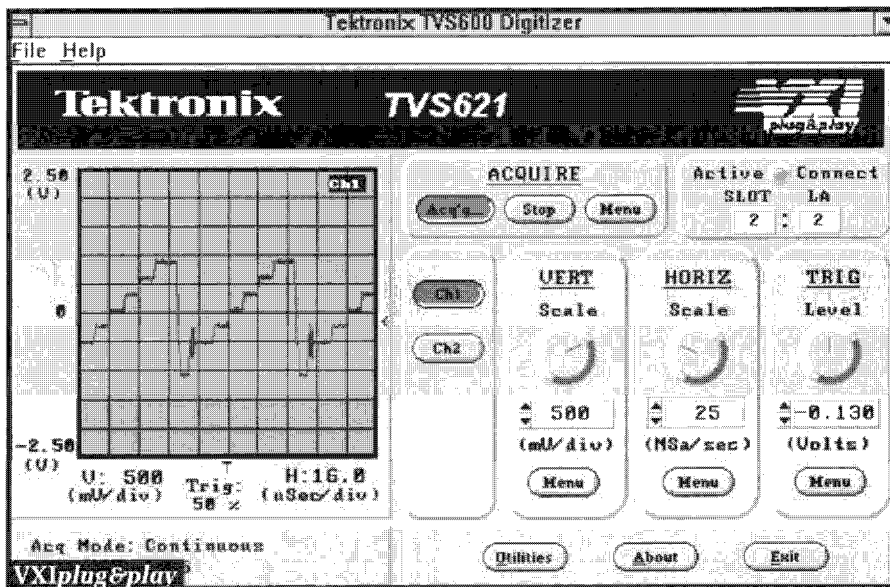
Probe Compensation – Allows adjusting passive probes for use with 1 M Ω input impedance.

Reference Output – Allows verifying accuracy of internal amplitude and time sources.

Serial Interface – RS-232C DTE Interface provides an alternative computer interface for instrument control and waveform data transfer.

Performance Assurance –

Auto-Cal with user verifiable references.
Tested to IEEE-1057 Standard for Digitizing Waveform Recorders.
3 year product warranty.
Environmentally rugged.



ENVIRONMENTAL, PHYSICAL AND SAFETY

VXI – "C" size, 2 slots wide.

Temperature – Operating: 0°C to +50°C.

Humidity – Operating: 95% relative (non-condensing) \leq 30°C, 45% relative to +50°C.

Vibration – Operating: Mil-T-28800E Type III Class 3.

Shock – Nonoperating – 60 g, 11 ms, half-sine, 3 shocks per side.

Altitude – Operating: to 4.6 km (15,000 ft.).

Airflow – 6.6 l/s at 0.078 mm H₂O for 10°C rise.

Current Requirements –

	TVS600
+12 V	1.1 A
+5 V	9.6 A
-2 V	0 A
-5.2 V	4.1 A
-12 V	0.9 A

Maximum Power – 98 Watts.

EMC

EMC performance in VXI mainframe dependent with testing for the TVS600 Series tested in a Tektronix VX1410 mainframe.

Emissions (complies with) – Enclosure: EN55022 Class B for radiated emissions; AC Mains: EN60555-2 for power line harmonics EN55022 Class B for conducted emissions.

Immunity – Complies with EN50082-1 (IEC 801-2).

Immunity ESD – Complies with EN50082-1 (IEC 801-2).

Immunity Fast Transient – Complies with EN50082-1 (IEC 801-4).

Compliance – Complies with VFG243, FCC CFR 47, Part 15 Subpart B, Class A, MIL-STD-461.

Safety – Complies with UL 1244, CSA 22.2 no. 231, and IEC 1010-1.

COMMAND SET

Message Based – SCPI (Standard Commands for Programmable Instruments).

Throughput Enhancements:

- Fast Data Channel for waveform and measurement transfers.
- 10 complete instrument settings stored in the instrument (battery backed-up).
- Low level (binary) settings query and return.
- Fast instrument settings changes.
- Acquisition and Waveform Data Transfer Looping.
- Auto Advance with Time Stamping.
- Waveform Measurements, Math, and Transforms executed in hardware DSP.
- Answers not just waveform data for further processing in the system computer.
- Instrument status signaling (e.g., operation complete, triggered, waveform data available) using the VXI TTL and ECL trigger bus.
- Waveform Math** – Between waveforms, or a waveform and a scalar.
Operators: Add, Subtract, Multiply, and Divide.

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Waveform Transforms –

Integrate.

Differentiate.

Smooth with user selected number of points.

FFT with user selection of 6 Window functions and scaling (e.g., linear, logarithmic).

Waveform Measurements –

Period	Frequency
High	Low
+ Width	– Width
Maximum	Minimum
Rise Time	Fall Time
Peak to Peak	Amplitude
+ Duty Cycle	– Duty Cycle
Mean	Cycle Mean
RMS	Cycle RMS
Area	Cycle Area
Mid	Standard Deviation

Measurement flexibility is provided through independent user selection of functions such as Base-Top method, and crossing levels for making rise time measurements.

Digital Filtering –

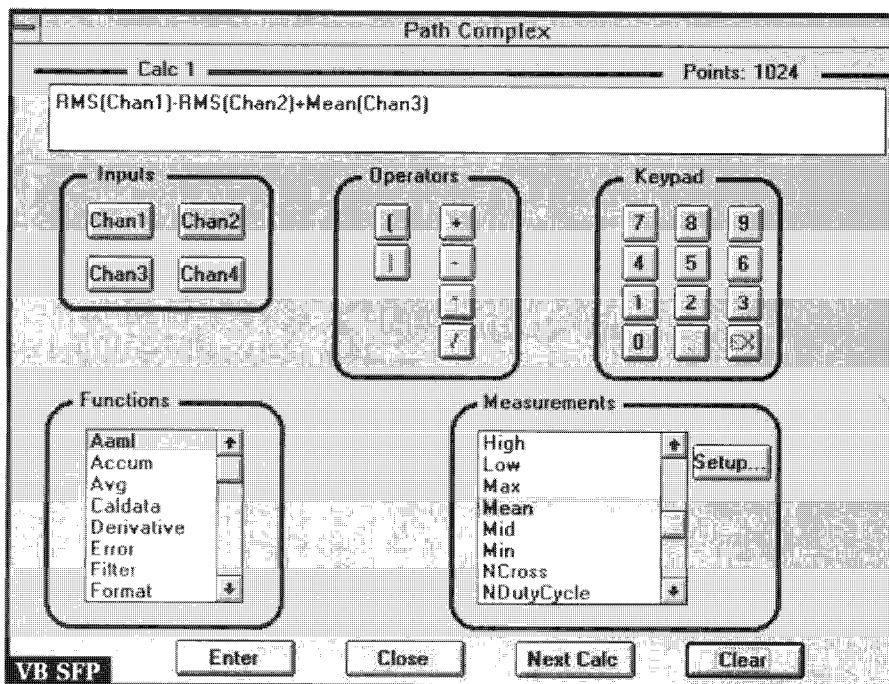
Lowpass

Highpass

Bandpass

Notch

User selection of start, stop, center frequency, span, stopband rejection, and transition width.



Processing Power – Waveform math, transforms, measurements, and digital filtering can be intermixed in an algebraic expression to act on acquired waveform data.

For example:

Rise time (Smooth (CH 1 * CH 2)).

VXI plug&play – The TVS600 Series is VXI plug&play WIN Framework compatible.

ORDERING INFORMATION

For price information: Outside the U.S. contact your local Tektronix representative. Inside the U.S. see the price list in the back of this catalog.

TVS645

4 channel, 1 GHz, 5 GS/s,
15 K Waveform Analyzer.

TVS641

4 channel, 1 GHz, 1 GS/s,
15 K Waveform Analyzer.

TVS625

2 channel, 1 GHz, 5 GS/s,
15 K Waveform Analyzer.

TVS621

2 channel, 1 GHz, 1 GS/s,
15 K Waveform Analyzer.

Each includes: User Manual, Quick Reference Guide, and plug&play WIN Framework software.

RECOMMENDED ACCESSORIES – Also see page 434.

PROBES

Active Probes –

750 MHz, 2pF/1M, 10X, 1.5 m. Order P6205.

1 GHz, 10X, 1.5 m. Order P6243.

1.5 GHz, 1pF/1M, 10X, 1.5 m. Order P6245.

Passive Probes –

500 MHz, 8pF/10M, 10X, 1.3 m.

Order P6139A.

500 MHz, 5pF/9.5M, 20X, 1.5 m.

For Fine Pitch/Surface Mount Devices.

Order P6563AS.

Differential Probes –

100 MHz, 10,000:1 CMRR, 1X/10X,

2 m. Order P6046.

100 MHz, –50 db CMRR, 50X/100X, Order P5205.

1 MHz, 100,000:1 CMRR, 1X/10X/100X.

Differential Amplifier. Order ADA400A.

High Voltage Probes –

2.5 kV, 250 MHz, 2.75 pF/10M, 100X,
Order P5100.

20 kV, 75 MHz, 3pF/100M, 1000X,
3.1 m. Order P6015A.

Word Recognizer Probes – 20 MHz,
17-Bit TTL, 40 ns word. Order P6408.

Current Probes, AC Only –

120 Hz to 60 MHz, 7.5 A peak, Order P6021.

965 kHz to 120 MHz, 3 A peak, Order P6022.

Current Probes, AC and DC –

DC to 50 MHz, 20 A DC/50 A Peak.

Order AMS03S.



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