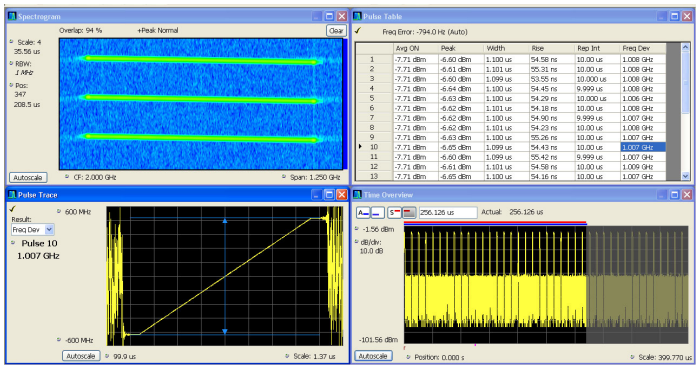
Vector Signal Analysis Software

SignalVu-PC Datasheet



Features & Benefits

- PC-based mutli-domain vector signal analysis for waveforms acquired by Tektronix Real-Time Signal Analyzers and Oscilloscopes
- Analyze without acquisition hardware present
- Free up instruments for further use while analysis is done offline
- Enable analysis at multiple sites without purchasing additional hardware
- Wide range of acquisition engines
  - Tektronix Real-Time and Mixed-Domain Oscilloscopes (MSO/DPO3000, MDO/MSO/DPO4000, MSO/DPO5000, DPO7000, DPO/DSA/MSO70000 Series)
  - Tektronix Real-Time Signal Analyzers (RSA3000, RSA5000, RSA6000 Series)
- Use your powerful PC workstation
  - Windows XP (32 bit) and Windows 7 (64 bit) versions available
- Analyze
  - Extensive time-correlated, multi-domain displays connect problems in time, frequency, phase, and amplitude for quicker understanding of cause and effect when troubleshooting
  - Power measurements and signal statistics help you characterize components and systems: ACLR, Multicarrier ACLR, Power vs. Time, CCDF, and OBW/EBW
  - AM/FM/PM Modulation and Audio Measurements (Option SVA) for characterization of analog transmitters and audio signals
  - Settling Time Measurements, Frequency, and Phase (Option SVT) for characterization of wideband frequency-agile oscillators
  - Advanced Signal Analysis Suite (Option SVP) – Automated pulse measurements including rise time, pulse width, and pulse-to-pulse phase provide deep insight into pulse train behavior
  - General Purpose Digital Modulation Analysis (Option SVM) provides modulation analysis of 23 modulation types
  - Flexible OFDM analysis (Option SVO) of 802.11a/g/j and WiMAX 802.16-2004 signals
  - Frequency offset control for analyzing baseband signals with near-zero intermediate frequencies (IF)

Applications

- Wideband Radar and Pulsed RF Signals
- Frequency Agile Communications
- Broadband Satellite and Microwave Backhaul Links
- Education

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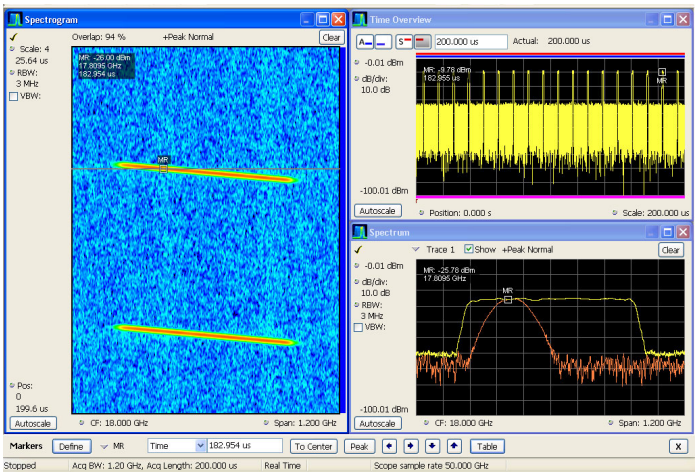


Once captured into memory, SignalVu provides detailed analysis in multiple domains. The spectrogram display (left panel) shows the frequency of an 800 MHz wide LFM pulse changing over time. By selecting the point in time in the spectrogram during the On time of the pulse, the chirp behavior can be seen as it sweeps from low to high (lower right panel).

SignalVu-PC Vector Signal Analysis Software for Oscilloscopes and Real-Time Signal Analyzers

Wideband Signal Characterization

SignalVu-PC vector signal analysis software helps you easily validate wideband designs and characterize wideband spectral events. Using the signal analysis engine of the RSA5000 and RSA6000 Series real-time signal analyzer on an external computer, you can now move your analysis of acquisitions off the instrument and onto your desktop. Whether your design validation needs include wideband radar, high data rate satellite links, or frequency-hopping communications, SignalVu-PC vector signal analysis software can speed your time-to-insight by showing you the time-variant behavior of these wideband signals.

Capture With a Variety of Tools

Capture once – make multiple measurements without recapturing. Using oscilloscopes, up to four channels can be captured simultaneously; each of which can be independently analyzed by SignalVu-PC software. Channels can be RF, I and Q, or differential inputs. Users can also apply math functions to the acquisition prior to analysis by SignalVu-PC. Acquisition lengths vary depending upon the selected capture bandwidth: full-bandwidth acquisitions can range from 1 ms to 25 ms depending upon model and option selections. Real-time signal analyzer captures range from up to 7.15 seconds at maximum acquisition bandwidth to several hours at reduced bandwidths.

Analyze

SignalVu-PC vector signal analysis software utilizes the same analysis capabilities found in the RSA5000 and RSA6000 Series real-time signal analyzers.

Time-correlated measurements can be made of frequency, phase, amplitude, and modulation versus time. This is ideal for signal analysis that includes frequency hopping, pulse characteristics, modulation switching, settling time, bandwidth changes, and intermittent signals.

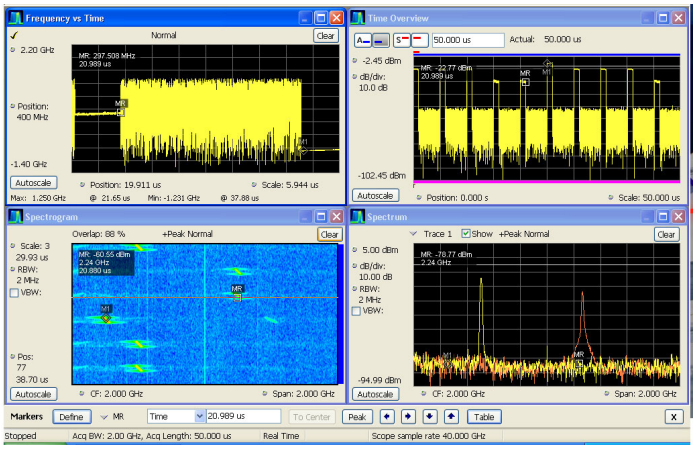
Acquisitions from all current Tektronix MDO/MSO/DPO Series oscilloscopes, including the spectrum analyzer in the mixed-domain oscilloscope can be analyzed with SignalVu-PC, adding deep analysis capabilities to these broadband acquisition systems. Signals acquired with RTSAs can also be analyzed with all of the same post-acquisition analysis capabilities as are present on the instruments.

Options Tailored for Your Wideband Applications

The basic SignalVu-PC enables spectrum analysis, RF power and statistics, spectrograms, amplitude, frequency and phase vs. time, and analog modulation measurements. Options are available for settling time, audio, modulation, pulse, and OFDM analysis.

Education License

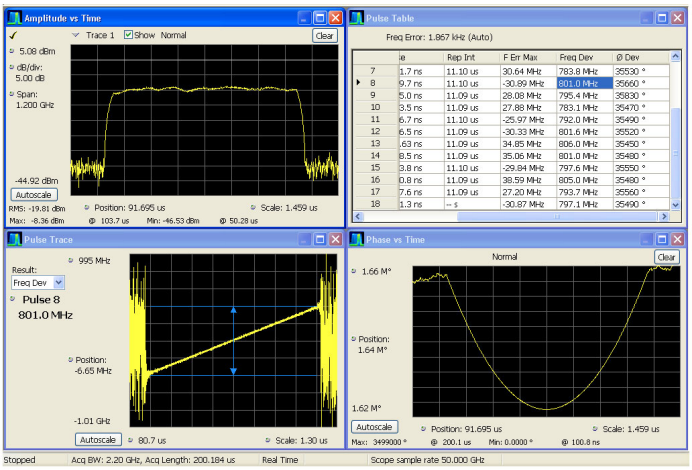
Qualified educational facilities can cost-effectively use SignalVu-PC in teaching environments. The specially priced education version includes all available analysis options standard and provides results watermarked 'Education Version'.



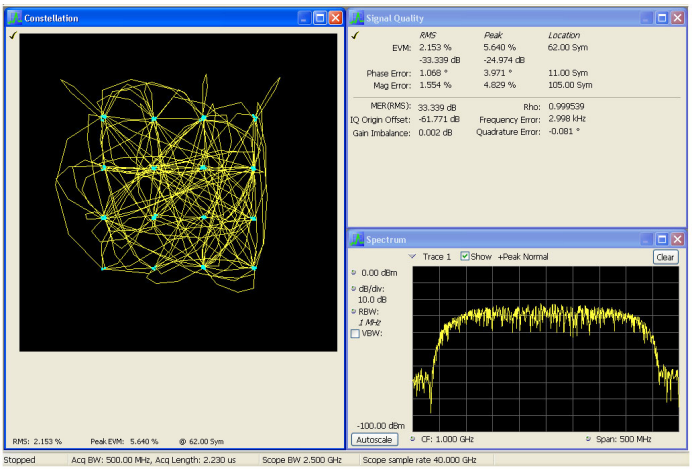
Time-correlated, multi-domain view provides a new level of insight into design or operational problems not possible with conventional analysis solutions. Here, the hop patterns of a narrowband signal can be observed using Spectrogram (lower left) and its hop characteristics can be precisely measured with Frequency vs, Time display (upper left). The time and frequency responses can be observed in the two right-hand views as the signal hops from one frequency to the next. All of the analysis shown above is available in the base version of SignalVu-PC.

Measurement Functions

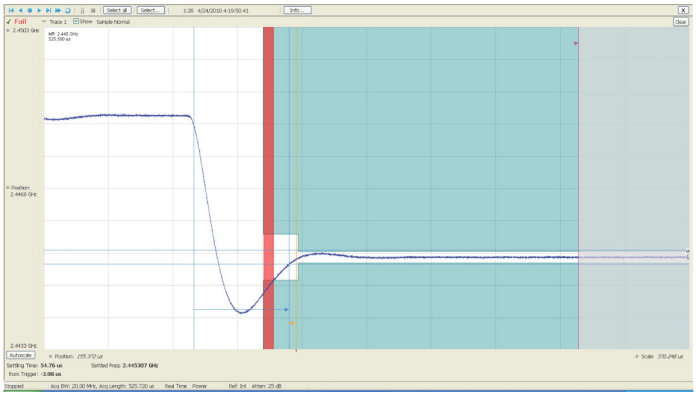
Measurements	Description
Spectrum Analyzer Measurements (Base Software)	Channel Power, Adjacent Channel Power, Multicarrier Adjacent Channel Power/Leakage Ratio, Occupied Bandwidth, xdB Down, dBm/Hz Marker, dBc/Hz Marker
Time Domain and Statistical Measurements (Base Software)	RF IQ vs. Time, Amplitude vs. Time, Power vs. Time, Frequency vs. Time, Phase vs. Time, CCDF, Peak-to-Average Ratio, Amplitude, Frequency, and Phase Modulation Analysis
AM/FM/PM Modulation and Audio Measurements (Option SVA)	Carrier Power, Frequency Error, Modulation Frequency, Modulation Parameters (±peak, peak-peak/2, RMS), SINAD, Modulation Distortion, S/N, THD, TNHD, Hum and Noise
Settling Time (Frequency and Phase) (Option SVT)	Measured Frequency, Settling Time from last settled frequency, Settling Time from last settled phase, Settling Time from Trigger. Automatic or manual reference frequency selection. User-adjustable measurement bandwidth, averaging, and smoothing. Pass/Fail Mask Testing with 3 user-settable zones
Advanced Signal Analysis (Option SVP)	Average On Power, Peak Power, Average Transmitted Power, Pulse Width, Rise Time, Fall Time, Repetition Interval (seconds), Repetition Interval (Hz), Duty Factor (%), Duty Factor (ratio), Ripple (dB), Ripple (%), Droop (dB), Droop (%), Overshoot (dB), Overshoot (%), Pulse-Pulse Frequency Difference, Pulse-Pulse Phase Difference, RMS Frequency Error, Max Frequency Error, RMS Phase Error, Max Phase Error, Frequency Deviation, Phase Deviation, Impulse Response (dB), Impulse Response (time), Time Stamp
Flexible OFDM Analysis (Option SVO)	OFDM analysis for WLAN 802.11a/g/j and WiMAX 802.16-2004. Constellation, Scalar Measurement Summary, EVM or Power vs. Carrier, Symbol Table (Binary or Hexadecimal)
General Purpose Digital Modulation Analysis (Option SVM)	Error Vector Magnitude (EVM) (RMS, Peak, EVM vs. Time), Modulation Error Ratio (MER), Magnitude Error (RMS, Peak, Mag Error vs. Time), Phase Error (RMS, Peak, Phase Error vs. Time), Origin Offset, Frequency Error, Gain Imbalance, Quadrature Error, Rho, Constellation, Symbol Table FSK only: Frequency Deviation, Symbol Timing Error



The Advanced Signal Analysis package (Option SVP) provides 27 individual measurements to automatically characterize long pulse trains. An 800 MHz wide LFM chirp centered at 18 GHz is seen here with measurements for pulses 7 through 18 (upper right). The shape of the pulse can be seen in the Amplitude vs. Time plot shown in the upper left. Detailed views of pulse #8's frequency deviation and parabolic phase trajectory are shown in the lower two views.



Wideband satellite and point-to-point microwave links can be directly observed with SignalVu analysis software. Here, General Purpose Digital Modulation Analysis (Option SVM) is demodulating a 16QAM backhaul link running at 312.5 MS/s.



Settling time measurements (Option SVT) are easy and automated. The user can select measurement bandwidth, tolerance bands, reference frequency (auto or manual), and establish up to 3 tolerance bands vs. time for Pass/Fail testing. Settling time may be referenced to external or internal trigger, and from the last settled frequency or phase. In the illustration, frequency settling time for a hopped oscillator is measured from an external trigger point from the device under test.

Characteristics (Typical)

The following is typical performance of SignalVu-PC analyzing acquisitions from any MSO/DPO5000, DPO7000, or DPO/DSA/MSO70000 Series oscilloscopes. Vector modulation analysis is provided for the MDO4000 spectrum analyzer acquisitions. All other MDO spectrum analysis specifications are available in the MDO4000 datasheet. No published performance is available for MSO/DPO3000/2000 and MDO4000 Series oscilloscope acquisitions.

Frequency Related

Characteristic	Description
Frequency Range	See appropriate oscilloscope datasheet
Initial Center Frequency Setting Accuracy	Equal to time-base accuracy of oscilloscope
Center Frequency Setting Resolution	0.1 Hz
Frequency Offset Range	0 Hz to the maximum bandwidth of the oscilloscope
Frequency Marker Readout Accuracy	±(Reference Frequency Error × Marker Frequency + 0.001 × Span + 2) Hz
Span Accuracy	±0.3%
Reference Frequency Error	Equal to oscilloscope reference frequency accuracy, aging, and drift. Refer to appropriate DPO/DSA/MSO/MDO datasheet

3rd Order Intermodulation Distortion*1

Center Frequency	MSO/DPO5000	DPO7000	DPO/DSA/ MSO70000
2 GHz	–38 dBc	–40 dBc	–55 dBc
10 GHz	—	—	–48 dBc
18 GHz	—	—	–50 dBc

*1 Conditions: Each signal level –5 dBm, reference level 0 dBm, 1 MHz tone separation. Math traces off. DPO7054/7104 and MSO/DPO5034/5054/5104 performance not listed.

Residual Responses*2

Characteristic	Description
DPO/DSA/ MSO70000 Series (All spans)	–60 dBm
DPO7000 Series (All spans)	–65 dBm
MSO/DPO5000 Series (All spans)	–70 dBm

*2 Conditions: RF input terminated, reference level 0 dBm, measurements made after specified oscilloscope warm-up and SPC calibration. Does not include zero Hz spur.

Displayed Average Noise Level*3

Span	MSO/DPO5000	DPO7000	DPO/DSA/ MSO70000
DC - 500 MHz	–94 dBm	–100 dBm	–103 dBm
>500 MHz - 3.5 GHz	—	–102 dBm	–103 dBm
>3.5 GHz - 14 GHz	—	—	–101 dBm
>14 GHz - 20 GHz	—	—	–88 dBm
>20 GHz - 25 GHz	—	—	–87 dBm
>25 GHz - 33 GHz	—	—	–85 dBm

*3 Conditions: RF input terminated, 10 kHz RBW, 100 averages, reference level –10 dBm, trace detection average. Measurements made after specified oscilloscope warm-up and SPC calibration. MSO/DPO5034 and MSO/DPO5054 performance not listed.

Acquisition Related

Maximum acquisition time will vary based on the oscilloscope's available memory and analog bandwidth. The following table highlights each model's single-channel capabilities given its maximum available memory configuration.

Model*[5]	Max Span	Max Acquisition Time at Max Sample Rate	Min RBW at Max Sample Rate	Min IQ Time Resolution	Max Number of FastFrames*[6]
DPO/DSA73304D	33 GHz	2.5 ms	1.2 kHz	20 ps	65,535
DPO/DSA72504D	25 GHz				
DPO/DSA/ MSO72004C	20 GHz				
DPO/DSA/ MSO71604C	16 GHz				
DPO/DSA/ MSO71254C	12.5 GHz				
DPO/DSA/ MSO70804C	8 GHz	5 ms	600 Hz	80 ps	
DPO/DSA/ MSO70604C	6 GHz				
DPO/DSA/ MSO70404C	4 GHz				
DPO7354C	3.5 GHz	12.5 ms	300 Hz	50 ps	
DPO7254C	2.5 GHz				
DPO7104C	1 GHz			100 ps	
DPO7054C	500 MHz				
MSO/DPO5204	2 GHz	25 ms	100 Hz	200 ps	
MSO/DPO5104	1 GHz				
MSO/DPO5054	500 MHz			400 ps	
MSO/DPO5034	350 MHz				
MDO4000 Spectrum Analyzer	≥1 GHz*[5]	10 ms	40 Hz	200 ps	Not Available
MSO/DPO/MDO4000	1 GHz	4 ms	557 Hz	2 ns	
MSO/DPO2000	200 MHz	1 ms	2.23 kHz	2 ns	
MSO/DPO3000	500 MHz	2 ms	1.11 kHz	800 ps	

*[5] With maximum available record length option, maximum bandwidth model, and maximum sample rate. The maximum span of the MDO4000 Series is based on the guaranteed real-time capture bandwidth at any measurement frequency. Maximum span when used as a spectrum analyzer is the entire frequency range of the instrument.

*[6] Maximum number of frames available will depend upon the oscilloscope's record length, sample rate, and the acquisition length settings.

Analysis Related

Displays by Domain	Views
Frequency (Base Software)	Spectrum (Amplitude vs. Linear or Log Frequency) Spectrogram (Amplitude vs. Frequency over Time)
Time and Statistics (Base Software)	Amplitude vs. Time Frequency vs. Time Phase vs. Time Amplitude Modulation vs. Time Frequency Modulation vs. Time Phase Modulation vs. Time RF IQ vs. Time Time Overview CCDF Peak-to-Average Ratio
Settling Time, Frequency, and Phase (Option SVT)	Frequency Settling vs. Time Phase Settling vs. Time
Advanced Measurements Suite (Option SVP)	Pulse Results Table Pulse Trace (Selectable by pulse number) Pulse Statistics (Trend of Pulse Results, FFT of Trend, and Histogram)
Digital Demod (Option SVM)	Constellation Diagram EVM vs. Time Symbol Table (Binary or Hexadecimal) Magnitude and Phase Error vs. Time, and Signal Quality Demodulated IQ vs. Time Eye Diagram Trellis Diagram Frequency Deviation vs. Time
Flexible OFDM (Option SVO)	EVM vs. Symbol, vs. Subcarrier Subcarrier Power vs. Symbol, vs. Subcarrier Subcarrier Constellation Symbol Data Table Mag Error vs. Symbol, vs. Subcarrier Phase Error vs. Symbol, vs. Subcarrier Channel Frequency Response

RF and Spectrum Analysis Performance

Bandwidth Related

Characteristic	Description
Resolution Bandwidth	
Resolution Bandwidth (Spectrum analysis)	1, 2, 3, 5 sequence, auto-coupled, or user selected (arbitrary)
Resolution Bandwidth Shape	Approximately Gaussian, shape factor 4.1:1 (60:3 dB) ±10%, typical
Resolution Bandwidth Accuracy	±1% (Auto-coupled RBW mode)
Alternative Resolution Bandwidth Types	Kaiser Window (RBW), –6 dB Mil, CISPR, Blackman-Harris 4B Window, Uniform Window (none), Flat-top Window (CW Ampl.), Hanning Window
Video Bandwidth	
Video Bandwidth Range	Dependent on oscilloscope record length setting. Approximately 500 Hz to 5 MHz
RBW/VBW Maximum	10,000:1
RBW/VBW Minimum	1:1
Resolution	5% of entered value
Accuracy (Typical)	±10%
Time Domain Bandwidth (Amplitude vs. Time Display)	
Time Domain Bandwidth Range	At least 1/2 to 1/10,000 of acquisition bandwidth
Time Domain BW Shape	Approximately Gaussian, shape factor 4.1:1(60:3 dB), ±10% typical
	Shape factor <2.5:1 (60:3 dB) typical for all bandwidths
Time Domain Bandwidth Accuracy	±10%

Spectrum Display Traces, Detectors, and Functions

Characteristic	Description
Traces	Three traces + 1 math trace + 1 trace from spectrogram for spectrum display
Detector	Peak, –peak, average, CISPR peak
Trace Functions	Normal, Average, Max Hold, Min Hold
Spectrum Trace Length	801, 2401, 4001, 8001, or 10401 points

AM/FM/PM Modulation and Audio Measurements (Option SVA)*7

Characteristic	Description
Analog Demodulation	
Carrier Frequency Range	1 kHz or (1/2 × Audio Analysis Bandwidth) to maximum input frequency*8
Maximum Audio Frequency Span	10 MHz*8
Audio Filters	
Low Pass (kHz)	0.3, 3, 15, 30, 80, 300, and user-entered up to 0.9 × audio bandwidth
High Pass (Hz)	20, 50, 300, 400, and user-entered up to 0.9 × audio bandwidth
Standard	CCITT, C-Message
De-emphasis (µs)	25, 50, 75, 750, and user-entered
File	User-supplied .TXT or .CSV file of amplitude/frequency pairs. Maximum 1000 pairs
FM Modulation Analysis	
FM Measurements Dev./(Mod. Rate) > 0.1	Carrier Power, Carrier Frequency Error, Audio Frequency, Deviation (+peak, –peak, peak-peak/2, RMS), SINAD, Modulation Distortion, S/N, Total Harmonic Distortion, Total Non-harmonic Distortion, Hum and Noise
FM Deviation Accuracy (Rate: 1 kHz, Deviation: 1 kHz to 100 kHz)	±1.5% of deviation
FM Rate Accuracy (Rate: 1 kHz to 100 kHz, Deviation: 1 kHz to 100 kHz)	±1.0 Hz
Carrier Frequency Accuracy (Deviation: 1 kHz to 10 kHz)	±1 Hz + (transmitter frequency × reference frequency error)
Residuals (FM) (Rate: 1 kHz to 10 kHz, Deviation: 5 kHz)	
THD	0.2% (7000, 70000 Series) 1.0% (5000 Series)
SINAD	44 dB (7000, 70000 Series) 38 dB (5000 Series)
AM Modulation Analysis	
AM Measurements	Carrier Power, Audio Frequency, Modulation Depth (+peak, –peak, peak-peak/2), RMS, SINAD, Modulation Distortion, S/N, Total Harmonic Distortion, Total Non-harmonic Distortion, Hum and Noise
AM Depth Accuracy (Rate: 1 kHz, Depth: 50%)	±1% + 0.01 × measured value
AM Rate Accuracy (Rate: 1 kHz, Depth: 50%)	±1.0 Hz
Residuals (AM)	
THD	0.3% (7000, 70000 Series) 1.0% (5000 Series)
SINAD	48 dB (7000, 70000 Series) 43 dB (5000 Series)
PM Modulation Analysis	
PM Measurements	Carrier Power, Carrier Frequency Error, Audio Frequency, Deviation (+peak, –peak, peak-peak/2, RMS), SINAD, Modulation Distortion, S/N, Total Harmonic Distortion, Total Non-harmonic Distortion, Hum and Noise
PM Deviation Accuracy (Rate: 1 kHz, Deviation: 0.628 rad)	±100% × (0.01 + (rate / 1 MHz))
PM Rate Accuracy (Rate: 1 kHz, Deviation: 0.628 rad)	±1 Hz
Residuals (PM)	
THD	0.1% (7000, 70000 Series) 0.5% (5000 Series)
SINAD	48 dB (7000, 70000 Series) 43 dB (5000 Series)
Direct Audio Input	
Audio Measurements	Signal Power, Audio Frequency (+peak, –peak, peak-peak/2, RMS), SINAD, Modulation Distortion, S/N, Total Harmonic Distortion, Total Non-harmonic Distortion, Hum and Noise
Direct Input Frequency Range (for audio measurements only)	1 Hz to 10 MHz
Maximum Audio Frequency Span	10 MHz
Audio Frequency Accuracy	±1 Hz
Residuals (PM)	
THD	1.5%
SINAD	38 dB

*7 All published performance based on conditions of Input Signal: 0 dBm, Input Frequency: 100 MHz, RBW: Auto, Averaging: Off, Filters: Off. Sampling and input parameters optimized for best results.

*8 Sampling rates of the oscilloscope are recommended to be adjusted to no more than 10X the audio carrier frequency for modulated signals, and 10X the audio analysis bandwidth for direct input audio. This reduces the length of acquisition required for narrow-band audio analysis.

Minimum Audio Analysis Bandwidth and RBW vs. Oscilloscope Memory and Sample Rate (Option SVA)

Model	Sample Rate: 1 GS/s				Sample Rate: Maximum			
	Standard Memory		Maximum Memory		Standard Memory		Maximum Memory	
	Min. Aud. BW	RBW (Auto)	Min. Aud. BW	RBW (Auto)	Min. Aud. BW	RBW (Auto)	Min. Aud. BW	RBW (Auto)
MSO/DPO5034 MSO/DPO5054	200 kHz	400 Hz	20 kHz	40 Hz	1 MHz	2 kHz	100 kHz	200 Hz
MSO/DPO5104 MSO/DPO5204	100 kHz	200 Hz	10 kHz	20 Hz	1 MHz	2 kHz	100 kHz	200 Hz
DPO7000	50 kHz	100 Hz	50 kHz	100 Hz	2 MHz	4 kHz	2 MHz	4 kHz
DPO/DSA/ MSO70000 ≥12.5 GHz BW	200 kHz	400 Hz	10 kHz	20 Hz	Not recommended	>4 kHz	1 MHz	2 kHz
DPO/DSA/ MSO70000 <12.5 GHz BW	200 kHz	400 Hz	20 kHz	40 Hz	Not recommended	>4 kHz	500 kHz	1 kHz

Settling Time, Frequency, and Phase (Option SVT)*9

Settled Frequency Uncertainty, 95% Confidence (Typical), at Stated Measurement Frequencies, Bandwidths, and # of Averages

Measurement Frequency, Averages	Frequency Uncertainty at Stated Measurement Bandwidth			
	1 GHz	100 MHz	10 MHz	1 MHz
1 GHz				
Single Measurement	20 kHz	2 kHz	500 Hz	100 Hz
100 Averages	10 kHz	500 Hz	200 Hz	50 Hz
1000 Averages	2 kHz	200 Hz	50 Hz	10 Hz
9 GHz				
Single Measurement	20 kHz	5 kHz	2 kHz	200 Hz
100 Averages	10 kHz	2 kHz	500 Hz	50 Hz
1000 Averages	2 kHz	500 Hz	200 Hz	20 Hz

Settled Phase Uncertainty, 95% Confidence (Typical), at Stated Measurement Frequencies, Bandwidths, and # of Averages

Measurement Frequency, Averages	Phase Uncertainty at Stated Measurement Bandwidth			
	1 GHz	100 MHz	10 MHz	1 MHz
1 GHz				
Single Measurement	2°	2°	2°	2°
100 Averages	0.5°	0.5°	0.5°	0.5°
1000 Averages	0.2°	0.2°	0.2°	0.2°
9 GHz				
Single Measurement	5°	5°	5°	5°
100 Averages	2°	2°	2°	2°
1000 Averages	0.5°	0.5°	0.5°	0.5°

*9 Settled Frequency or Phase at the measurement frequency. Measured signal level > –20 dBm, Attenuator: Auto.

Advanced Measurement Suite (Option SVP)

Characteristic	Description
Measurements	Average On Power, Peak Power, Average Transmitted Power, Pulse Width, Rise Time, Fall Time, Repetition Interval (seconds), Repetition Interval (Hz), Duty Factor (%), Duty Factor (ratio), Ripple (dB), Ripple (%), Droop (dB), Droop (%), Overshoot (dB), Overshoot (%), Pulse-Pulse Frequency Difference, Pulse-Pulse Phase Difference, RMS Frequency Error, Max Frequency Error, RMS Phase Error, Max Phase Error, Frequency Deviation, Phase Deviation, Impulse Response (dB), Impulse Response (time), Time Stamp
Number of Pulses	1 to 10,000
System Rise Time (Typical)	Equal to oscilloscope rise time

Minimum Pulse Width for Detection*10

Model	Minimum PW
DPO/DSA72004B MSO72004	400 ps
DPO/DSA71604B MSO71604	500 ps
DPO/DSA71254B MSO71254	640 ps
DPO/DSA70804B MSO70804	1 ns
DPO/DSA70604B MSO70604	1.3 ns
DPO/DSA70404B MSO70404	2 ns
DPO7354	2.25 ns
DPO7254	3 ns
DPO7104	8 ns
DPO7054	16 ns
MSO/DPO5204	4 ns
MSO/DPO5104	8 ns
MSO/DPO5054	16 ns
MSO/DPO5034	25 ns

*10 Conditions: Approximately equal to 10/(IQ sampling rate). IQ sampling rate is the final sample rate after digital down conversion from the oscilloscope. Pulse measurement filter set to max bandwidth.

Pulse Measurement Accuracy*11

Measurement	Accuracy (Typical)
Average On Power	±0.3 dB + Absolute Amplitude Accuracy of oscilloscope
Average Transmitted Power	±0.4 dB + Absolute Amplitude Accuracy of oscilloscope
Peak Power	±0.4 dB + Absolute Amplitude Accuracy of oscilloscope
Pulse Width	±(3% of reading + 0.5 × sample period)
Pulse Repetition Rate	±(3% of reading + 0.5 × sample period)

*11 Conditions: Pulse Width > 450 ns, S/N Ratio ≥30 dB, Duty Cycle 0.5 to 0.001, Temperature 18 °C to 28 °C.

Digital Modulation Analysis (Option SVM)

Characteristic	Description
Modulation Formats	π/2DBPSK, BPSK, SBPSK, QPSK, DQPSK, π/4DQPSK, D8PSK, 8PSK, OQPSK, SOQPSK, CPM, 16/32/64/128/256QAM, MSK, GMSK, GFSK, 2-FSK, 4-FSK, 8-FSK, 16-FSK, C4FM
Analysis Period	Up to 80,000 Samples
Filter Types	
Measurement filters	Square-root raised cosine, raised cosine, Gaussian, rectangular, IS-95, IS-95 EQ, C4FM-P25, half-sine, None, User Defined
Reference filters	Raised cosine, Gaussian, rectangular, IS-95, SBPSK-MIL, SOQPSK-MIL, SOQPSK-ARTM, None, User Defined
Alpha/B × T Range	0.001 to 1, 0.001 step
Measurements	Constellation, Error Vector Magnitude (EVM) vs. Time, Modulation Error Ratio (MER), Magnitude Error vs. Time, Phase Error vs. Time, Signal Quality, Symbol Table, rho FSK only: Frequency Deviation, Symbol Timing Error
Symbol Rate Range	1 kS/s to (0.4 * Sample Rate) GS/s (Modulated signal must be contained entirely within the acquisition bandwidth)

Adaptive Equalizer

Characteristic	Description
Type	Linear, decision-directed, feed-forward (FIR) equalizer with coefficient adaptation and adjustable convergence rate
Modulation Types Supported	π/2 DBPSK, BPSK, SBPSK, QPSK, DQPSK, π/4 DQPSK, D8PSK, 8PSK, D16PSK, OQPSK, SOQPSK, CPM, 16/32/64/128/256QAM, MSK, 2-FSK, 4-FSK, 8-FSK, 16-FSK, C4FM
Reference Filters for All Modulation Types except OQPSK	Raised Cosine, Rectangular, None
Reference Filters for OQPSK	Raised Cosine, Half Sine
Filter Length	1-128 taps
Taps/Symbol: Raised Cosine, Half Sine, No Filter	1, 2, 4, 8
Taps/Symbol: Rectangular Filter	1
Equalizer Controls	Off, Train, Hold, Reset

16QAM Residual EVM (Typical)*[12] for DPO7000 and DPO/DSA/MSO70000 Series

Symbol Rate	RF	IQ
100 MS/s	<2.0%	<2.0%
312.5 MS/s	<3.0%	<3.0%

*[12] CF = 1 GHz, Measurement Filter = root raised cosine, Reference Filter = raised cosine, Analysis Length = 200 symbols.

16QAM Residual EVM (Typical)*[13] for MSO/DPO5000 Series

Symbol Rate	RF	IQ
10 MS/s	1.5%	1.0%
100 MS/s	4.0%	2.0%

*[13] Carrier frequency 700 MHz. MSO/DPO5054 and MSO/DPO5034 performance not listed. Use of external reference may degrade EVM performance.

16QAM Residual EVM (Typical) for MDO RF Input*[14]

Symbol Rate	Carrier Frequency		
	1 GHz	2.4 GHz	5.8 GHz
10 MS/s	1.0%	2.0%	3.5%

*[14] Measurement Filter = root raised cosine, Reference Filter = raised cosine, Analysis Length = 200 symbols.

OFDM Residual EVM, 802.11g Signal at 2.4 GHz

Characteristic	DPO7000 Series	DPO/DSA/ MSO70000 Series	MDO4000 RF Channel
Input Level Optimized for Best Performance	–33 dB	–38 dB	–37 dB

General Characteristics

Characteristic	Description
Programmatic Interface	SCPI-compliant command set. Requires installation of Tektronix Virtual Instrument Software Architecture (VISA) drivers

System Requirements

Characteristic	Description
Operating Systems	Windows 7 Service Pack 1 x86 or x64 Windows XP Service Pack 3 x86
Disk Space	6 GB free on C: drive
RAM	1 GB (4 GB recommended)

Instruments and File Types Supported

Instrument Family	File Type				
	.WFM	.ISF	.TIQ	.IQT	.MAT
Oscilloscopes					
Performance: MSO/DPO5000 DPO7000 DPO/DSA/MSO70000	X		X*[15]		
Mixed-domain: MDO4000		X	X*[16]		
Bench: MSO/DPO2000/3000 MSO/DPO4000		X			
Real-Time Signal Analyzers					
RSA3000				X	
RSA5000/6000			X		X
Other					
Third-party waveforms in MATLAB Level 5 format					X

*[15] .TIQ files can be created on performance oscilloscopes with SignalVu installed. SignalVu is a separate product from SignalVu-PC.

*[16] The MDO RF channel saves waveforms in the .TIQ format. MDO oscilloscope waveforms are stored in .ISF format.

SignalVu-PC vs. SignalVu

SignalVu for oscilloscopes is a separate product made to run directly on Tektronix performance oscilloscopes. SignalVu directly controls the acquisition settings of the oscilloscopes and automatically transfers data from the oscilloscope acquisition channel to the SignalVu software.

SignalVu-PC runs on a separate PC. Files from oscilloscopes and signal analyzers can be opened and analyzed. SignalVu-PC does not communicate with the acquisition instrument or control its acquisition settings.

Ordering Information

SignalVu-PC Vector Signal Analysis Software is compatible with Windows XP (x86, 32 bit) and Windows 7 (x86/x64, 32 or 64 bit). SignalVu-PC SVE is the base product for SignalVu-PC and is required for all options. SignalVu-PCEDU is a separate version that includes all options for educational institutions.

All SignalVu-PC Orders Include: Software CD with all versions of software. Printable help files are included on the CD. Activation keys are included in hard copy form and through e-mail. You can choose to have all information delivered electronically by choosing the 'NO SHIP' option. If 'NO SHIP' is ordered, all information from the software CD is downloaded from Tek.com, and activation keys are e-mailed.

Purchasing, Licensing, and Activation

SignalVu-PC is available for download at www.tek.com/SignalVu-PC. Purchasers can specify whether to receive the software and activation keys electronically or through physical media. Purchasers of SignalVu-PC receive activation codes for the base software and each option purchased. Activation of purchased licenses requires internet access. In secure applications, activation can be performed on an internet-enabled PC and applied to a secure PC without internet access. SignalVu-PCEDU education licenses require internet access by the PC on which they are installed.

Licensing is perpetual and no maintenance contract is offered or required. Licenses can be deactivated and re-applied to a new PC should you need to move the software.

Owners of SignalVu-PC and SignalVu-PCEDU can download any bug fixes or enhancements to existing products free of charge. New options with new measurements may become available and upgrades can be purchased to add the new functionality.

Demonstration Version of SignalVu-PC

SignalVu-PC demonstration software is available at www.tek.com/SignalVu-PC. Demonstration licenses can be activated immediately with no internet connection required and are valid for 30 days after activation.

SignalVu-PC-SVE Vector Signal Analysis Software

Option	Description (SignalVu-PC-SVE required)
SVP	Advanced Signal Analysis (including pulse measurements)
SVM	General Purpose Digital Modulation Analysis
SVT	Settling Time, Frequency, and Phase
SVO	Flexible OFDM with support for 802.11a/j/g and 802.16-2044 (fixed WiMAX) modulation types
SVA	AM/FM/PM Modulation and Audio Measurements
SHIP	Activation keys, software CD, and instructions shipped in hard copy. Activation keys are also e-mailed
NO SHIP	Software and support materials are downloaded from Tek.com and activation keys are e-mailed

SignalVu-PCEDU Vector Signal Analysis Software, Education Version

Option	Description (SignalVu-PCEDU required)
SHIP	Activation keys, software CD, and instructions shipped in hard copy. Activation keys are also e-mailed
NO SHIP	Software and support materials are downloaded from Tek.com and activation keys are e-mailed

SVPCUP SignalVu-PC Upgrades

Option	Description (SignalVu-PC-SVE required)
SVP	Advanced Signal Analysis (including pulse measurements)
SVM	General Purpose Digital Modulation Analysis
SVT	Settling Time, Frequency, and Phase
SVO	Flexible OFDM with support for 802.11a/j/g and 802.16-2044 (fixed WiMAX) modulation types
SVA	AM/FM/PM Modulation and Audio Measurements
SHIP	Activation keys, software CD, and instructions shipped in hard copy. Activation keys are also e-mailed
NO SHIP	Software and support materials are downloaded from Tek.com and activation keys are e-mailed

CE

Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.

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For Further Information. Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit **www.tektronix.com**

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