Tektronix®

RSA7100A

RSA7100A 스펙트럼 분석기 데이터 시트

* Monitor not included.

RSA7100A 광대역 신호 분석기는 최대 800MHz 대역폭까지 실시간 스펙트럼 분석을 제공하고, 여러 인터페이스로 동시 스트리밍하여 기록 (최대 2 시간)하며 완벽한 대역폭에서 끊김 없는 데이터를 재생할 수 있습니다.

주요특징

- 16kHz ~ 14 / 26.5GHz 주파수 범위는 광범위한 분석 요구를 충족합니다.
- 1GHz에서 -134dBc / Hz 위상 노이즈, 10kHz 오프셋 및 10GHz에서 0.5dB의 일반적인 진폭 정확도로 고급 설계 검증을 위한 고성능 스펙트럼 분석
- 표준320 MHz 실시간 대역폭; 3.6GHz까지 표준 내부 프리앰프
- 업계 최고의 실시간 성능 : 전체 신호 레벨에서 100 % 인터셉트 가능성에 대해 419 nsec
- 고급레이더,통신 및 스펙트럼 관리요구사항을 위해 3.6GHz 이상의 주파수에서 800MHz 수집 대역폭 사용 가능
- 시간 영역에서 4ns, 주파수 영역에서 700ns의 이벤트에 대한 실시간 트리거는 매번 관심 신호를 처음으로 포착합니다.
- IQFlowTM는 장치에서 RAID 및 40GbE를 포함한 하나 이상의 클라이언트로 IQ 데이터를 지속적으로 스트리밍 하고 실시간 DSP 알고리즘을 수행하고 긴 이벤트 시퀀스를 기록 / 분석하는 데 필요한 속도와 유연성을 제공하는 API를 제공합니다.
- 2 시간 이상의 내부 RAID로 스트리밍 캡처 (최대 전체 800MHz 대역폭에서 2.75 시간) 환경 기록 및 긴 이벤트 시퀀스 분석 가능 모든 길이의 기록 된 이벤트를 분석하기 위한 DataVu-PC 소프트웨어에는 관심 있는 이벤트를 표시하고 다른 파형으로 파형을 내보내는 기능이 포함됩니다 PDW (Pulse Descriptor
- 녹화 이벤트의 실시간 모니터링을 위한 동시 스트리밍 및 실시간 분석으로 필요한 데이터를 얻을 수 있습니다
- 데드 타임이 제거 된 효율적인 고속 프레임 캡처로 메모리 및 분석을 최적화하여 더 긴 테스트 시퀀스를 분석 할 수 있습니다.
- DPX 스펙트럼 / 스펙트로그램으로 표준 실시간 스펙트럼 분석으로 과도 현상 및 간섭을 찾는 시간을 최소화
- 채널 전력, ACLR, CCDF, OBW / EBW, 스퓨리어스 검색 및 진폭 / 주파수 / 위상을 포함한 표준 측정은 개발 작업을 위한 완벽한 툴 세트를 제공합니다.
- SignalVu-PC 용 애플리케이션 라이센스를 통해 변조, 펄스, WLAN, 위상 노이즈 및 주파수 / 위상 안정화 측정을 포함한 다양한 분석을 제공 할 수 있습니다.
- 이벤트의 정확한 타임 스탬핑을 위해 사용 가능한 내부 GPS 수신기; 타이밍 기준 소스에는 GPS, IRIG-B AM, IRIG-B DC 및 1PPS가 포함됩니다.

응용 분야

- 고급 레이더 / EW 설계 평가
- 환경 평가, 모니터링 및 기록
- 광대역 통신 설계
- 스펙트럼 관리

RSA7100A는 새로운 솔루션을 상상할 수 있는 성능을 갖추었습니다

RSA7100A는 광대역 분석 및 신호 기록에 중점을 둔 고성능 스펙트럼 분석기입니다. 컴퓨팅 엔진에서 RF 획득을 분리함으로써, 실시간 처리를 위해 이전에 필요했던 FPGA 설계 대신 그래픽 프로세서를 사용할 수 있습니다. 프로세서 기능이 향상됨에 따라 RF 하드웨어 교체 대신 PC 업그레이드를 통해 시스템의 새로운 성능을 쉽게 유지할 수 있으므로 RSA7100A는 장기 비용을 최소화하기 위한 현명한 선택입니다. 계측기를 강력한 워크 스테이션으로 사용하여 자체 시뮬레이션 및 설계에서 이 CPU/GPU 조합의 성능을 활용할 수도 있습니다.

RSA7100A는 통신, 레이더 및 전자전에서 최신 광대역 설계를 수행하는 엔지니어와 현장 및 운영 시 새로운 광대역 시스템의 효과를 확인해야 하는 스펙트럼 관리자를 위해 설계되었습니다.
신호 분석은 두 가지 소프트웨어 패키지로 가능합니다. 실시간, 스펙트럼 및 벡터 신호 분석을위한 SignalVu-PC 및 광대역 신호를 기록 할 때 생성되는 매우 큰 파일 세트 분석을 위한 DataVu-PC.

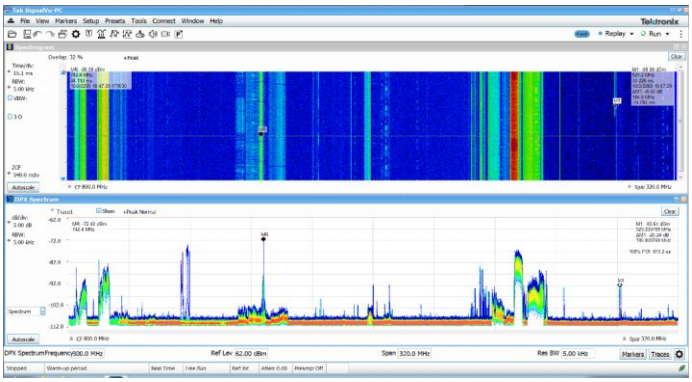
풍부한 분석 기능을 제공하는 SignalVu-PC 소프트웨어

RSA7100은 Tek의 기존 스펙트럼 분석기의 기초로 사용되는 강력한 프로그램 인 SignalVu-PC와 함께 작동합니다. SignalVu-PC는 실시간 스펙트럼 분석 및 다양한 애플리케이션 패키지를 포함한 심층 분석 기능을 제공합니다. DPX® 스펙트럼 / 스펙트로그램의 실시간 처리가 PC에서 가능 해져 하드웨어 비용이 더욱 줄어 듭니다. SignalVu-PC에 대한 프로그래밍 인터페이스가 제공되어 모든 측정 및 설정을 외부 프로그램에 제공합니다. 무료 SignalVu-PC 프로그램의 기본 기능은 기본 기능과는 거리가 있으며 아래에 표시된 측정 값이 포함되어 있습니다.

SignalVu-PC 기본 버전에 포함된 측정 및 기능

General signal analysis	**Description**
Spectrum analyzer	Spans from 100 Hz to full range of the instrument, 3 traces + math and spectrogram trace, 5 markers with power, relative power, integrated power, power density and dBc/Hz functions
DPX spectrum/spectrogram	Real time display of spectrum with 100% probability of intercept of up to 419 nsec signals in up to 800 MHz span
Amplitude, frequency, phase vs. time, RF I and Q vs. time	Basic vector analysis functions
Time Overview/Navigator	Enables easy setting of acquisition and analysis times for deep analysis in multiple domains
Spectrogram	Analyze and re-analyze your signal in 2-D or 3-D waterfall display
Analog modulation analysis	**Description**
AM, FM, PM analysis	Measures key AM, FM, PM parameters
RF measurements	**Description**
Spurious measurement	User-defined limit lines and regions provide automatic spectrum violation testing across the entire range of the instrument.
Spectrum emission mask	User-set or standards-specific masks.
Occupied bandwidth	Measures 99% power, -xdB down points.
Channel power and ACLR	Variable channel and adjacent/alternate channel parameters.
MCPR	Sophisticated, flexible multi-channel power measurements.
CCDF	Complementary Cumulative Distribution Function plots the statistical variations in signal level.
Signal strength	Measures signal strength and displays a spectrum and signal strength bar for interference hunting and signal quality evaluations.

아래 그림은 시간 경과에 따른 스펙트럼 점유 및 간섭을 결정하기 위한 광대역 연속 모니터링 기능을 보여줍니다. 스펙트로 그램 및 실시간 스펙트럼은 640MHz ~ 960MHz의 시간에 따른 무선 스펙트럼 활동을 표시하여 TV, 협 대역 통신, 셀룰러 기지국 및 규제되지 않은 900MHz ISM 대역을 모두 시간 상관 관계로 보여줍니다. 저잡음 플로어를 보장하기 위해 분석의 분해능 대역폭은 25kHz이며, 100 % 인터셉트 확률에 대한 최소 신호 지속 시간은 놀라운 98 마이크로 초입니다.



SignalVu-PC 애플리케이션 라이센스와 결합된 RSA7100A는 고급 분석, 800MHz 대역폭, 내부 RAID로 스트리밍, 기록 및 재생을 위해 여러 인터페이스로 동시 스트리밍 제공

SignalVu-PC는 다음을 포함하여 다양한 애플리케이션 지향 옵션을 제공합니다.

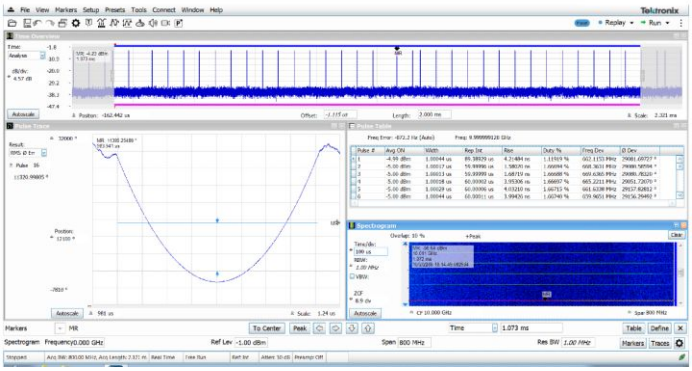
- 독점적 인 Pulse-Ogram™ 디스플레이를 포함한 펄스 분석
- 범용 변조 분석 (16/32/64/128/256 QAM, QPSK, O-QPSK, GMSK, FSK, APSK를 포함한 27 가지 변조 유형)
- CISPR 피크, 준 피크 및 평균 검출기를 사용한 EMC / EMI 분석
- 내부 RAID로 데이터 스트리밍
- IQFlowTM는 API 및 40GbE를 통해 장치에서 하나 이상의 클라이언트로 IQ 데이터를 동시에 지속적으로 스트리밍합니다.
- 802.11a / b / g / j / p, 802.11n, 802.11ac의 WLAN 분석위
- 상 I 및 위상 2 신호의 P25 분석
- LTE ™ FDD 및 TDD 기지국 (eNB) 셀 ID 및 RF 측정
- 기본 속도, 저에너지 및 Bluetooth 5. Bluetooth® 분석 5. 향상된 데이터 속도 지원
- 매핑
- SINAD, THD를 포함한 AM / FM / PM / 직접 오디오 측정신호 분류 및 조사
- 자동 위상 노이즈/지터 측정

자세한 내용과 주문 정보는 별도의 SignalVu-PC 데이터 시트를 참조하십시오. 선택된 응용 프로그램은 다음과 같습니다.

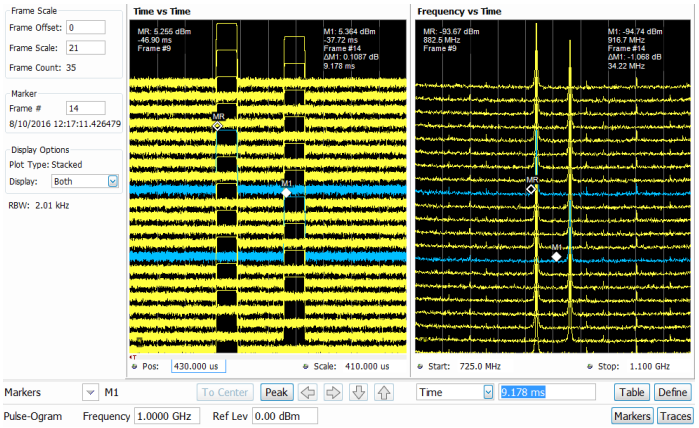
펄스 분석

펄스 분석 패키지 (SVPH)는 29 개의 개별 측정과 누적 통계를 제공하여 광대역 펄스 시스템 설계자 및 평가자를 위한 세계화의 특징을 열어줍니다. RSA7100A와 함께 SignalVu-PC의 빠른 프레임 획득 모드를 사용하면 펄스 동안 관심 있는 시간 만 획득하여 메모리를 가장 효율적으로 사용할 수 있습니다.
누적 통계 디스플레이는 여러 획득에 대한 분석 데이터를 분석하여 수백만 펄스로 분석을 더욱 확장합니다. 디스플레이 및 측정에는 다음이 포함됩니다.

Displays	Available measurements
Cumulative histograms of any measurement Cumulative measurements table with statistics (min, max, mean, standard deviation) Cumulative histograms of any measurement Pulse-Ogram waterfall display of amplitude vs. time of multiple pulses Spectrum of any pulse from the Pulse-Ogram Measurement display of any selected pulse vs. time Trend of selected measurement vs. pulse number FFT of selected measurement vs. pulse number	Pulse frequency Power (Average on, Peak, Average transmitted) Pulse width Rise time Fall time Repetition interval (seconds and Hz) Duty factor (% and ratio) Ripple (dB and %) Droop (dB and %) Overshoot (dB and %) Pulse-to-Pulse and Pulse-to-Reference frequency difference Pulse-to-Pulse and Pulse-to-Reference phase difference Frequency error (RMS and Maximum) Phase error (RMS and Maximum) Deviation (Frequency and Phase) Impulse response (dB and time) Time stamp



위 그림은 700 MHz 폭의 처프 신호입니다. 디스플레이 상단에 전류 획득의 펄스를 보여주는 시간 개요가 표시됩니다. 왼쪽에 위상 편차가 표시되어 주파수 처프의 특징적인 포물선 모양을 보여줍니다. 이 신호는 펄스 테이블과 오른쪽의 스펙트로 그램에 표시된 반복 간격의 변화를 가집니다.



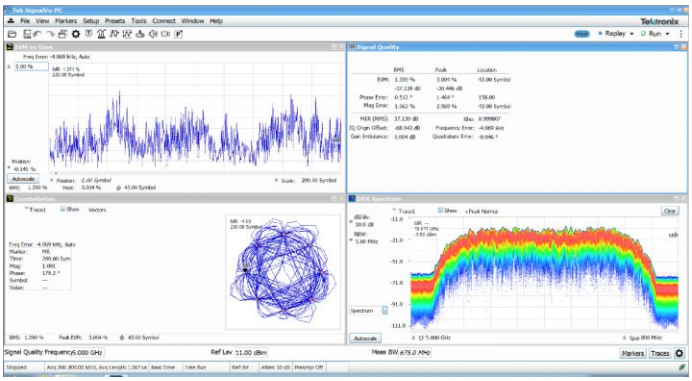
위의 그림은 SignalVu-PC 애플리케이션 라이센스 SVPH의 고유한 Pulse-Ogram 디스플레이입니다. 이것은 시간 영역에서 트리거와의 관계를 보여주는 트리거 된 펄스의 폭포입니다. 변화는 즉시 타이밍 대 트리거의 변화로 나타납니다. 각 시간 도메인 트레이스는 시간과 주파수 도메인 효과의 즉각적인 상관 관계를 위해 디스플레이의 오른쪽에 스펙트럼으로 표시됩니다.

범용 변조 분석

SignalVu-PC 애플리케이션 SV21은 27 가지 변조 유형을 다음을 포함하는 단일 분석 패키지로 묶습니다.

Displays	Measurements
Constellation I and Q vs. Time EVM vs. Time Frequency deviation vs. Time Magnitude error vs. Time Phase error vs. Time Eye diagram Trellis diagram Signal quality Symbol table	Error vector magnitude (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 FSK only: Frequency deviation, Symbol timing error

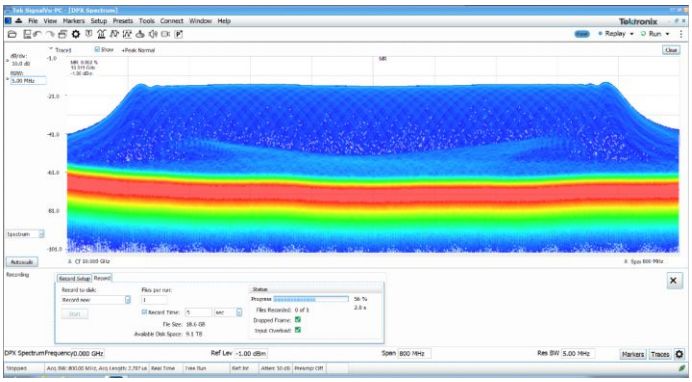
Modulation types
π/2DBPSK, BPSK, SBPSK, QPSK, DQPSK, π/4DQPSK, D8PSK, 8PSK, OQPSK, SOQPSK, CPM, 16/32/64/128/256QAM, MSK, GMSK, GFSK, 2-FSK, 4-FSK, 8-FSK, 16-FSK, C4FM, D16PSK, 16APSK, and 32APSK



위 그림에서 500 MSymbols / sec pi / 4-QPSK로 변조 된 5GHz 캐리어는 RSA7100A 옵션 B800 및 SignalVu-PC 애플리케이션 라이센스 SVMH로 분석되었습니다. DPX 스펙트럼의 지속적인 모니터링과 함께 측정 요약, EVM 대 시간 및 성좌 표시가 표시됩니다.

RAID로 스트리밍 녹화

STREAMxx-SVPC 옵션을 사용하면 RSA7100A의 전체 실시간 대역폭을 컨트롤러의 사용 가능한 RAID 시스템으로 스트리밍 할 수 있습니다. 다른 모든 분석 (실시간 스펙트럼 분석, 변조 분석 등)은 스트리밍과 동시에 사용할 수 있습니다. 스트리밍 하는 동안 분석하는 이 기능은 데이터 수집의 품질을 보장하여 재실행을 피하고 시간을 절약합니다. 800MHz 대역폭에서 2 시간 이상의 스토리지를 사용할 수 있는 두 가지 RAID 옵션이 제공됩니다. 감소 된 대역폭에서 더 긴 녹화 시간을 사용할 수 있습니다.

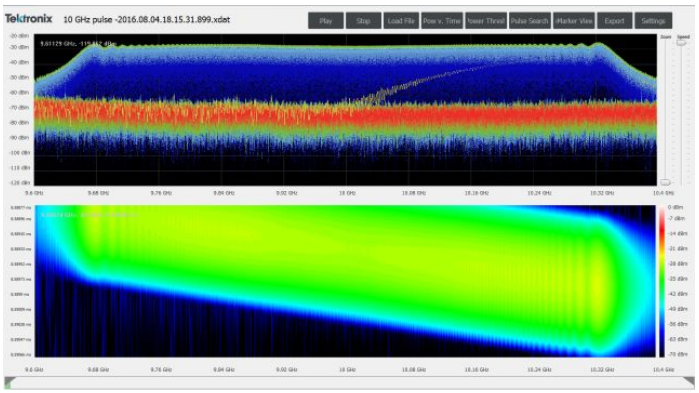


버튼을 누르거나 트리거가 수신되면 손쉬운 녹음이 가능합니다. 예상 된 파일 크기가 보고 되고 고품질 기록을 보장하기 위해 건너 뛴 프레임 또는 과부하 상태 표시가 제공됩니다. 위의 5 초간 녹화가 진행되는 것을 볼 수 있습니다. DPX 스펙트럼은 800 MHz 수집에 대한 실시간 모니터링을 제공합니다. 파일 크기, 사용 가능한 디스크 공간, 기록 진행률, 기록 된 파일 수가 모두보고 됩니다.

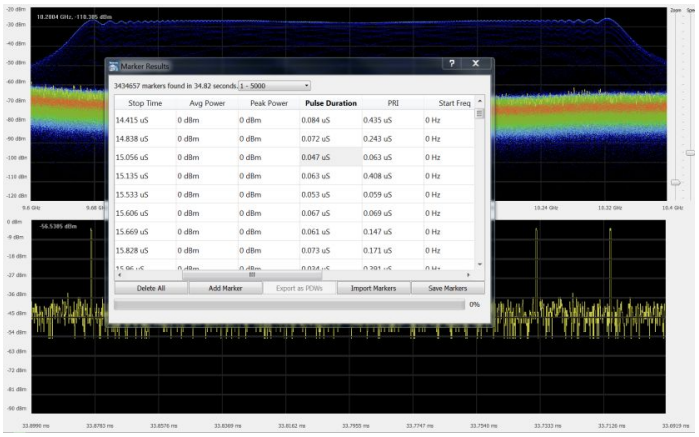
손실된 프레임 및 입력 과부하 표시기는 모두 동일한 제어 화면에 표시됩니다.

장시간 녹화 분석을위한 DataVu-PC

SignalVu-PC는 최대 16GB 크기의 파일을 열고 1GB의 열린 파일을 분석 할 수 있습니다. 그러나 16GB는 800MHz 대역폭에서 불과 몇 초의 데이터이며 30TB 크기에 도달 할 수있는 스트리밍 레코딩의 분석에는 충분하지 않습니다. DataVu-PC는 대용량 파일 분석을 위한 솔루션입니다. DataVu-PC를 사용하면 길이가 무제한 인 파일의 색상 등급 스펙트럼, 스펙트로 그램 및 진폭 대 시간을 볼 수 있습니다. 관심 있는 신호를 신속하게 식별하기 위해 검색 및 마크 테스트가 가능합니다. 검색은 진폭으로 규정 될 수 있으며 발견 된 최대 2,000,000 개의 이벤트에 마커가 배치됩니다. 관심 있는 신호를 검토하기 위해 사용자가 선택한 섹션의 재생이 제공되며, 추가 분석을 위해 선택한 영역을 SignalVu-PC로 내보낼 수 있습니다. DataVu-PC 내에서 펄스 분석이 가능하며 결과 시작 / 중지 시간, 평균 / 피크 전력, 펄스 지속 시간, 펄스 반복 간격 (PRI) 및 최대 2,000,000 펄스의 시작 / 중지 주파수, 모두 PDW (Pulse Descriptor Word) 형식으로 내보낼 수 있습니다. 자세한 내용은 별도의 DataVu-PC 데이터 시트를 참조하십시오.



위는 DataVu-PC에 표시된 99 % 오버랩 스펙트로 그램 디스플레이와 결합 된 컬러 그레이딩 스펙트럼 디스플레이입니다. 데이터의 완전한 시각화를 위해 스트리밍 파일의 속도와 세부 사항을 변경하기 위한 전체 오버랩 / 스킵 제어 기능이 있습니다.

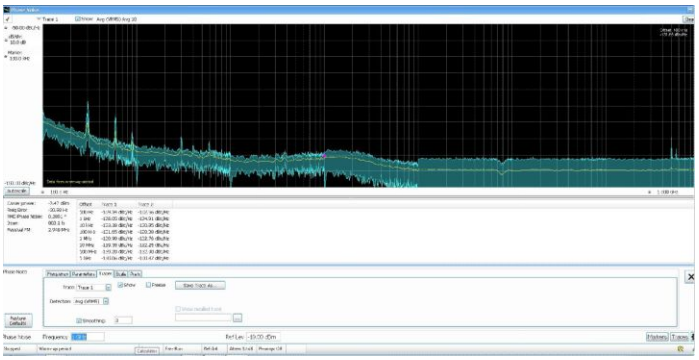


DataVu-PC 펄스 옵션은 대규모 데이터 세트에서 펄스 및 측정을 빠르게 표시합니다. 위의 펄스 검색 결과에는 시작 / 중지 시간, 평균 / 피크 전력, 펄스 지속 시간, PRI (Pulse Repetition Interval) 및 2,000,000 펄스까지의 시작 / 중지 주파수의 펄스 측정 값이 표시됩니다. 다른 도구에서 사용하기 위해 펄스 결과를 PDW 형식으로 내보낼 수 있습니다.

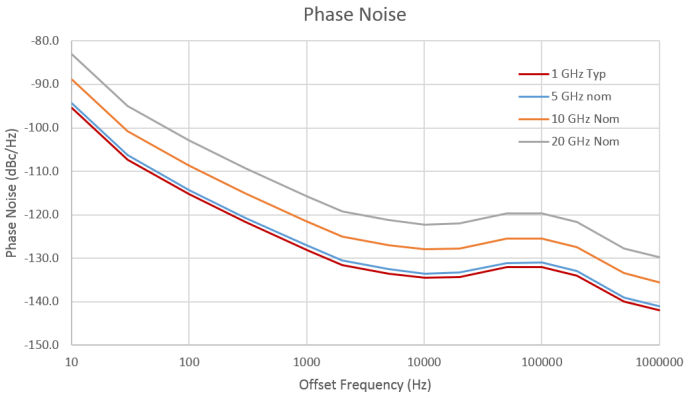
자동 위상 노이즈 및 지터 측정

위상 노이즈는 레이더 시스템에서 도플러 정보를 처리하는 기능을 저하시키고 디지털 변조 통신 시스템에서 에러 벡터 크기를 저하시킵니다. 스펙트럼 분석기 (PHAS)를 사용한 자동 위상 노이즈 및 지터 측정은 전용 위상 노이즈 분석기의 필요성을 줄여 측정 비용을 절감 할 수 있습니다.

아래에 표시된 바와 같이 1GHz 반송파의 위상 노이즈는 10kHz 오프셋에서 -133dBc / Hz로 측정됩니다. 단일 측 파대 위상 노이즈는 트레이스 또는 표 형식으로 표시되는 캐리어의 오프셋 주파수 대 dBc/Hz로 표시됩니다 (하나는 ±피크 트레이스 (파란색) 및 하나는 평균 트레이스 (노란색)). 트레이스 스무딩 및 평균화가 지원됩니다.



이 주파수 및 작동 범위에서 RSA7100A의 고유 위상 잡음-134dBc / Hz는 대다수의 응용 분야에서 충분한 측정 마진을 제공합니다.
애플리케이션에는 VCO 위상 노이즈, 발진기 위상 노이즈, 클럭 소스 지터, 신호 발생기 위상 노이즈 등이 포함됩니다.
DPX® 신호 처리와 결합 된 Tektronix 위상 노이즈/지터 애플리케이션은 순간 불안정한 신호 소스를 설계하고 문제를 해결하는 강력한 솔루션을 제공합니다.
위상 노이즈 애플리케이션은 자동 반송파 추적, 평균화 및 동적 측정 대역폭 조정을 수행하여 10Hz에서 1GHz에 이르는 모든 반송파 오프셋에 필요한 측정 정확도와 속도를 제공합니다. 화면에 통과 / 실패 제한이 있는 로그 주파수 추적 또는 표 형식으로 또는 프로그램 제어를 통해 결과를 얻을 수 있습니다. 통합 한계는 RMS 위상 잡음, 지터 및 잔류 FM에 대해 프로그래밍 할 수 있습니다.
이 측정 어플리케이션과 함께 RSA7100A의 낮은 계측기 위상 노이즈는 최대 26.5GHz의 주파수에서 고성능 위상 노이즈 측정이 가능합니다.



위의 그림은 RSA7100A의 일반적인 위상 노이즈 성능을 보여줍니다.

RSA7100A에 포함 된 CTRL7100A 컨트롤러

텍트로닉스는 CTRL7100A 컨트롤러를 RAID에 동시 스트리밍을 통해 지정된 실시간 DPX 작동 성능을 충족하도록 설계했습니다. 계측기를 강력한 워크 스테이션으로 사용하여 자체 시뮬레이션 및 설계에서이 CPU / GPU 조합의 성능을 활용할 수도 있습니다.

CTRL7100A 주요 사양

CTRL7100A는 다음 구성으로 제공됩니다. 컨트롤러의 전체 사양은 CTRL7100A 데이터 시트를 참조하십시오.

- 듀얼 인텔 ® 제온 ® 프로세서 E5-2623 v4 (10M 캐시,
- 2.6GHz) 64GB DDR4 2133MHz RAM
- 512GB SSD (분리 가능)
- 옵션 RAID 컨트롤러 및 전면 패널 이동식 드라이브는 4GB / s 및 최대 32TB 지원
- Windows 7 (Win8 Pro COA) 운영 체제
- MD FirePro W9100 16GB 512 비트 GDDR5 PCIe 3.0 워크 스테이션 비디오 카드
  - 16 GB GDDR5 메모리
  - 6 미니 디스플레이 포트 1.2 출력320 GB/s
  - memory s 메모리 대역폭
  - 4K 디스플레이 해상도 (최대 4096 x 2160)
  - 5.24 TFLOPS 단 정밀도 성능
- 40 GbE 카드
- RAID 옵션으로 스트리밍 (20 분 또는 전체 800MHz 대역폭에서 165 분)

Specifications

All specifications are guaranteed unless noted otherwise. All specifications apply to all models unless noted otherwise.

Frequency range

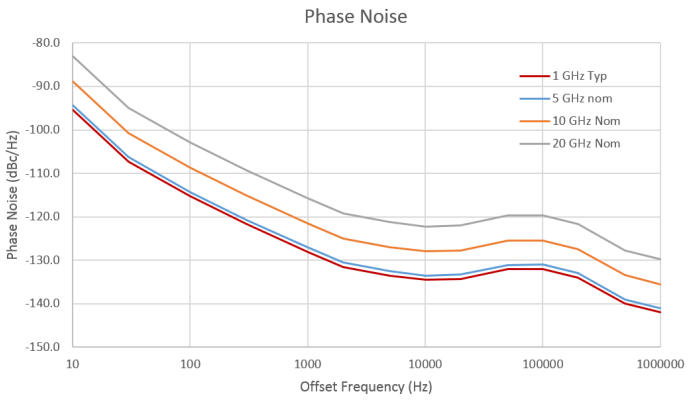
Frequency range	Preamp OFF:
	16 kHz to 14 GHz (RSA7100A Option 14)
	16 kHz to 26.5 GHz (RSA7100A Option 26)
	Preamp ON:
	10 MHz to 3.6 GHz
Tuning resolution	1×10^{-3} Hz
Frequency marker readout accuracy	± (RE × MF + 0.001 × Span) Hz
	RE: Reference Frequency Error
	MF: Marker Frequency [Hz]

Frequency reference

Frequency	10 MHz
Initial accuracy at Cal (10 min warm-up)	± 50 x 10^{-9} (23 °C to 28 °C)
Aging after 30 days of continuous operation, typical	± 0.5 x 10^{-9} per day
	± 100 x 10^{-9} first year
Cumulative error (Initial + Temperature + Aging), typical	200 x 10^{-9} (1 year)
Temperature drift	10 x 10^{-9} (23 °C to 28 °C)
	50 x 10^{-9} (0 °C to 55 °C)
External reference output	BNC connector, 50 Ω, nominal
External reference output level	0.71 Vpp to 2 Vpp into 50 Ω
External reference output level, typical	1.2 Vpp into 50 Ω
External reference input	BNC connector, 50 Ω, nominal
External reference input frequency	10 MHz ±0.2 x 10^{-6}
External reference input level	0.5 Vpp to 2 Vpp into 50 Ω

Phase noise

Frequency = 1 GHz, typical mean	-115 dBc/Hz at 100 Hz offset
	-128 dBc/Hz at 1 kHz offset
	-134 dBc/Hz at 10 kHz offset
	-132 dBc/Hz at 100 kHz offset
	-142 dBc/Hz at 1 MHz offset
Frequency = 5 GHz, nominal	-114 dBc/Hz at 100 Hz offset
	-127 dBc/Hz at 1 kHz offset
	-133 dBc/Hz at 10 kHz offset
	-131 dBc/Hz at 100 kHz offset
	-141 dBc/Hz at 1 MHz offset
Frequency = 10 GHz, nominal	-109 dBc/Hz at 100 Hz offset
	-122 dBc/Hz at 1 kHz offset
	-128 dBc/Hz at 10 kHz offset
	-125 dBc/Hz at 100 kHz offset
	-136 dBc/Hz at 1 MHz offset
Frequency = 20 GHz, nominal	-103 dBc/Hz at 100 Hz offset
	-116 dBc/Hz at 1 kHz offset
	-122 dBc/Hz at 10 kHz offset
	-120 dBc/Hz at 100 kHz offset
	-130 dBc/Hz at 1 MHz offset



RF input

RF input impedance	50 Ω
RF VSWR (RF attn ≥10 dB), typical	< 1.5 (10 MHz to 14 GHz)
	< 1.7 (> 14 GHz to 26.5 GHz)

Maximum RF input level

Maximum DC voltage	±40 V (RF Input)
Maximum Safe input power	+ 30 dBm
Maximum Measurable input power	+ 30 dBm

ADC and IF overload are detected and the user is informed and streaming data is flagged, but not stopped. Furthermore, an IF overload will initiate a protection event that will switch out the input signal. If SignalVu-PC is acquiring samples when this occurs, SignalVu-PC will automatically reset the switch periodically so that if the overload condition goes away, the input will continue to be sampled normally.

If the overload occurs while SignalVu-PC is not acquiring, then before SignalVu-PC starts acquiring it will automatically set an appropriate reference level then begin acquiring. When Center Frequency (CF) is < 80 MHz and reference level is < -40 dBm with pre-amp on, LO-to-IF leakage can cause ADC overload due to the 0 Hz spur. In this case, increasing reference level will correct the overload condition.

Input attenuator

RF attenuator

0 dB to 100 dB in 1dB steps, 16kHz to 3.6 GHz

0 dB to 75 dB in 5dB steps, 3.6 GHz to 26.5 GHz

0 dB to 75 dB in 5dB steps, 3.2 GHz to 3.6 GHz [1]

Input preselector

The preselector is input filters used for image suppression when the span of the instrument allows for its use. Two methods of preselection are used in the RSA7100A: a fixed low-pass filter (LPF) and a tunable bandpass filter (BPF).

Acquisition mode	Preselector Auto	Preselector On	Preselector Off
Swept, 50 MHz steps	On	On	Step CF ≤ 3.6 GHz: On Step CF > 3.6 GHz: Off
Swept, 320 MHz steps	NA	NA	Step CF ≤ 3.41 GHz: On Step CF > 3.41 GHz: Off
Real-time span ≤ 50 MHz	On	On	CF ≤ 3.6 GHz: On CF > 3.6 GHz: Off
Real-time span > 50 MHz	CF ≤ 3.41 GHz: On CF > 3.41 GHz: Off CF > 3.2 GHz: Off [2]	NA	CF ≤ 3.41 GHz: On CF > 3.41 GHz: Off CF > 3.2 GHz: Off

Sweep time

Full-span sweep time, typical mean

(RBW: Auto, Span = 26.5 GHz)

Preselector Auto: 14.75 sec

Preselector Off: 1.93 sec

1 Wideband extended tuning mode.

2 Wideband tuning mode.

Amplitude and RF flatness

Reference level setting range

-130 dBm to +40 dBm, 0.1 dB step

Frequency response at 18℃ to 28℃ (At 10 dB RF attenuator setting)

Span ≤ 100 MHz.

For CF < 100 MHz, specifications apply for Ref Level ≥ - 40 dBm.

Verified with input level of -20 to -15 dBm, Ref level = -15 dBm, 10 dB RF attenuation, all settings auto-coupled.

Signal to noise ratios > 40 dB.

Amplitude accuracy – preamp OFF

Center frequency range	18 ºC to 28 ºC	18 ºC to 28 ºC, typical	0 ºC to 55 ºC, typical
10 MHz to < 100 MHz	---	±0.11 dB	---
100 MHz to < 2.8 GHz	±0.16 dB	±0.13 dB	±0.18 dB
2.8 GHz to 3.6 GHz	±0.16 dB	±0.13 dB	±0.38 dB

Amplitude accuracy – preamp ON

Center frequency range	18 ºC to 28 ºC	18 ºC to 28 ºC, typical	0 ºC to 55 ºC, typical
10 MHz to < 100 MHz	---	±0.2 dB	---
100 MHz to < 2.8 GHz	±0.20 dB	±0.14 dB	±0.10 dB
2.8 GHz to 3.6 GHz	±0.20 dB	±0.14 dB	±0.26 dB

Absolute amplitude accuracy

Span ≤ 100 MHz.

For CF < 100 MHz, specifications apply for Ref Level ≥ - 40 dBm.

Verified with input level of 0 to 10 dB below Ref level, 10 dB RF attenuation, all settings auto-coupled.

Signal to noise ratios > 40 dB.

Preamp OFF, Preselector Bypassed, 100 MHz Span, -10 dBm Ref Level

Center frequency range	18 ºC to 28 ºC	18 ºC to 28 ºC, typical	0 ºC to 55 ºC, typical
10 MHz to < 100 MHz	---	±0.3 dB	---
100 MHz to 3.6GHz	±0.8 dB	±0.4 dB	±0.8 dB
> 3.6 GHz to < 8.5 GHz	±0.9 dB	±0.4 dB	±1.1 dB
8.5 GHz to < 14 GHz	±1.0 dB	±0.5 dB	±1.4 dB
14 GHz to < 20 GHz	±1.7 dB	±1.0 dB	±1.7 dB
20 GHz to 26.5 GHz	±2.0 dB	±1.2 dB	±2.2 dB

Preamp ON, 100 MHz Span, -30 dBm Ref Level

Center frequency range	18 ºC to 28 ºC	18 ºC to 28 ºC, typical	0 ºC to 55 ºC, typical
10 MHz to < 100 MHz	---	±0.4 dB	---
100 MHz to 3.6GHz	±1.2 dB	±0.6 dB	±1.2 dB

Preselector Enabled, 50 MHz Span, -10 dBm Ref Level

Center frequency range	18 ºC to 28 ºC	18 ºC to 28 ºC, typical	0 ºC to 55 ºC, typical
> 3.6 GHz to 8.5 GHz	±1.6 dB	±0.8 dB	±1.7 dB
8.5 GHz to 14 GHz	±1.5 dB	±0.7 dB	±1.5 dB
> 14 GHz to 20 GHz	±2.6 dB	±1.3 dB	±2.2 dB
20 GHz to 26.5 GHz	±2.8 dB	±1.5 dB	±2.2 dB

Channel response (amplitude and phase deviation), typical

For these specifications, set Preselector as Off, Attenuator to 10 dB, 18 °C to 28 °C.

Channel response, typical

Characteristic		Description			
Measurement center frequency	Span (MHz)	Amplitude flatness (dBrms)	Amplitude flatness (dB)	Phase linearity (degrees rms)	Phase linearity (degrees)
10 MHz to 3.6 GHz (CF ≥ Span)	10	0.06	±0.8	0.08	±0.1
	25	0.15	±0.2	0.4	±0.5
	50	0.2	±0.3	1.0	±1.3
	100	0.4	±0.6	2.5	±3.5
	320	1.0	±1.4	10	±13
3.6 GHz to 26.5 GHz	10	0.07	±0.1	0.08	±0.1
	25	0.1	±0.12	0.3	±0.5
	50	0.1	±0.15	0.8	±1.1
	100	0.17	±0.24	1.2	±1.8
	320	0.6	±0.86	5	±8
	800	0.9	±1.27	11	±16

Noise and distortion

3rd Order IM intercept (TOI)

+24 dBm at 3.3 GHz, Preamp OFF

(2-tone signal level -20 dBm per tone at the RF input. 1 MHz tone separation. Attenuator = 0 dB, Ref Level = -10 dBm. 5 MHz span, RBW set so noise is 10 dB below the IM3 tone level or lower. Production tested in a verification mode not part of normal operation.)

3rd Order IM intercept (TOI), typical

-12 dBm (10 MHz to 3.6 GHz, Preamp ON)

+19 dBm (10 MHz to 100 MHz, Preamp OFF)

+24 dBm (100 MHz to 3.6 GHz, Preamp OFF)

+20 dBm (3.6 GHz to 7 GHz)

+27 dBm (7.5 GHz to 14 GHz)

+21 dBm (14 GHz to 26.5 GHz)

(2-tone signal level -20 dBm per tone at the RF input. 1 MHz tone separation. Attenuator = 0 dB, Ref Level = -10 dBm. 5 MHz span, RBW set so noise is 10 dB below the IM3 tone level or lower.)

3rd Order Intermod Distortion (Preamp OFF, Preselector bypassed, 320 MHz acquisition bandwidth), typical

-85 dBc (100 MHz to 3.4 GHz)

-65 dBc (3.4 GHz to 6 GHz)

-80 dBc (6 GHz to 26.5 GHz)

(2-tone signal level -20 dBm per tone at the RF input. 50 MHz tone separation. Attenuator = 0 dB, Ref Level = -10 dBm)

2nd Harmonic Intercept (Preselector Enabled, Preamp OFF), typical

+40 dBm (50 MHz to 300 MHz input signal)

+74 dBm (300 MHz to 1.8 GHz input signal)

+68 dBm (1.8 GHz to 13.25 GHz input signal)

(0 dBm CW at the RF input. Attenuator = 10 dB, Ref Level = 0 dBm. Span 50 ≤ MHz.)

Displayed Average Noise Level (DANL) (Preamp OFF, Preselector bypassed, 18 ◦C to 28 ◦C)	-153 dBm/Hz (>10 MHz to 1.7 GHz) -150 dBm/Hz (>1.7 GHz to 2.8 GHz) -148 dBm/Hz (>2.8 GHz to 3.6 GHz) -152 dBm/Hz (>3.6 GHz to 14 GHz) -145 dBm/Hz (>14 GHz to 17 GHz) -150 dBm/Hz (>17 GHz to 24 GHz) -146 dBm/Hz (>24 GHz to 26.5 GHz) (Normalized to 1 Hz RBW, with log-average detector, 0 dB attenuation, ref level -50 dBm.)
Displayed Average Noise Level (DANL) (Preamp OFF, Preselector bypassed), typical	-153 dBm/Hz (200 kHz to 10 MHz) -155 dBm/Hz (10 MHz to 100 MHz) -156 dBm/Hz (100 MHz to 1.7 GHz) -154 dBm/Hz (1.7 GHz to 2.8 GHz) -151 dBm/Hz (2.8 GHz to 3.6 GHz) -156 dBm/Hz (3.6 GHz to 14 GHz) -152 dBm/Hz (14 GHz to 24 GHz) -150 dBm/Hz (24 GHz to 26.5 GHz) (Normalized to 1 Hz RBW, with log-average detector, 0 dB attenuation.)
Displayed Average Noise Level (DANL) (Preamp ON, 18 ◦C to 28 ◦C)	-163 dBm/Hz (10 MHz to 50 MHz) -164 dBm/Hz (50 MHz to 1.7 GHz) -162 dBm/Hz (>1.7 GHz to 3.6 GHz) (Normalized to 1 Hz RBW, with log-average detector, 0 dB attenuation, ref level -50 dBm.)
Displayed Average Noise Level (DANL) (Preamp ON), typical	-168 dBm/Hz (10 MHz to 100 MHz) -167 dBm/Hz (100 MHz to 1.7 GHz) -165 dBm/Hz (1.7 GHz to 3.6 GHz) (Normalized to 1 Hz RBW, with log-average detector, 0 dB attenuation.)
Displayed Average Noise Level (DANL) (Preselector enabled), typical	-152 dBm/Hz (3.6 GHz to 14 GHz) -147 dBm/Hz (14 GHz to 26.5 GHz) (Normalized to 1 Hz RBW, with log-average detector, 0 dB attenuation, ref level -50 dBm.)

Residual spurious response

Residual response, typical (Ref = -60 dBm, Span = 5 MHz)	< -115 dBm (100 MHz to 3.6 GHz)
	< -115 dBm (3.6 GHz to 11 GHz)
	< -105 dBm (11 GHz to 14 GHz)
	< -105 dBm (14 GHz to 24 GHz)
	< -95 dBm (24 GHz to 26.5 GHz)
	(Measured with input terminated, 0 dB attenuation, preamp off.)
Residual response, typical (Ref = -60 dBm, Span = 100 MHz, 18 ℃ to 28 ℃)	< -98 dBm (100 MHz to 3.6 GHz)
	< -102 dBm (>3.6 GHz to 11 GHz)
	< -86 dBm (>11 GHz to 14 GHz)
	< -86 dBm (>14 GHz to 24 GHz, Option 26)
	< -84 dBm (>24 GHz to 26.5 GHz, Option 26)
	(Measured with input terminated, 0 dB attenuation, preamp off, preselector off.)
Residual response, typical (Ref = -60 dBm, Span = 320 MHz)	< -110 dBm (100 MHz to 3.6 GHz)
	< -105 dBm (3.6 GHz to 11 GHz)
	< -85 dBm (11 GHz to 14 GHz)
	< -85 dBm (14 GHz to 26.5 GHz)
	(Measured with input terminated, 0 dB attenuation, preamp off, preselector off.)
Residual response, typical (Ref = -60 dBm, Span = 800 MHz)	< -85 dBm (3.6 GHz to 14 GHz)
	< -85 dBm (14 GHz to 20 GHz)
	< -75 dBm (20 GHz to 26.5 GHz)
	(Measured with input terminated, 0 dB attenuation, preamp off, preselector off.)

Spurious response with signal

Spurious response with image signal (18 ℃ to 28 ℃)	-98 dBc (CF = 100 MHz to 3.6 GHz, input at CF +9.225 GHz)
	-81 dBc (CF > 3.6 GHz to 14 GHz, input at CF + 1.225 GHz)
	-74 dBc (CF > 14 GHz to 26.5 GHz, input at CF + 1.225 GHz)
	(Input level = 0 dBm. Ref Level = 0 dBm. RF atten = 10 dB. 50 MHz span.)
Spurious response with signal at CF, span = 320 MHz (Spur offset > 2.5 MHz), typical	<-80 dBc (CF = 100 MHz to 3.6 GHz, except 3.2 to 3.55 GHz)
	<-65 dBc (CF = 3.2 GHz to 3.55 GHz)
	<-85 dBc (CF = 3.6 to 14 GHz)
	<-80 dBc (CF = 14 GHz to 26.5 GHz)
	<-65 dBc (CF = 3.6 GHz to 14 GHz, span = 800 MHz)
	<-65 dBc (CF = 14 GHz to 26.5 GHz, span = 800 MHz)
	(Input level = -10 dBm. Ref Level = -10 dBm. RF atten = 10 dB. Preselector off.)
Spurious response with signal at CF (50 kHz ≤ spur offset < 2.5 MHz), typical	-80 dBc (CF = 100 MHz to 3.6 GHz, except 3.38 to 3.39 GHz)
	-70 dBc (CF = 3.38 GHz to 3.39 GHz)
	-75 dBc (CF = 3.6 GHz to 14 GHz)
	-65 dBc (CF = 14 GHz to 26.5 GHz)
	(Input level = -10 dBm. Ref Level = -10 dBm. RF atten = 10 dB. Preselector on, span = 5 MHz.)

Spurious response with signal within capture BW at other than CF, span = 320 MHz, typical	<-80 dBc (CF = 100 MHz to 3.6 GHz, except Signal at 3.2 to 3.55 GHz) < -65dBc (Signal at 3.2 to 3.55 GHz, CF = 3.04 GHz to 3.6 GHz) -85 dBc (CF 3.6 GHz to 14 GHz) -80 dBc (CF 14 GHz to 26.5 GHz) (Input level = -10 dBm. Ref Level = -10 dBm. RF atten = 10 dB.)
Spurious response with signal within capture BW at other than CF, span = 800 MHz, typical mean	-65 dBc (CF = 3.6 GHz to 26.5 GHz) (Ref Level = -10 dBm. RF atten = 10 dB, Input Level = -20 dBm.) The mean is taken from the largest spur within the span at each CF step and each input frequency stepped across the span. The input signal is stepped at 80 MHz/step across the span and the CF is stepped at 800 MHz/step across the specified frequency range. If a particular span and input combination has no spurs > -70 dBc it is not included in the mean so it does not contribute to reducing the mean.
Spurious response with signal outside span, except for signal frequencies specified here, typical	-80 dBc (Input level = -30 dBm. Ref Level = -30 dBm. RF atten = 10 dB. Span ≤ 50 MHz.)
Spurious Response due to signal applied at CF+1225 MHz to CF+1250 MHz and 2290 MHz to 2320 MHz, typical	-55 dBc (CF 100 MHz to 2.5 GHz) (Input level = -10 dBm. Ref Level = -10 dBm. RF atten = 10 dB, span ≤ 50 MHz.)
Spurious Response due to signal applied at 160 MHz to 215 MHz and 3360 MHz to 3415 MHz, typical	-65 dBc (CF 100 MHz to 3.6 GHz) (Input level = -10 dBm. Ref Level = -10 dBm. RF atten = 10 dB, span ≤ 50 MHz.)
Spurious Response due to signal applied at 585 MHz to 640 MHz and 4585 MHz to 4640 MHz, typical	-70 dBc (CF 100 MHz to 3.6 GHz) (Input level = -10 dBm. Ref Level = -10 dBm. RF atten = 10 dB, span ≤ 50 MHz.)
Local oscillator feed-through to input connector (Attenuator = 10 dB), typical	< - 110 dBm (CF ≤ 3.6 GHz, preamp off) < -60 dBm (CF >3.6 GHz, preselector on)

Wideband extended tuning

Frequency response (18 ℃ to 28 ℃), Preamp OFF, typical	±4.0 dB (CF = 3.2 GHz to 3.6 GHz) (Input level = -20 to -15 dBm. Ref level = -15 dBm. RF atten = 10 dB, all setting auto-coupled. Span > 320 MHz. Signal to noise ratio >40 dB.)
Channel response (18 ℃ to 28 ℃), preselector bypassed, typical	Measurement CF: 3.2 GHz to 3.6 GHz Span: 800 MHz Amplitude flatness: 1.0 dBrms Amplitude flatness: ±4.0 dB
Residual response (18 ℃ to 28 ℃), Preamp OFF, typical	< -105 dBm (3.2 GHz to 3.6 GHz) (Ref level = -60 dBm. RF atten = 0 dB. Span = 800 MHz. Measured with input terminated.) (These are not related to input signals.)

Internal trigger

Trigger mode, type, and source	Modes: **Free run** (triggered by the end the preceding acquisition), **Triggered** (triggered by event) Types: **Single** (one acquisition from one trigger), **Continuous** (repeated acquisitions from repeating triggers) Sources: **RF Input** (downconverted to IF), **Trigger Input**, **Host** (trigger initiated by host)
Trigger events	Power Level within Span (RF Input) Frequency Mask, (Host) Host Request (Host) DPX Density (Host)
Trigger GPS time stamp, typical	<15 ns relative to GPS time (GPS satellites may have error up to ±90 ns relative to UTC.)
Pre- and post-trigger setting	Trigger position is settable within 1 % to 99 % of total data length

Power trigger

Power trigger level range	30 dBm to -170 dBm
Power trigger level resolution	0.1 dB
Power trigger level accuracy (This specification is in addition to the overall amplitude accuracy uncertainty for SA mode.)	±1 dB (level ≥ -50 dB from reference level) for trigger levels >30 dB above the noise floor at the center frequency. Instrument Center Frequency ≥ 100 MHz This applies when the Trigger Level is between 10% and 90% of the signal amplitude
Power trigger position timing uncertainty, typical	±8 ns
Power trigger bandwidth setting	This is not an independent setting. It is set by the "Time-Domain Bandwidth" control. Power Trigger Bandwidth is determined by Acquisition bandwidth.
Power trigger minimum event duration	4 ns

External trigger

External trigger threshold voltage	3.3V TTL, VIL 0.8V, VIH 2.0V
External trigger input impedance	10 kΩ
External trigger minimum pulse width	>10 ns
External trigger timing uncertainty	±8 ns

Frequency mask and DPX density trigger (Option TRIGH)

Frequency mask trigger mask point horizontal resolution	< 0.13 % of span
Frequency mask trigger level range	0 to -80 dB from reference level
Frequency mask trigger level resolution	0.1 dB
Frequency mask trigger level accuracy (with respect to reference level)	±(Channel Response Flatness + 2.5 dB) for mask levels ≥ -50 dB and >30 dB above the noise floor

Frequency mask trigger timing uncertainty	±(0.5*Spectrum time)
DPX density trigger area of interest range	2 to 801 pixels (horizontal) x 2 to 201 pixels (vertical)

Real-time event minimum duration for 100% probability of intercept/ trigger, typical

Span (MHz)	RBW (kHz)	FFT length (points)	Minimum signal duration for 100% POI at 100% amplitude (µsec)			
			DPX Spectrum	DPXogram	Freq. mask trigger	Density trigger
800	50,000	38/ 256	0.419	0.844	0.419	0.946
	20,000	95/ 256	0.516	0.947	0.572	1.025
	10,000	190/ 256	0.686	1.115	0.768	1.164
	1,000	1,900/ 2,048	3.006	4.071	3.483	3.377
	300	6,333/ 8,192	11.836	15.412	12.654	12.008
	100	19,000/ 32,768	45.031	60.086	52.755	46.581
	30	63,333/ 65,536	131.352	166.418	140.185	130.031
	25	76,000/ 131,072	212.109	268.897	227.644	212.050
	1	1,900,000/ 2,097,152	3824	3831	4154	3733
	0.12	15,833,333/ 16,777,216	42120	42269	44721	41520
320	32,000	60/ 256	0.431	0.860	0.469	0.678
	20,000	94/ 256	0.476	0.908	0.517	0.684
	10,000	190/ 256	0.600	1.042	0.651	0.813
	1,000	1,900/ 1,024	2.685	3.229	2.870	2.754
	300	6,334/ 4,096	9.156	10.962	10.208	9.778
	100	19,000/ 16,384	32.464	40.156	37.425	33.908
	30	63,334/ 32,768	92.512	106.968	101.865	94.935
	25	76,000/ 65,536	134.919	161.777	159.406	148.456
	1	1,900,000/ 1,048,576	2760	2890	2890	2696
	0.1	19,000,000/ 16,777,216	39754	41804	41804	39170
100	8,000	240/ 256	0.611	1.041	0.648	0.905
	1,000	1,900/ 512	2.703	3.207	2.974	2.929
	300	6,334/ 1,024	7.816	8.884	8.286	7.989
	100	19,000/ 4,096	24.838	29.005	26.615	25.888
	30	63,334/ 16,384	88.503	99.438	95.286	94.922
	25	76,000/ 16,384	101.230	112.169	108.048	107.388
	1	1,900,000/ 524,288	2670	2780	2980	2461
	0.1	19,000,000/ 4,194,304	25641	26434	28128	24989

Span (MHz)	RBW (kHz)	FFT length (points)	Minimum signal duration for 100% POI at 100% amplitude (µsec)			
			DPX Spectrum	DPXogram	Freq. mask trigger	Density trigger
50	4,000	480/ 256	0.850	1.227	0.888	1.181
	1,000	1,894/ 256	2.476	2.970	2.575	2.910
	300	6,334/ 512	7.835	9.017	8.345	8.232
	100	19,000/ 2,048	24.559	29.195	26.484	25.697
	30	63,334/ 8,192	85.654	96.715	93.143	92.642
	25	76,000/ 8,192	98.364	109.275	105.853	105.263
	1	1,900,00/ 262,144	2730	2778	2991	2322
	0.1	19,000,000/ 2,097,152	23430	24048	25055	22247

Real time transforms per second, typical

Span (MHz)	RBW (kHz)	Transforms per second			
		DPX Spectrum	DPXogram	Freq. mask trigger	Density trigger
800	50,000	2,627,562	1,241,584	2,365,733	1,243,943
	20,000	2,376,594	1,174,142	2,094,919	1,196,807
	10,000	2,018,280	1,081,222	1,731,537	1,140,029
	1,000	906,043	460,681	638,292	710,374
	300	181,750	110,150	158,214	176,353
	100	37,417	24,338	29,850	36,480
	30	14,701	9,700	13,023	14,995
	25	7,346	5,183	6,594	7,350
	1	519	517	443	544
	0.12	37	37	34	38
320	32,000	2,696,885	1,250,776	2,444,144	1,676,513
	20,000	2,616,606	1,229,611	2,366,207	1,709,864
	10,000	2,436,340	1,174,661	2,167,808	1,605,154
	1,000	1,273,703	753,106	1,030,598	1,181,032
	300	354,423	216,078	258,150	301,316
	100	74,336	47,270	54,275	69,560
	30	34,275	22,918	25,954	32,883
	25	16,974	11,658	11,994	14,032
	1	1,161	1,137	1,009	1,255
	0.1	48	47	43	49
100	8,000	2,699,036	1,248,489	2,448,673	1,556,652
	1,000	1,245,859	765,075	931,228	999,302
	300	674,595	392,013	512,214	625,691
	100	171,305	27,702	31,299	33,285
	30	39,639	27,655	31,205	33,452
	25	36,639	27,655	31,205	33,452
	1	1,297	1,134	925	1,781
	0.1	150	134	109	166
50	4,000	2,703,955	1,254,739	2,452,569	1,472,428
	1,000	1,717,706	928,828	1,467,931	1,017,554
	300	658,103	372,705	497,315	553,161
	100	178,889	98,097	133,639	161,150
	30	44,806	29,969	33,554	36,719
	25	44,717	30,064	33,501	36,828
	1	1,204	1,137	916	2,369
	0.1	225	197	164	307

Acquisition

Real-time capture bandwidth

320 MHz (Standard)

800 MHz (Option B800)

Sampling rate and available memory time in RTSA/Time/ Demodulation mode

Acquisition bandwidth	Sample rate (for I and Q)	Significant bits (I and Q each)	Record length	Maximum record time (sec)
800 MHz	1,000 MS/s	12	2G samples	2.1
320 MHz	500 MS/s	12	2G samples	4.2
160 MHz	250 MS/s	13	2G samples	8.5
100 MHz	150 MS/s	13	2G samples	14.3
50 MHz	75 MS/s	13	2G samples	28.6
40 MHz	62.5 MS/s	14	2G samples	34.3
20 MHz	31.25 MS/s	15	2G samples	68.7
10 MHz	15.625 MS/s	15	2G samples	137.4

Minimum acquisition length in RTSA/Time/ Demod Mode

64 samples

Acquisition length setting resolution in RTSA/Time/ Demod Mode

1 sample

Amplitude vs Time

Time scale zero span

1 µs min to 2000 s max

Time accuracy

± 0.5% of total time

Time resolution

0.1% of total time

Time linearity

±0.5% of total time

Recording to RAID

Sampling rate and maximum record length

Acquisition bandwidth	Streaming sample rate (for I and Q)	Maximum record length (Option B)	Maximum record length (Option C)
>320 to 800 MHz	1000 MS/s, packed	20 min	165 min
>320 to 800 MHz	1000 MS/s, unpacked	20 min	120 min
>160 to 320 MHz	500 MS/s	40 min	4 hr
> 50 to 160 MHz	250 MS/s	80 min	8 hr
> 50 to 100 MHz	150 MS/s	130 min	13 hr
> 40 to 50 MHz	75 MS/s	256 min	26 hr
> 40 to 50 MHz	125 MS/s	160 min	16 hr
> 20 to 40 MHz	65.2 MS/s	320 min	32 hr
> 10 to 20 MHz	31.25 MS/s	10 hr	64 hr
≤10 MHz	15.625 MS/s	20 hr	128 hr

Disk size and lifetime, 800 MHz bandwidth

RAID option	Total time of all records	Expected lifetime of disk
Option B at 1000 MS/s	55 min	290 hr
Option B at 1000 MS/s, stored unpacked	40 min	226 hr
Option C at 1000 MS/s	165 min	900 hr
Option C at 1000 MS/s, stored unpacked	120 min	680 hr

Unpacked data

At >320 to 800 MHz acquisition bandwidth, data can be packed in 12-bit samples. This is done to reduce the data transfer rate requirement and to guarantee gap-free recordings. At 320 MHz acquisition bandwidth and below, packing is not necessary and data is always stored as 16-bit samples.

GPS location and timing

Format GPS (L1: 1575.42 MHz)

GPS antenna power 5 V, 60 mA max

GPS active antenna power auto-detect threshold 7.9 mA, max

Maximum RF power at GPS input +3 dBm

Horizontal position accuracy 2.5 m CEP

3.5 m SEP

(Test conditions: 24 hours static, -130 dBm received signal strength.)

GPS timestamp accuracy to UTC, typical ±100 ns

IRIG-B timing

Format IRIG-B DC (IRIG-B 00X), IRIG-B AM (IRIG-B 12X)

IRIG-B DC signal level 0 to 3.3 V, +5 V tolerant

1 kΩ input resistance

IRIG-B AM signal level	-5 V, to +5 V 1.5 V to 10 Vp-p mark, 3:1 mark-space ratio 1 kHz input carrier frequency 5 kΩ input resistance
IRIG-B AM timing accuracy (typical)	±1150 nS ± 260 nS standard deviation

SignalVu-PC standard measurements

Measurements included.

General signal analysis	
Spectrum analyzer	Spans from 100 Hz to full span of instrument Three traces plus math and spectrogram trace Five markers with power, relative power, integrated power, power density and dBc/Hz functions
DPX Spectrum/Spectrogram	Real time display of spectrum with 100% probability of intercept of up to 419 nsec signals in up to 800 MHz span. Swept DPX with DPX Spectrum to perform stepped DPX spectrum measurements over the full frequency range of the instrument.
Amplitude, frequency, phase vs. time, RF I and Q vs. time	Basic vector analysis functions
Time Overview/Navigator	Enables easy setting of acquisition and analysis times for deep analysis in multiple domains
Spectrogram	Analyze and re-analyze your signal with a 2-D or 3-D waterfall display
Analog modulation analysis	
AM, FM, PM analysis	Measures key AM, FM, PM parameters
RF measurements	
Spurious measurement	User-defined limit lines and regions provide automatic spectrum violation testing across the entire range of the instrument. Four traces can be saved and recalled; CISPR Quasi-Peak and Average detectors available with option SVQP.
Spectrum emission mask	User-defined or standards-specific masks
Occupied Bandwidth	Measures 99% power, -xdB down points
Channel Power and ACLR	Variable channel and adjacent/alternate channel parameters
MCPR	Sophisticated, flexible multi-channel power measurements
CCDF	Complementary Cumulative Distribution Function plots the statistical variations in signal level

Measurement functions

Measurement functions	Description
Frequency domain	Channel Power, Multi-Carrier Adjacent Channel Power / Leakage Ratio, Adjacent Channel Power, dBm/Hz Marker, dBc/Hz Marker
Time domain and statistical	RF I/Q vs. Time, Power vs. Time, Frequency vs. Time, Phase vs. Time, CCDF, Peak-to-Average Ratio

DPX Spectrogram processing

DPX Spectrogram trace detection	+Peak, -Peak, Avg (Vrms)
DPX Spectrogram trace length	800 to 10401 points
DPX Spectrogram memory depth	Trace Length = 801: 1,005,376 traces Trace Length = 10401: 77,336 traces

SignalVu-PC standard measurements

Time resolution per line

5 µs to 6400 s (user-settable)

(Minimum time resolution specified at 800 MHz RT BW, 1 MHz RBW, 801 trace points)

DPXogram maximum number of lines

Trace points	Number of lines
801	921,594
2,401	307,198
4,000	184,318
10,401	70,891

SignalVu-PC applications performance summary

General Purpose Analog Modulation Analysis Accuracy, typical

(0 dBm input at center; 0 dBm Input Power Level, Reference Level 10 dBm, Attenuation = Auto)

AM demodulation accuracy

±2%

(Carrier Frequency 1 GHz, 10 to 60 % Modulation Depth)

(1 kHz / 5 kHz Input/Modulated Frequency)

PM demodulation accuracy

±3°

(Carrier Frequency 1 GHz, 400 Hz / 1 kHz Input/Modulated Frequency)

FM demodulation accuracy

±1% of span

(Carrier Frequency 1 GHz, 1 kHz / 5 kHz Input/Modulated Frequency)

General purpose digital modulation analysis (SVMxx-SVPC)

Carrier type

Continuous, Burst (5 µs minimum on-time)

Modulation formats

BPSK, QPSK, 8PSK, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM, π/2DBPSK, DQPSK, π/4DQPSK, D8PSK, D16PSK, SBPSK, OQPSK, SOQPSK, 16-APSK, 32-APSK, MSK, GFSK, CPM, 2FSK, 4FSK, 8FSK, 16FSK, C4FM

Analysis period

Up to 164,840 samples

Measurement filter

Root Raised Cosine, Raised Cosine, Gaussian, Rectangular, IS-95 Base EQ, User, None

Reference Filter

Gaussian, Raised Cosine, Rectangular, IS-95 baseband, User, None

Filter rolloff factor

α : 0.001 to 1, in 0.001 steps

Measurement functions

Constellation, Error Vector Magnitude (EVM) vs. Time, Symbol Table

Vector diagram display format

Symbol/locus display, Frequency Error measurement, Origin Offset measurement

Constellation diagram display format

Symbol display, Frequency Error measurement, Origin Offset measurement

Error vector diagram display format

EVM, Magnitude Error, Phase Error, Waveform Quality (ρ) measurement, Frequency Error measurement, Origin Offset measurement

Symbol table display format

Binary, hexadecimal

QPSK Residual EVM (center frequency = 2 GHz), typical mean

0.35 % (100 kHz symbol rate)

0.35 % (1 MHz symbol rate)

0.35 % (10 MHz symbol rate)

0.75 % (30 MHz symbol rate)

0.75 % (60 MHz symbol rate)

1.5 % (120 MHz symbol rate)

2.0 % (240 MHz symbol rate)

400 symbols measurement length, 20 Averages, normalization reference = maximum symbol magnitude

SignalVu-PC applications performance summary

256 QAM Residual EVM (center frequency = 2 GHz), typical mean	0.4 % (10 MHz symbol rate) 0.6 % (30 MHz symbol rate) 0.6 % (60 MHz symbol rate) 1.0 % (120 MHz symbol rate) 1.5 % (240 MHz symbol rate) 400 symbols measurement length, 20 Averages, normalization reference = maximum symbol magnitude
OQPSK Residual EVM (center frequency = 2 GHz), typical mean	0.6% (100 kHz symbol rate, 200 kHz measurement bandwidth) 0.6% (1 MHz symbol rate, 2 MHz measurement bandwidth) 1.0% (10 MHz symbol rate, 20 MHz measurement bandwidth) Reference filter: raised-cosine, Measurement filter: root raised cosine, Filter parameter: Alpha = 0.3
SOQPSK (MIL) Residual EVM (center frequency = 250 MHz), typical mean	0.4% (4 kHz symbol rate, 64 kHz measurement bandwidth) Reference filter: MIL STD, Measurement filter: none
SOQPSK (MIL) Residual EVM (center frequency = 2 GHz), typical mean	0.5% (20 kHz symbol rate, 320 kHz measurement bandwidth) 0.5% (100 kHz symbol rate, 1.6 MHz measurement bandwidth) 0.5% (1 MHz symbol rate, 16 MHz measurement bandwidth) Reference filter: MIL STD, Measurement filter: none
SOQPSK (ARTM) Residual EVM (center frequency = 250 MHz), typical mean	0.3% (4 kHz symbol rate, 64 kHz measurement bandwidth) Reference filter: ARTM STD, Measurement filter: none
SOQPSK (ARTM) Residual EVM (center frequency = 2 GHz), typical mean	0.5% (20 kHz symbol rate, 320 kHz measurement bandwidth) 0.5% (100 kHz symbol rate, 1.6 MHz measurement bandwidth) 0.5% (1 MHz symbol rate, 16 MHz measurement bandwidth) Reference filter: ATRM STD, Measurement filter: none
SBPSK (MIL) Residual EVM (center frequency = 250 MHz), typical mean	0.3% (4 kHz symbol rate, 64 kHz measurement bandwidth) Reference filter: MIL STD, Measurement filter: none
SBPSK (MIL) Residual EVM (center frequency = 2 GHz), typical mean	0.5% (20 kHz symbol rate, 320 kHz measurement bandwidth) 0.5% (100 kHz symbol rate, 1.6 MHz measurement bandwidth) 0.5% (1 MHz symbol rate, 16 MHz measurement bandwidth) Reference filter: MIL STD, Measurement filter: none
CPM (MIL) Residual EVM (center frequency = 250 MHz), typical mean	0.3% (4 kHz symbol rate, 64 kHz measurement bandwidth) Reference filter: MIL STD, Measurement filter: none
CPM (MIL) Residual EVM (center frequency = 2 GHz), typical mean	0.5% (20 kHz symbol rate, 320 kHz measurement bandwidth) 0.5% (100 kHz symbol rate, 1.6 MHz measurement bandwidth) 0.5% (1 MHz symbol rate, 16 MHz measurement bandwidth) Reference filter: MIL STD, Measurement filter: none
2/4/8/16FSK Residual RMS FSK Error (center frequency = 2 GHz), typical mean	0.5% (2/4FSK, 10 kHz symbol rate, 10 kHz frequency deviation) 0.4% (8/16FSK, 10 kHz symbol rate, 10 kHz frequency deviation) Reference filter: none, Measurement filter: none

Adaptive equalizer

Type	Linear, Decision-Directed, Feed-Forward (FIR) equalizer with coefficient adaptation and adjustable convergence rate.
Supported modulation types	BPSK, QPSK, OQPSK, DQPSK, π/2DBPSK, π/4DQPSK, 8PSK, D8SPK, D16PSK, 16/32/64/128/256-QAM, 16/32-APSK

SignalVu-PC applications performance summary

Reference filters	Raised cosine, rectangular, none
Reference filters (OQPSK)	Raised cosine, half sine
Adaptive filter length	1 to 128 taps
Adaptive filter taps/symbol	1, 2, 4, or 8 (Raised cosine, half sine, or none
Adaptive filter taps/symbol (Rectangular filter)	1
Equalizer controls	Off, Train, Hold, Reset
Flexible OFDM Measurements application (SVOxx-SVPC)	
802.11a/g/j/p OFDM and 802.16-2004 maximum residual EVM (RMS), typical mean	-52 dB at 2.4 GHz (802.11a/g/j and 802.16-2004) -50 dB at 2.4 GHz and 5.8 GHz
802.11b Maximum Residual EVM (RMS), typical mean	1.0% at 2.4 GHz
WLAN 802.11n Measurement application (SV24xx-SVPC)	
OFDM Maximum Residual EVM (RMS), typical mean	-49 dB at 2.4 GHz -49 dB at 5.8 GHz (40 MHz bandwidth)
WLAN 802 11ac measurement application (SV25Hxx-SVPC)	(802.11ac OFDM)
OFDM Maximum Residual EVM (RMS), CF = 5.8 GHz, typical mean	-50 dB at 40 MHz BW -48 dB at 80 MHz BW -43 dB at 160 MHz BW
APCO P25 Measurements Application (SV26xx-SVPC)	
Measurements	RF output power, operating frequency accuracy, modulation emission spectrum, unwanted emissions spurious, adjacent channel power ratio, frequency deviation, modulation fidelity, frequency error, eye diagram, symbol table, symbol rate accuracy, transmitter power and encoder attack time, transmitter throughput delay, frequency deviation vs. time, power vs. time, transient frequency behavior, HCPM transmitter logical channel peak adjacent channel power ratio, HCPM transmitter logical channel off slot power, HCPM transmitter logical channel power envelope, HCPM transmitter logical channel time alignment, cross-correlated markers
Modulation fidelity, typical mean	C4FM = ≤ 1.0% HCMP = ≤ 0.5% HDQPSK = ≤ 0.25% Input signal level is optimized for best modulation fidelity.
Bluetooth Measurements Application (SV27xx-SVPC and SV31xx-SVPC)	
Supported standards	Bluetooth® 4.2 Basic Rate, Bluetooth® 4.2 Low Energy, Bluetooth® 4.2 Enhanced Data Rate. Bluetooth® 5 when SV31 is enabled.
Measurements	Peak Power, Average Power, Adjacent Channel Power or InBand Emission mask, -20 dB Bandwidth, Frequency Error, Modulation Characteristics including ΔF1avg (11110000), ΔF2avg (10101010), ΔF2 > 115 kHz, ΔF2/ΔF1 ratio, frequency deviation vs. time with packet and octet level measurement information, Carrier Frequency f0, Frequency Offset (Preamble and Payload), Max Frequency Offset, Frequency Drift f_1-f_0, Max Drift Rate f_n-f_0 and f_n-f_{n-5}, Center Frequency Offset Table and Frequency Drift table, color-coded Symbol table, Packet header decoding information, eye diagram, constellation diagram

SignalVu-PC applications performance summary

Output power (BR and LE), typical mean	Supported measurements: Average power, peak power Level uncertainty: refer to instrument amplitude and flatness specification Measurement range: signal level > –70 dBm
Modulation characteristics, typical mean (CF = 2400 MHz to 2500 MHz)	Supported measurements: ΔF_1avg, ΔF_2avg, ΔF_2avg/ ΔF_1avg, ΔF_2max%>=115kHz (basic rate), ΔF_2max%>=115kHz (low energy) Deviation range: ±280 kHz Deviation uncertainty (at 0 dBm): <2 kHz [3] + instrument frequency uncertainty (basic rate) <3 kHz + instrument frequency uncertainty (low energy) Measurement resolution: 10 Hz Measurement range: Nominal channel frequency ±100 kHz RF signal power range: > –70 dBm
Initial Carrier Frequency Tolerance (ICFT) (BR and LE), typical mean	Measurement uncertainty (at 0 dBm): <1 kHz [4] + instrument frequency uncertainty Measurement resolution: 10 Hz Measurement range: Nominal channel frequency ±100 kHz RF signal power range: > –70 dBm
Carrier Frequency Drift (BR and LE), typical mean	Supported measurements: Max freq. offset, drift f_1- f_0, max drift fn-f_0, max drift fn-f_{n-5} (BR and LE 50 µs) Measurement uncertainty: <1 kHz [5] + instrument frequency uncertainty Measurement resolution: 10 Hz Measurement range: Nominal channel frequency ±100 kHz RF signal power range: > –70 dBm
In-band emissions (ACPR) (BR and LE)	Level uncertainty: refer to instrument amplitude and flatness specification

LTE Downlink RF measurements (SV28xx-SVPC)	
Standard Supported	3GPP TS 36.141 Version 12.5
Frame Format supported	FDD and TDD
Measurements and Displays Supported	Adjacent Channel Leakage Ratio (ACLR), Spectrum Emission Mask (SEM), Channel Power, Occupied Bandwidth, Power vs. Time showing Transmitter OFF power for TDD signals and LTE constellation diagram for Primary Synchronization Signal and Secondary Synchronization Signal with Cell ID, Group ID, Sector ID, RS (Reference Signal) Power and Frequency Error.
Channel power measurement accuracy	Level uncertainty: refer to instrument amplitude and flatness specification

3 At nominal power level of 0 dBm

4 At nominal power level of 0 dBm

5 At nominal power level of 0 dBm

SignalVu-PC applications performance summary

Pulse measurements (SVPxx-SVPC)

Measurements (nominal)

Pulse-Ogram™ waterfall display of multiple segmented captures, with amplitude vs time and spectrum of each pulse. Pulse frequency, Delta Frequency, 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- Ref Pulse frequency difference, Pulse- Ref Pulse phase difference, 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.

Pulse measurement characteristics

Characteristic	For 40 MHz bandwidth	For 320 and 800 MHz bandwidth
Minimum Pulse Width for detection, typical	150 ns	50 ns
Average ON Power (at 18 to 28 °C), typical	±0.4 dB + absolute Amplitude Accuracy For pulses of 300 ns width or greater, and signal levels above 70 dB below reference level.	±0.4 dB + absolute Amplitude Accuracy For pulses of 100 ns width or greater, duty cycles of .5 to .001, and S/N ratio ≥ 30 dB.
Duty factor, typical	±0.2% of reading For pulses of 450 ns width or greater, duty cycles of .5 to .001, and S/N ratio ≥ 30 dB.	±0.2% of reading For pulses of 150 ns width or greater, duty cycles of .5 to .001, and S/N ratio ≥ 30 dB.
Average transmitted power, typical	±0.4 dB + absolute Amplitude Accuracy For pulses of 300 ns width or greater, duty cycles of .5 to .001, and S/N ratio ≥ 30 dB.	±0.4 dB + absolute Amplitude Accuracy For pulses of 100 ns width or greater, duty cycles of .5 to .001, and S/N ratio ≥ 30 dB.
Peak pulse power, typical	±0.4 dB + absolute Amplitude Accuracy For pulses of 300 ns width or greater, duty cycles of .5 to .001, and S/N ratio ≥ 30 dB.	±0.4 dB + absolute Amplitude Accuracy For pulses of 100 ns width or greater, duty cycles of .5 to .001, and S/N ratio ≥ 30 dB.
Pulse width, typical	±0.25% of reading For pulses of 450 ns width or greater, duty cycles of .5 to .001, and S/N ratio ≥ 30 dB.	±0.25% of reading For pulses of 150 ns width or greater, duty cycles of .5 to .001, and S/N ratio ≥ 30 dB.

Pulse measurement characteristics (continued)

Characteristic	Center frequency	40 MHz bandwidth	320 MHz bandwidth	800 MHz bandwidth
Pulse-to-pulse carrier phase (non-chirped pulse), typical	2 GHz	±0.4°	±0.5°	NA
	4 GHz	NA	NA	±0.5°
	10 GHz	±0.4°	±0.5°	±0.5°
	20 GHz	±0.4°	±0.5°	±0.5°
Pulse-to-Pulse carrier phase (linear-chirped pulse), typical	2 GHz	±0.3°	±0.5°	NA
	4 GHz	NA	NA	±0.75°
	10 GHz	±0.3°	±0.5°	±0.75°
	20 GHz	±0.5°	±0.5°	±0.75°
Pulse-to-Pulse carrier frequency (non-chirped pulse), typical	2 GHz	±40 kHz	±400 kHz	NA
	4 GHz	NA	NA	±800 kHz
	10 GHz	±40 kHz	±400 kHz	±800 kHz
	20 GHa	±40 kHz	±400 kHz	±800 kHz
Pulse-to-Pulse carrier frequency (linear-chirped pulse), typical	2 GHz	±25 kHz	±400 kHz	NA
	4 GHz	NA	NA	±800 kHz
	10 GHz	±25 kHz	±400 kHz	±800 kHz
	20 GHz	±25 kHz	±400 kHz	±800 kHz

SignalVu-PC applications performance summary

Characteristic	Center frequency	40 MHz bandwidth	320 MHz bandwidth	800 MHz bandwidth
Pulse-to-Pulse delta frequency (non-chirped pulse), typical	2 GHz	±1 kHz	±20 kHz	NA
	4 GHz	NA	NA	±60 kHz
	10 GHz	±1 kHz	±20 kHz	±60 kHz
	20 GHz	±5 kHz	±25 kHz	±75 kHz
Pulse frequency linearity (Absolute Frequency Error RMS), typical	2 GHz	±10 kHz	±100 kHz	NA
	4 GHz	NA	NA	±200 kHz
	10 GHz	±10 kHz	±100 kHz	±200 kHz
	20 GHz	±10 kHz	±100 kHz	±200 kHz
Chirp frequency linearity (Absolute Frequency Error RMS), typical	2 GHz	±10 kHz	±150 kHz	NA
	4 GHz	NA	NA	±300 kHz
	10 GHz	±10 kHz	±150 kHz	±300 kHz
	20 GHz	±10 kHz	±150 kHz	±300 kHz

ACLR for 3GPP Down Link, 1 DPCH (2130 MHz), typical mean	-67 dB (Adjacent Channel) -67 dB (First Alternate Channel)
ACLR LTE, typical mean	-68 dB (Adjacent Channel) -70 dB w/Noise Correction (Adjacent Channel) -70 dB (First Alternate Channel) -73 dB w/Noise Correction (First Adjacent Channel)
ACLR P25 C4FM, HCPM, HDQPSK modulation (not noise corrected), typical mean	-85 dB, CF = 460 MHz, 815 MHz (Measured at 25 kHz offset, 6 kHz measurement bandwidth)
OBW measurement accuracy, typical mean	±0.35%
xdB Bandwidth measurement, typical mean	±3%, 0 to -18 dB below carrier

SignalVu-PC applications performance summary

Frequency and Phase Settling Time Measurement (Opt. SVT)

Measured input signal >-20 dBm. Attenuator: Auto.

Settled frequency uncertainty, typical mean

Measurement frequency	Averages	Bandwidth					
		800 MHz	320 MHz	50 MHz	10 MHz	1 MHz	100 kHz
1 GHz	Single measurement	NA	1 kHz	100 Hz	10 Hz	5 Hz	1 Hz
	100 averages	NA	200 Hz	25 Hz	5 Hz	0.5 Hz	0.1 Hz
	1000 averages	NA	100 Hz	10 Hz	1 Hz	0.25 Hz	0.05 Hz
10 GHz	Single measurement	2 kHz	1 kHz	100 Hz	10 Hz	5 Hz	1 Hz
	100 averages	500 Hz	200 Hz	25 Hz	5 Hz	0.5 Hz	0.1 Hz
	1000 averages	250 Hz	100 Hz	10 Hz	1 Hz	0.25 Hz	0.05 Hz
20 GHz	Single measurement	3 kHz	1 kHz	100 Hz	25 Hz	5 Hz	1 Hz
	100 averages	1 kHz	200 Hz	25 Hz	10 Hz	1 Hz	0.5 Hz
	1000 averages	500 Hz	100 Hz	10 Hz	5 Hz	0.5 Hz	0.1 Hz

Settled phase uncertainty, typical mean

Measurement frequency	Averages	Phase uncertainty (degrees)				
		800 MHz	320 MHz	50 MHz	10 MHz	1 MHz
1 GHz	Single measurement	NA	0.50	0.50	0.50	0.50
	100 averages	NA	0.1	0.05	0.05	0.05
	1000 averages	NA	0.02	0.01	0.01	0.01
10 GHz	Single measurement	0.50	0.50	0.50	0.50	0.50
	100 averages	0.1	0.1	0.05	0.05	0.05
	1000 averages	0.05	0.02	0.01	0.01	0.01
20 GHz	Single measurement	0.50	0.50	0.50	0.50	0.50
	100 averages	0.1	0.1	0.05	0.05	0.05
	1000 averages	0.05	0.02	0.01	0.01	0.01

AM/FM/PM measurement application (SVAxx-SVPC)

Carrier frequency range (analog demodulation)

(16 kHz or 1/2 × (audio analysis bandwidth) to maximum input frequency

Maximum audio frequency span (analog demodulation)

10 MHz

Global conditions for audio measurements

Input frequency: <2 GHz

RBW: Auto

Averaging: Off

Filters: Off

FM measurements (Mod. index >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 carrier power accuracy, typical mean

±0.85 dB

Carrier frequency: 10 MHz to 2 GHz

Input power: -20 to 0 dB

FM carrier frequency accuracy, typical mean

±0.5 Hz + (transmitter freq * reference freq error)

Deviation: 1 to 10 kHz

SignalVu-PC applications performance summary

FM deviation accuracy, typical mean	± (1% of (rate + deviation) + 50 Hz) Rate: 1 kHz to 1 MHz
FM rate accuracy, typical mean	±0.2 Hz
FM residual THD, typical mean	
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
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
Audio filters	Low pass: 300 Hz, 3 kHz, 15 kHz, 30 kHz, 80 kHz, 300 kHz and user-entered up to 0.9*(audio bandwidth) High pass: 20 Hz, 50 Hz, 300 Hz, 400 Hz, and user-entered up to 0.9*(audio bandwidth) Standards-based: CCITT, C-Message De-emphasis (µs): 25, 50, 75, 750, and user-entered User defined audio file format: User-supplied .TXT or .CSV file of amplitude/frequency pairs. Maximum 1000 pairs

Mapping (MAPxx-SVPC)

Supported map types	Pitney Bowes MapInfo (*.mif), Bitmap (*.bmp), Open Street Maps (.osm)
Saved measurement results	Measurement data files (exported results)
Map file used for the measurements	Google Earth KMZ file
Recallable results files (trace and setup files)	MapInfo-compatible MIF/MID files

Environmental specifications

Atmospherics

Temperature	**RF Converter:** Operating: 0 ° C to + 40 ° C Non-operating: - 20 °C to +60 °C **Controller:** Operating: +10 ° C to + 35 ° C Non-operating: -20 °C to +60 °C
Relative humidity non-condensing, typical	**RF Converter** Operating: 10% to 90%, up to 40 °C **Controller** Operating: 40 to 70 %
Altitude	**RF Converter:** Operating: Up to 2000 m Non-Operating: Up to 12000 m **Controller:** Operating: Up to 3000 m Non-operating: Up to 12000 m

Installation requirements

Heat dissipation

RSA7100A Maximum Power Dissipation (fully loaded)	400 W maximum. Maximum line current is 4.5 Amps at 90 V line. 300 W typical
CTRL7100A maximum power dissipation (fully loaded)	500 W maximum. Maximum line current is 5.5 Amps at 90 V line. 400 W typical

Cooling (RSA7100A)

Bottom/Top	44.45 mm (1.75 in)
Both sides	44.45 mm (1.75 in)
Rear	76.2 mm (3.0 in)

Cooling (CTRL7100A)

Bottom/Top/Both sides	6.4 mm (0.25 in)
Front/Rear	76.2 mm (3.00 in)

Primary line voltage

Voltage	100 to 240 V at 50/60 Hz
Voltage range limits	90 to 264 V at 47 to 63 Hz

Physical specifications

RSA7100A physical dimensions

Width	445.5 mm (17.54 in)
Height	177.1 mm (6.79 in)
Length	577.9 mm (22.75 in)
Weight	24.2 kg (53.2 lbs)

CTRL7100A I/O	PCIe 2x USB 3.0 on front panel 2x USB 3.0 on rear panel 2x USB 2.0 on rear panel 17 removable drive bays (1 for OS, 16 for RAID) 6 Mini-Display ports 2x 10 Gbit Ethernet 1x 40 Gbit Ethernet (Mellanox ConnectX-3 Ethernet Adapter) with QSFP connector type

Physical specifications

CTRL7100A RAID

Disk size and lifetime, 800 MHz bandwidth

RAID option	Total time of all records	Expected lifetime of disk
Option B at 1000 MS/s	55 min	290 hr
Option B at 1000 MS/s, stored unpacked	40 min	226 hr
Option C at 1000 MS/s	165 min	900 hr
Option C at 1000 MS/s, stored unpacked	120 min	680 hr

CTRL7100A internal characteristics

GPU: AMD W9100

Dual Intel® Xeon® Processor E5-2623 v4 (10M Cache, 2.6 GHz)

Clock 2.6 GHZ

Internal Cache 10MB

64GB DDR4 2133 MHz RAM

Optional RAID controller and front-panel removable drives supports 4 GB/s streaming and up to 32 TB memory

OS: Windows 7

RSA7100A interfaces, inputs, and output ports

Connectors

RF input	40 GHz Planar Crown bulkhead with 3.5mm female coax adapter
External frequency reference input	BNC, female
External frequency reference output	BNC, female
Trigger/Sync input	BNC, female
Noise source control	BNC, female
GPS antenna	SMA, female
IRIG-B input	BNC, female
1PPS input/output	SMA, female

Status indicators

Power LED	LED, red

Dynamics

Random vibration	RF Converter, Operating: 5-500 Hz, 0.3 G rms
	Controller, Operating: 5-500 Hz, 1.0 G rms
Shock operating	RF Converter, Operating: 30 G, half-sine, 11ms duration
	RF Converter, Non-operating: 5-500 Hz, 2.45 G rms
	Controller, Operating: 15 G, half-sine, 11ms duration
	Controller, Non-operating: 5-500 Hz, 2.28 G rms
	(Converter RF attenuator may change states during horizontal shock. To reset, change to any other state and back to desired state.)
Shock non-operating	RF Converter: 30 G, half-sine, 11ms duration
	Controller: 25 G, half-sine, 11ms duration

Ordering information

RSA7100A

Real-Time Spectrum Analyzer, up to 800 MHz acquisition bandwidth. The RSA7100A includes the RF acquisition unit and the CTRL-7100A controller together as a single orderable item. The CTRL-7100A controller is also available as a separate item if additional or replacement controllers are needed.

Includes: Installation and safety manual, 3.5mm Crown Connector-Female, PCIe cable, mouse, keyboard, adapter: Mini-Display Port to HDMI, Mini-Display Port to DVI. Power cables, rack mount kits for acquisition unit and controller. Controller rack-mount is a 'telecom-style'. A server-style rackmount can also be used with the controller, available from third parties.

Note: A PC monitor is not included with the RSA7100A. Tektronix recommends the Dell UltraSharp U2414H 23.8 inch Widescreen IPS LCD Monitor, or any monitor that supports Display port, DVI or HDMI input and has a minimum 1920 x 1080 display resolution.

How to order

When ordering the RSA7100A, the CTRL-7100A controller is included. The CTRL7100A is available in three configurations depending on the RAID configuration. You can select no RAID, or a RAID with 20 minutes or 120 minutes recording time. You also select between two frequency ranges and whether you would like to have an internal GPS receiver and/or an ISO17025 calibration data report.

SignalVu-PC licenses can be ordered as options to the RSA7100A and are installed on the included controller during manufacturing, minimizing order complexity and saving you time in configuration upon receiving your instrument. These licenses are node-locked to the controller and can be moved twice over the lifetime of the license. Standalone licenses, either node-locked or floating, can be ordered and customer-installed on the controller if greater flexibility is needed.

RSA7100A hardware options

RSA7100A options	Description	Ordering instructions
RSA7100A	Real-time spectrum analyzer, 320 MHz bandwidth	
Opt. 14	Frequency range 16 kHz-14 GHz	Select one
Opt. 26	Frequency range 16 kHz-26.5 GHz	
Opt. GPS	GPS receiver, 1PPS, and IRIG-B	Select one
Opt. NO GPS	No GPS receiver, 1PPS, or IRIG-B	
Opt. CAL	Calibration report with data (ISO 17025)	
Opt. GPS CAL	GPS receiver, 1PPS, IRIG-B, and calibration report with data (ISO17025)	
Opt. C7100-A	Controller, no RAID storage	Select one
Opt. C7100-B	Controller, RAID storage, 20 minutes recording time at 800 MHz bandwidth (requires STREAMNL-SVPC)	
Opt. C7100-C	Controller, RAID storage, > 120 minutes recording time at 800 MHz bandwidth (requires STREAMNL-SVPC)	
Opt. SV09	High performance real time (export class 3A002), node-locked license	Mandatory option

RSA7100A license options

The application licenses below can be added to the controller of your RSA7100A at the time of manufacture, saving you time in managing the installation of the licenses.

All licenses installed in the factory are node-locked to the controller. Floating licenses are also available, managed with the Tektronix Asset Management System (Tek AMS). For a complete list of separately purchased floating and node-locked license, see the SignalVu-PC datasheet for ordering information.

SignalVu-PC licenses ordered as options to RSA7100A and installed on the included controller (Factory installed on unit)	Description	License type
Opt. B800NL-SVPC	800 MHz acquisition bandwidth (for frequencies > 3.6 GHz)	Node locked
Opt. CUSTOM-APINL-SVPC	Streaming API for customer-defined access of RSA7100A analyzer	Node locked

SignalVu-PC licenses ordered as options to RSA7100A and installed on the included controller (Factory installed on unit)	Description	License type
Opt. STREAMNL-SVPC	IQFlow™ streaming data to RAID (requires option C7100-B or C7100-C) and 40 GbE	Node locked
Opt. SVMHNL-SVPC	General Purpose Modulation Analysis to work with analyzer of any acquisition bandwidth and MDO	Node locked
Opt. SVPHNL-SVPC	Pulse Analysis to work with analyzer of any acquisition bandwidth and MDO	Node locked
Opt. TRIGHNL-SVPC	Advanced triggers (Frequency Mask, Density) to work with RSA7100A	Node locked
Opt. MAPNL-SVPC	Mapping and signal strength	Node locked
Opt. SV54NL-SVPC	Signal survey and classification	Node locked
Opt. PHASNL-SVPC	Phse noise / jitter measurements	Node locked
Opt. SVTNL-SVPC	Settling Time (frequency and phase) measurements	Node locked
Opt. SV23NL-SVPC	WLAN 802.11a/b/g/j/p measurement	Node locked
Opt. SV24NL-SVPC	WLAN 802.11n measurement (requires SV23)	Node locked
Opt. SV25HNL-SVPC	WLAN 802.11ac measurement to work with analyzer of acquisition bandwidth ≤40 MHz and MDO4000B/C (requires SV23 and SV24)	Node locked
Opt. SV26NL-SVPC	APCO P25 measurement	Node locked
Opt. SV27NL-SVPC	Bluetooth measurement to work with analyzer of acquisition bandwidth ≤40 MHz and MDO4000B/C	Node locked
Opt. SV28NL-SVPC	LTE Downlink RF measurement to work with analyzer of acquisition bandwidth ≤40 MHz and MDO4000B/C	Node locked
Opt. SV31NL-SVPC	Bluetooth 5 measurements (requires SV27)	Node locked
Opt. SVANL-SVPC	AM/FM/PM/Direct Audio Analysis	Node locked
Opt. SVONL-SVPC	Flexible OFDM Analysis	Node locked
Opt. SVQPNL-SVPC	EMI CISPR Detectors	Node locked
Opt. CONNL-SVPC	SignalVu-PC connection to the MDO4000B/C series mixed-domain oscilloscopes	Node locked

Recommended accessories

174-6990-00	Additional PCIe cable, PCIE X8, Straight connector on both ends, Molex
650-5991-00	Additional 512 GB solid-state drive with Windows 7, SignalVu-PC installed
131-9062-xx	Additional 3.5 mm Crown Connector-Female
RSA7100RAID-B	Replacement solid-state drives for RSA7100A option C7100-B, or CTRL7100A Option B. 10 1-TB drives included, customer-installable
RSA7100RAID-C	Replacement solid-state drives for RSA7100A option C7100-C, or CTRL7100A Option C. 16 2-TB drives included, customer installable

Language options for the RSA7100A

Opt. L0	English manual
Opt. L5	Japanese manual
Opt. L7	Simplified Chinese manual
Opt. L99	No manual

Power plug options

Opt. A0	North America power plug (115 V, 60 Hz)
Opt. A1	Universal Euro power plug (220 V, 50 Hz)
Opt. A2	United Kingdom power plug (240 V, 50 Hz)
Opt. A3	Australia power plug (240 V, 50 Hz)
Opt. A4	North America power plug (240 V, 50 Hz)
Opt. A5	Switzerland power plug (220 V, 50 Hz)
Opt. A6	Japan power plug (100 V, 50/60 Hz)
Opt. A10	China power plug (50 Hz)
Opt. A11	India power plug (50 Hz)
Opt. A12	Brazil power plug (60 Hz)
Opt. A99	No power cord

Service options

Opt. C3	Calibration Service 3 Years
Opt. C5	Calibration Service 5 Years
Opt. G3	Complete Care 3 Years (includes loaner, scheduled calibration, and more)
Opt. G5	Complete Care 5 Years (includes loaner, scheduled calibration, and more)

Complimentary products

DataVu-PC is recommended for users who record data using the RSA7100A streaming and RAID options. Ordering information for DataVu-PC is shown below. See the separate DataVu-PC datasheet for details on licensing, minimum PC requirements, features, and functions.

DataVu-PC ordering information

DataVu-PC is distributed via www.tek.com. Hard copy versions of the software are not available. An operation manual is distributed in .pdf format with the software.

When purchasing DataVu-PC, you choose any one of the three base version DVPC-SPAN licenses (50 MHz, 200 MHz or 1000 MHz). The only difference between span licenses is the bandwidth of the allowed analysis. Choose the bandwidth that covers the maximum bandwidth of your acquisition/recording system. For example, all USB-based analyzers are accommodated with the DVPC-SPAN50 license, and all RSA7100A recordings at full bandwidth require DVPC-SPAN1000.

DVPC-SMARK, DVPC-MREC, and DVPC-PULSE work with any DVPC-SPAN bandwidth license chosen for analysis. The DVPC-SMARK license requires a DVPC-SPAN license of any bandwidth, and the DVPC-MREC and DVPC-PULSE licenses require a DVPC-SMARK license.

Nomenclature	License type	Description
DVPC-SPAN50NL	Node locked	Base version, DataVu-PC operation on acquisitions to 50 MHz bandwidth, plus LiveVu operation of one USB instrument
DVPC-SPAN50FL	Floating	
DVPC-SPAN200NL [6]	Node locked	Base version, DataVu-PC operation on acquisitions to 200 MHz bandwidth, plus LiveVu operation of one USB instrument
DVPC-SPAN200FL [6]	Floating	
DVPC-SPAN1000NL	Node locked	Base version, DataVu-PC operation on acquisitions to 1000 MHz bandwidth, plus LiveVu operation of one USB instrument
DVPC-SPAN1000FL	Floating	
DVPC-SMARKNL	Node locked	DataVu-PC Smart Markers, Time Overview, and Frequency Mask Search (requires base version)
DVPC-SMARKFL	Floating	

6 If you have a data source that operates at 50 MHz to 200 MHz bandwidth, such as a Tektronix RSA5000 or RSA6000 series spectrum analyzer with a third-party recording solution, choose DVPC-SPAN200.

Nomenclature	License type	Description
DVPC-MRECNL	Node locked	Multi-unit recording for USB spectrum analyzers (requires DVPC-SMARK)
DVPC-MRECFL	Floating	
DVPC-PULSENL	Node locked	DataVu-PC pulse analysis (requires DVPC-SMARK)
DVPC-PULSEFL	Floating	

CTRL7100A: Additional controllers for the RSA7100A

Additional controllers are available for the RSA7100A should you need to have controllers in multiple locations. The CTRL7100A is identical to the unit included with the RSA7100A. For detailed ordering information, see the CTRL7100A datasheet on www.Tek.com.

Additional spare RAID drive set for the controller

The following replacement or spare RAID drive sets are also available from Tektronix. These are drop-in replacements for when a spare is needed or when the original drive wears out. You will need to have a CTRL7100A with Option STREAMNL-SVPC installed in order to use the replacement and spare RAID sets.

Nomenclature	Description
CTRL7100UP Opt X-RAID-B	Additional solid-state drives for RSA7100A option C7100-B, or CTRL7100A Option B. 10 1-TB drives included, customer-installable. 20 Minutes recording capacity at 800 MHz bandwidth.
CTRL7100UP Opt X-RAID-C	Additional solid-state drives for RSA7100A option C7100-C, or CTRL7100A Option C.16 2-TB drives included, customer installable. 120 Minutes recording capacity at 800 MHz bandwidth.

CE

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

GPIB IEEE-488

Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.

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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.tek.com.

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