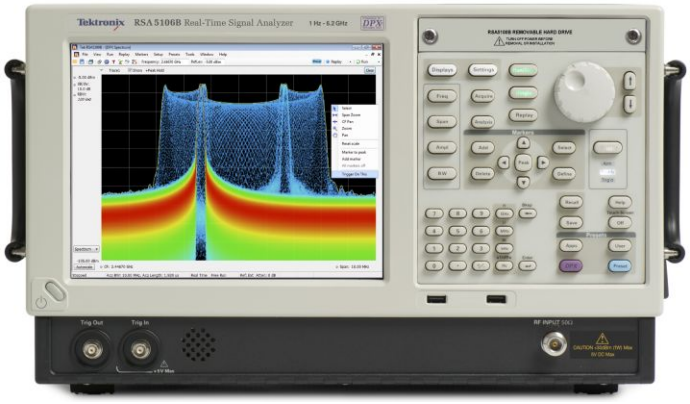
Tektronix®

스펙트럼 분석기 데이터 시트

RSA5000 시리즈



RSA5000 시리즈 실시간 신호 분석기는 기존 계측기를 대체하여 일상적인 작업에 필요한 측정 신뢰성과 기능을 제공합니다.RSA5000 시리즈는 업계 최고의 실시간 사양을 제공하며 100 % 인터셉트 확률과 최고의 실시간 동적 범위를 위한 최고의 최소 신호 지속 시간을 포함합니다.RSA5000 시리즈 장비를 사용하면 고성능 스펙트럼 분석기, 광대역 벡터 신호 분석기의 기능 및 실시간 스펙트럼 분석기의 고유 한 트리거 캡처 분석 기능을 모두 단일 패키지로 얻을 수 있습니다.

주요 성능 사양

- 2GHz에서 + 17dBm 3 차 차단
- 3GHz까지 ± 0.3dB 절대 진폭 정확도
- 표시된 평균 노이즈 레벨 : 26.5GHz에서 –142dBm / Hz, 2GHz에서 –157dBm / Hz 및 10kHz에서 –150dBm / Hz
- 내부 프리 앰프 사용 가능 : 26.5GHz에서 -156dBm / Hz의 DANL,
- 2GHz에서 -167dBm / Hz
- 위상 노이즈 : 1GHz에서 –113dBc / Hz 및 10MHz 반송 주파수에서 –134dBc / Hz, 10kHz 오프셋
- 고해상도 및 저소음의 고속 스위프 : 1 초 미만의 10kHz RBW에서 1GHz 스위프
- HD 옵션으로 실시간 스퓨리어스없는 동적 범위 80dB

주요 특징

- 실시간 신호 처리로 고장 발생 시간을 줄이고 설계 신뢰도 향상
  - 초당 최대 3,125,000 개의 스펙트럼으로 0.434µs 신호에 대해 100 % 인터셉트 가능
  - 스위프 DPX 스펙트럼으로 전체 주파수 범위에서 전례없는 신호 발견 가능
  - 스윕 DPX, 갭 프리 DPX 스펙트로 그램 및 실시간 진폭, 주파수 또는 위상을 가진 DPX 제로 스팬을 포함한 고급 DPX
- 문제에서 제로 트리거
  - 주파수 영역에서 0.434µs의 짧은 단일 발생에서 DPX density™ 트리거로 연속 신호와 드문 이벤트를 구분
  - 고급 시간 한정, 런트 및 주파수 에지 트리거는 20ns의 짧은 시간 동안 복잡한 신호에 작용
- 가장 넓고 깊은 신호 캡처
  - 25, 40, 85, 125 또는 165 MHz 수집 대역폭
  - HD 옵션으로 전체 획득 대역폭에서 80dB의 스퓨리어스 없는 동적 범위
  - 165MHz 대역폭에서 5 초 이상 획득
- 광대역 사전 선택 필터는 최대 165MHz의 전체 분석 대역폭에서 이미지(free) 측정 제공
- 일상 도구에서 기대하는 것보다 더 많은 표준 분석
  - 채널 전력, ACLR, CCDF, OBW / EBW, 스퍼(Spur) 검색, EMI 검출기를 포함한 측정
  - 진폭, 주파수, 위상 대 시간, DPX 스펙트럼 및 스펙트로그램
  - 상관 된 다중 도메인 디스플레이

- 최고의 실시간 및 다이나믹 레인지를 위한 성능 옵션 및 분석 옵션으로 부가 가치 제공
  - 높은 다이내믹 레인지 옵션은 가장 넓은 획득 대역폭에서 최고의 80dBc 스퓨리어스 없는 분석을 제공합니다
  - 고성능 DPX는 100 % 인터셉트 확률로 업계 최고의 최소 신호 지속 시간을 제공합니다
  - 특정 응용 프로그램 및 표준에 대한 전용 측정을 추가하기위한 선택적 소프트웨어 응용 프로그램
  - AM / FM / PM 변조 및 오디오 측정 (옵션 10)
  - 위상 노이즈 및 지터 (옵션 11)
  - 자동 정착 시간 측정 (주파수 및 위상) (옵션 12)
  - 30 개 이상의 펄스 측정, 사후 분석 및 누적 통계를 위해 200,000 개 이상의 펄스 획득이 가능합니다. (옵션 20)
  - 20 가지 이상의 변조 유형에 대한 범용 변조 분석 (옵션 21)
  - Phase 1 (C4FM) 및 Phase 2 (TDMA)에 대한 간단하고 완전한 APCO Project 25 트랜스미터 적합성 테스트 및 분석 (옵션 26)
  - 802.11 a / b / g / j / p, 802.11n 및 802.11ac에 대한 WLAN 분석 (옵션 23, 24, 25)
  - 잡음 지수 및 이득 측정 (옵션 14) Bluetooth® 분석 (옵션 27 및 옵션 31)
  - 수동 및 자동 측정 매핑 및 신호 강도 기능은 수신 신호 강도의 오디오 톤 및 시각적 표시를 제공합니다 (옵션 MAP)
  - LTE ™ FDD 및 TDD 기지국 (eNB) 송신기 RF 측정 (옵션 28)
  - 신호 분류 및 조사
  - EMC / EMI 사전 준수 및 문제 해결 (옵션 32)

응용 분야

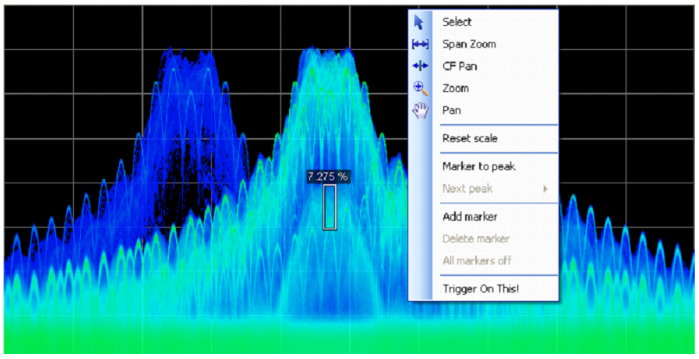
- 광대역 레이더 및 펄스 RF 신호
- 주파수 민첩한 통신
- 광대역 위성 및 전자 레인지 백홀 링크
- 교육
- 장기 진화 (LTE), 셀룰러
- EMC / EMI 사전 준수 및 문제 해결

고성능 스펙트럼 및 벡터 신호 분석 등

RSA5000 시리즈는 기존의 고성능 신호 분석기를 대체하여 일상적인 작업에 필요한 측정 신뢰성과 기능을 제공합니다. 2 GHz에서 +17dBm TOI 및 -157dBm/Hz DANL은 까다로운 스펙트럼 분석 측정에 필요한 동적 범위를 제공합니다. 모든 분석은 완전히 사전 선택되어 있으며 이미지가 없습니다. '사전 선택기 전환'을 통해 동적 범위와 분석 대역폭을 절충 할 필요가 없습니다.

채널 전력, ACLR, CCDF, 점유 대역폭, AM / FM / PM 및 스퓨리어스 측정을 포함한 전체 전력 및 신호 통계 측정 도구 세트가 표준입니다. 사용 가능한 위상 노이즈 및 범용 변조 분석 측정은 예상되는 고성능 분석 도구 세트를 완성합니다. 그러나 우수한 미드 레인지 신호 분석기만으로는 오늘날의 호핑된 과도 신호 요구를 충족시키기에 충분하지 않습니다.

RSA5000 시리즈는 다른 신호 분석기가 놓칠 수 있는 설계 문제를 쉽게 발견 할 수 있도록 도와줍니다. 혁신적인 DPX® 스펙트럼 디스플레이는 주파수 영역에서 시간이 지남에 따라 변화하는 신호 과도에 대한 직관적 인 생생한 컬러 뷰를 제공하여 설계의 안정성에 대한 즉각적인 확신을 주거나 결함 발생시 즉시 오류를 표시합니다. DPX®에서 문제가 발견되면 RSA5000 시리즈 스펙트럼 분석기를 이벤트에서 트리거 하고, 변화하는 RF 이벤트의 연속 시간 기록을 캡처하고, 모든 도메인에서 시간 상관 분석을 수행하도록 설정할 수 있습니다. 고성능 스펙트럼 분석기, 광대역 벡터 신호 분석기의 기능 및 실시간 스펙트럼 분석기의 고유 한 트리거 캡처 분석 기능을 모두 단일 패키지로 제공합니다.



혁신적인 DPX® 스펙트럼 디스플레이는 불안정성, 글리치 및 간섭을 감지하는 데 도움이 되는 과도 신호 동작을 보여줍니다. 여기서 세 가지 뚜렷한 신호를 볼 수 있습니다. 발생 빈도가 다른 두 개의 높은 수준의 신호가 밝은 파란색과 진한 파란색으로 표시되며 중앙 신호 아래의 세 번째 신호도 식별 할 수 있습니다. DPX Density™ 트리거를 사용하면 이 세 번째 신호가 있는 경우에만 분석 할 신호를 수집 할 수 있습니다.
Trigger On This ™가 활성화되었으며 신호 밀도 7.275 %를 측정하는 밀도 측정 상자가 자동으로 열립니다. 측정 된 값보다 큰 신호 밀도는 트리거 이벤트를 유발합니다.

디스커버 (Discover)

특허 받은 DPX® 스펙트럼 처리 엔진은 과도 현상에 대한 실시간 분석을 스펙트럼 분석기에 제공합니다.

초당 최대 3,125,000 개의 주파수 변환을 수행하면 길이가 0.434µs 인 최소 이벤트 지속 시간의 과도가 주파수 영역에 표시됩니다.

이것은 스윕 분석 기술보다 훨씬 빠릅니다. 비트 맵 디스플레이에서 발생률을 기준으로 이벤트를 색상으로 구분하여 일시적인 신호 동작에 대한 탁월한 통찰력을 제공합니다. DPX 스펙트럼 프로세서는 계측기의 전체 주파수 범위에서 스윕 할 수 있으므로 스펙트럼 분석기에서 이전에는 사용할 수 없었던 광대역 과도 캡처가 가능합니다.

스펙트럼 정보 만 필요한 응용 프로그램에서 DPX는 갭이 없는 스펙트럼 기록, 재생 및 최대 60,000 개의 스펙트럼 트레이스 분석을 제공합니다. 스펙트럼 기록 해상도는 라인 당 125µs ~ 6400s로 다양합니다.

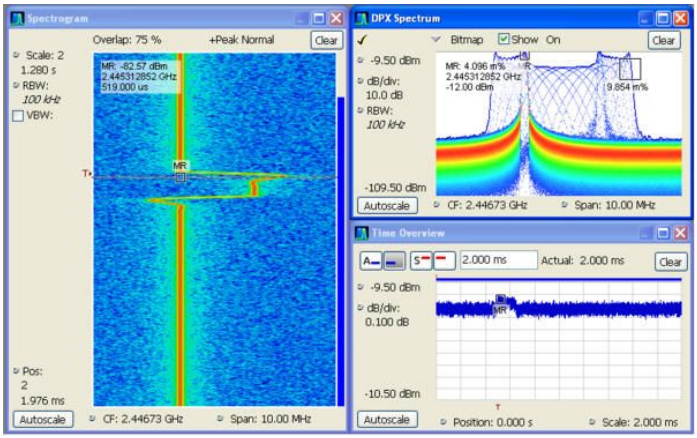
트리거 (Trigger)

텍트로닉스는 오랜 혁신적인 혁신 기능을 보유하고 있으며 RSA 시리즈 스펙트럼 분석기는 트리거 신호 분석에서 업계를 선도합니다. RSA5000 시리즈는 시간에 따른 전력, 런트, 밀도, 주파수 및 주파수 마스크 트리거를 포함하여 최신 디지털 구현 RF 시스템의 문제를 해결하는 데 필요한 고유 한 트리거를 제공합니다.

펄스 트레인에서 '짧은 펄스'또는 '긴 펄스'를 캡처하거나 주파수 마스크 트리거에 적용 할 때 주파수 도메인 이벤트가 지속될 때만 트리거 할 수 있도록 내부 트리거 소스에 시간 제한을 적용 할 수 있습니다. 지정된 시간. 런트 트리거는 잘못된 레벨로 켜지거나 꺼지는 문제가 되는 드문 펄스를 캡처 하여 오류 발생 시간을 크게 줄입니다.

DPX Density™ 트리거는 DPX 디스플레이의 측정 발생 빈도 또는 밀도에서 작동합니다. 고유 한 Trigger On This ™ 기능을 사용하면 DPX 디스플레이에서 원하는 신호를 간단히 가리킬 수 있으며 트리거 레벨은 측정 된 밀도 레벨보다 약간 아래에서 트리거 되도록 자동 설정됩니다. 버튼을 클릭하면 높은 수준의 신호가 있을 때 낮은 수준의 신호를 캡처 할 수 있습니다. FMT (주파수 마스크 트리거)는 획득 대역폭 내에서 주파수 점유의 모든 변경 사항을 모니터링 하도록 쉽게 구성됩니다.

시간 도메인에서 작동하는 전력 트리거는 사용자 설정 전력 임계 값을 모니터링 하도록 설정할 수 있습니다. 분해능 대역폭은 대역 제한 및 잡음 감소를 위해 전력 트리거와 함께 사용될 수 있습니다. 시스템 이벤트를 테스트하기 위해 두 개의 외부 트리거를 동기화에 사용할 수 있습니다.



트리거 및 캡처 : DPX Density™ 트리거는 주파수 도메인의 변화를 모니터링하고 위반 사항을 메모리에 캡처 합니다. 스펙트로 그램 디스플레이 (왼쪽 패널)는 시간에 따른 주파수 및 진폭 변화를 보여줍니다. 스펙트럼 위반이 DPX Density™ 트리거를 트리거 한 스펙트로 그램에서 특정 시점을 선택하면 주파수 도메인보기 (오른쪽 패널)가 자동으로 업데이트되어 정확한 순간에 세부적인 스펙트럼보기가 표시됩니다.

캡처(Capture)

큰 신호가 있는 경우 작은 신호를 실시간으로 캡처 할 수 있으며 최대 165MHz (Opt. B16x)까지 모든 획득 대역폭에서 70dB SFDR 이상이 가능합니다. B85HD, B125HD 및 B16xHD 옵션을 사용하면 광대역 획득 시스템의 동적 범위를 비교할 수 없는 80dB로 향상시킬 수 있습니다. 한 번만 캡처-다시 조정하지 않고 여러 번 측정합니다. 획득 대역폭의 모든 신호는 RSA5000 시리즈 딥 메모리에 기록됩니다. 레코드 길이는 선택한 확장 대역폭 (165MHz에서 최대 5.36 초, 1MHz에서 343.5 초 또는 10kHz 대역폭에서 6.1 시간)에 따라 메모리 확장 (Opt. 53)에 따라 다릅니다. 오프라인 분석을 위해 최대 2GB 길이의 수집을 MATLAB ™ Level 5 형식으로 저장할 수 있습니다. 대부분의 스펙트럼 분석기는 협 대역 조정 가능 대역 통과 필터를 사용하며, 종종 YTF (YIG Tuned Filter)를 사용하여 사전 선택기 역할을 합니다. 이 필터는 이미지 제거를 제공하고 첫 번째 믹싱 단계에 존재하는 신호의 수를 제한하여 스윕 된 애플리케이션에서 스퓨리어스 성능을 향상시킵니다.

YTF는 기본적으로 협 대역 장치이며 일반적으로 50MHz 미만의 대역폭으로 제한됩니다. 이 분석기는 광대역 분석을 수행 할 때 입력 필터를 우회하여 실시간 신호 분석과 같이 광대역 분석이 필요한 모드에서 작동 할 때 이미지 응답에 취약합니다. YTF가있는 스펙트럼 분석기와 달리 Tektronix 실시간 신호 분석기는 광대역 이미지가 없는 아키텍처를 사용하여 계측기가 조정 된 대역 외 주파수의 신호가 스퓨리어스 또는 이미지 응답을 생성하지 않도록 합니다.
이 이미지 없는 응답은 모든 이미지 응답이 억제되도록 설계된 일련의 입력 필터를 통해 달성됩니다. 입력 필터는 가장 넓은 획득 대역폭보다 겹치므로 전체 대역폭 획득이 항상 가능합니다. 이 시리즈의 필터는 다른 스펙트럼 분석기에서 사용되는 사전 선택기의 목적을 제공하지만 모든 기기 대역폭 설정 및 모든 주파수에서 이미지 없는 응답을 계속 제공하면서 항상 켜져 있다는 이점이 있습니다.

분석

RSA5000 시리즈는 부품 또는 RF 시스템 설계, 통합 및 성능 검증 분야의 엔지니어 또는 네트워크 또는 스펙트럼 관리 분야의 운영 엔지니어에게 생산성을 향상시키는 분석 기능을 제공합니다. 스펙트로그램은 스펙트럼 분석 외에도 시간에 따른 주파수 및 진폭 변화를 모두 표시합니다. 주파수, 위상, 진폭 및 변조 영역에서 시간 상관 측정을 수행 할 수 있습니다. 이는 주파수 호핑, 펄스 특성, 변조 스위칭, 안정화 시간, 대역폭 변경 및 간헐적 신호를 포함한 신호 분석에 이상적입니다.
RSA5000 시리즈의 측정 기능과 사용 가능한 옵션 및 소프트웨어 패키지는 다음 섹션에 요약되어 있습니다.

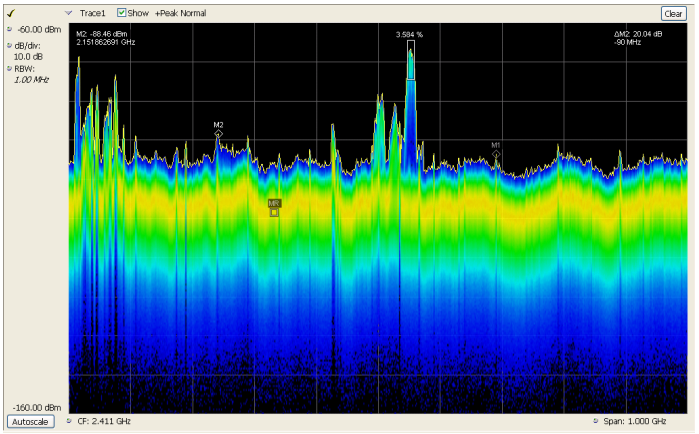
Measurement functions

Standard measurements	Description
Spectrum analyzer measurements	Channel power, Adjacent channel power, Multicarrier adjacent channel power/leakage ratio, Spectrum emissions mask, Occupied bandwidth, xdB down, dBm/Hz marker, dBc/Hz marker
Real time measurements	DPX Spectrum with density measurements, DPX Spectrogram with spectrums vs. time, Zero-Span DPX with up to 50,000 updates/sec
Time domain and statistical measurements	RF IQ vs Time, Power vs Time, Frequency vs Time, Phase vs Time, CCDF, Peak-to-Average Ratio
Spur search measurement	Up to 20 frequency ranges, user-selected detectors (Peak, Average, QP), filters (RBW, CISPR, MIL), and VBW in each range. Linear or log frequency scale. Measurements and violations in absolute power or relative to a carrier. Up to 999 violations identified in tabular form for export in .CSV format
Analog modulation analysis measurement functions	% amplitude modulation (+, -, total) frequency modulation (±Peak, +Peak, -Peak, RMS, Peak-Peak/2, frequency error) phase modulation (±Peak, RMS, +Peak, -Peak)
DPX density measurement	Measures % signal density at any location on the DPX spectrum display and triggers on specified signal density

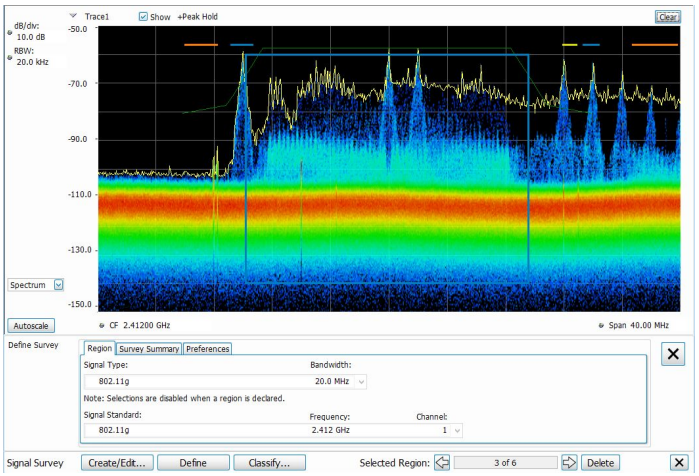
Measurement options	Description
AM/FM/PM modulation and audio measurements (Opt. 10)	carrier power, frequency error, modulation frequency, modulation parameters (±Peak, Peak-Peak/2, RMS), SINAD, modulation distortion, S/N, THD, TNHD
Phase noise and jitter measurements (Opt. 11)	10 Hz to 1 GHz frequency offset range, log frequency scale traces - 2: ±Peak trace, average trace, trace smoothing, and averaging
Settling Time (Frequency and Phase) (Opt. 12)	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

Measurement options	Description
Noise Figure and Gain measurements (Opt. 14)	Measurement displays of noise figure, gain, Y-factor, noise temperature, and tabular results. Single-frequency metering and swept-trace results are available. Support for industry-standard noise sources. Measures amplifiers and other non-frequency converting devices plus fixed local-oscillator up and down converters. Performs mask testing to user-defined limits. Built in uncertainty calculator.
Advanced pulse measurements suite (Opt. 20)	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.
General Purpose Digital Modulation Analysis (Opt. 21)	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
Flexible OFDM Analysis (Opt. 22)	OFDM analysis for WLAN 802.11a/j/g and WiMAX 802.16-2004
WLAN 802.11a/b/g/j/p measurement application (Opt. 23)	All of the RF transmitter measurements as defined in the IEEE standard, as well as a wide range of additional measurements including Carrier Frequency error, Symbol Timing error, Average/peak burst power, IQ Origin Offset, RMS/Peak EVM, and analysis displays, such as EVM and Phase/Magnitude Error vs. time/ frequency or vs. symbols/ subcarriers, as well as packet header decoded information and symbol table. Option 24 requires option 23. Option 25 requires option 24.
WLAN 802.11n measurement application (Opt. 24)	
WLAN 802.11ac measurement application (Opt. 25)	
APCO P25 compliance testing and analysis application (Opt. 26)	Complete set of push-button TIA-102 standard-based transmitter measurements with pass/fail results including ACPR, transmitter power and encoder attack times, transmitter throughput delay, frequency deviation, modulation fidelity, symbol rate accuracy, and transient frequency behavior, as well as HCPM transmitter logical channel peak ACPR, off slot power, power envelope and time alignment.

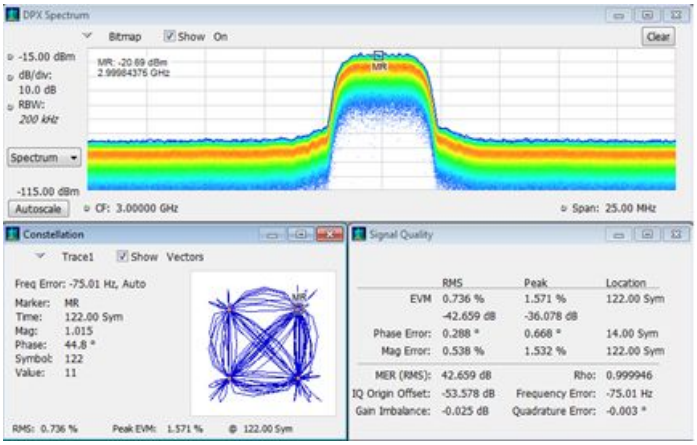
Measurement options	Description
Bluetooth Basic LE TX SIG measurements (Opt. 27)	기본 속도 및 Bluetooth 저에너지에 대해 Bluetooth SIG에서 정의한 송신기 측정에 대한 사전 설정 결과에는 합격 / 불합격 정보도 포함됩니다. 응용 프로그램은 또한 패킷 헤더 필드 디코딩을 제공하며 향상된 데이터 속도를 포함하여 표준을 자동으로 감지 할 수 있습니다.
Bluetooth 5 measurements (Opt. 31)	Bluetooth 저에너지 버전 5에 대한 Bluetooth SIG 측정 결과에는 통과 / 실패 정보도 포함됩니다. 응용 프로그램은 또한 LE 데이터 패킷의 패킷 헤더 필드 디코딩을 제공합니다. 옵션 31에는 옵션 27이 필요합니다.
LTE Downlink RF measurements (Opt. 28)	셀 ID, ACLR, SEM, 채널 전원 및 TDD Toff 전원에 대한 사전 설정. TDD 및 FDD 프레임 형식과 3GPP TS 버전 12.5로 정의 된 모든 기지국을 지원합니다. 결과에는 합격 / 불합격 정보가 포함됩니다. 연결된 계측기의 대역폭이 충분한 경우 실시간 설정으로 ACLR 및 SEM 측정이 빨라집니다.
Mapping and signal strength (Opt. MAP)	내장 된 매핑 소프트웨어가 수동 및 자동 드라이브 테스트를 모두 지원합니다. USB 또는 Bluetooth® 연결을 통해 상용 상용 타사 GPS 수신기가 지원됩니다. MapInfo 형식 및 스캔 된 버전 맵을 지원합니다. 또한 포스트 분석을 위해 인기 있는 Google 어스 및 MapInfo 맵 형식으로 내보내기를 지원합니다. 신호 강도 측정은 시각적 표시기와 신호 강도의 가청 톤을 모두 제공합니다.
RSAVu Analysis Software	W-CDMA, HSUPA. HSDPA, GSM/EDGE, CDMA2000 1x, CDMA2000 1xEV-DO, RFID, Phase noise, Jitter, IEEE 802.11 a/b/g/n WLAN, IEEE 802.15.4 OQPSK (Zigbee), Audio analysis
Signal Classification	신호 분류 응용 프로그램을 사용하면 전문가 시스템 안내를 통해 사용자가 신호를 분류할 수 있습니다. 관심 있는 스펙트럼 영역을 빠르게 생성 할 수 있는 그래픽 도구를 제공하여 신호를 효율적으로 분류하고 정렬 할 수 있습니다.
EMC/EMI Pre-compliance and troubleshooting (Opt. 32)	이 옵션은 많은 사전 정의 된 한계선을 지원합니다. 또한 원 버튼 푸시로 권장 안테나, LISN 및 기타 EMC 액세서리를 쉽게 설정할 수 있는 마법사가 추가되었습니다. 새로운 EMC-EMI 디스플레이를 사용하는 경우 시간이 많이 소요되는 준 첨두를 장애시 에만 적용하여 테스트를 가속화 할 수 있습니다. 이 디스플레이는 또한 푸시 버튼 주변 측정을 제공합니다. 검사 도구를 사용하면 관심 있는 주파수를 로컬로 측정하여 스캔 할 필요가 없습니다.



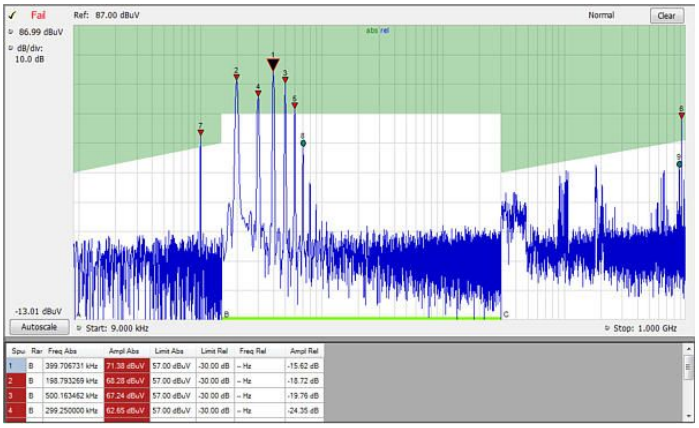
Swept DPX는 실시간 대역폭보다 넓은 범위에서 확률이 낮은 이벤트를 캡처 할 수 있습니다. 여기서 1GHz 스윕은 무선 안테나에서 1.9GHz ~ 2.9GHz의 활동 형태를 보여줍니다. 1.9 GHz 셀 밴드의 숫자 신호가 보이며 2.4 GHz ISM 밴드의 중요한 활동이 분명합니다. 밀도 측정은 중앙 근처에서 가장 큰 신호에 사용되어 대략 3.5 %의 점유율을 나타냅니다.



이 그림에서는 단일 지역이 선택되었습니다. 이를 802.11g 신호로 선언 했으므로 802.11g 신호의 스펙트럼 마스크가 해당 지역에 겹쳐 표시됩니다.
신호는 스펙트럼 마스크와 거의 일치하지만 ISM 대역에서 일부 Bluetooth 신호와의 간섭을 볼 수 있습니다.

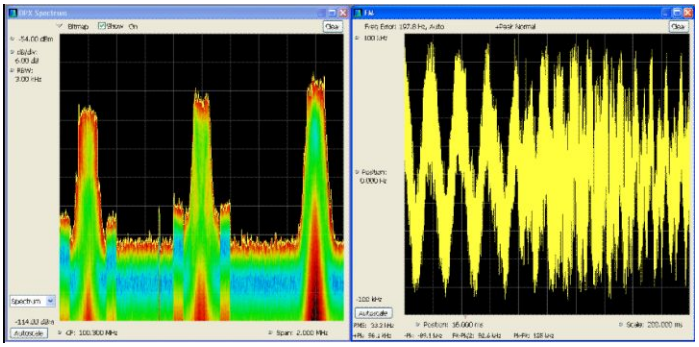


여러 도메인에서 시간 관련보기는 기존 분석기로는 불가능했던 설계 문제에 대한 새로운 통찰력을 제공합니다. 여기에서 변조 품질 및 성상도 측정은 DPX ® 스펙트럼 디스플레이의 지속적인 모니터링과 결합됩니다.

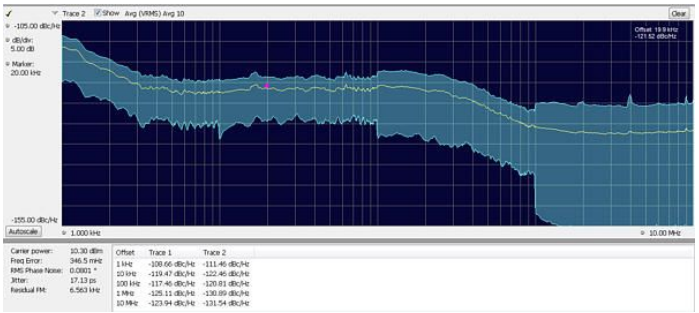


스퓨리어스 검색-각각 고유 한 해상도 대역폭, 비디오 대역폭, 검출기 (피크, 평균, 준 피크) 및 제한 범위를 사용하여 최대 20 개의 비 연속 주파수 영역을 정의할 수 있습니다. 테스트 결과는 .CSV 형식으로 외부 프로그램으로 내보낼 수 있으며 최대 999 개의 위반이 보고 됩니다. 스펙트럼 결과는 선형 또는 로그 스케일로 제공됩니다.

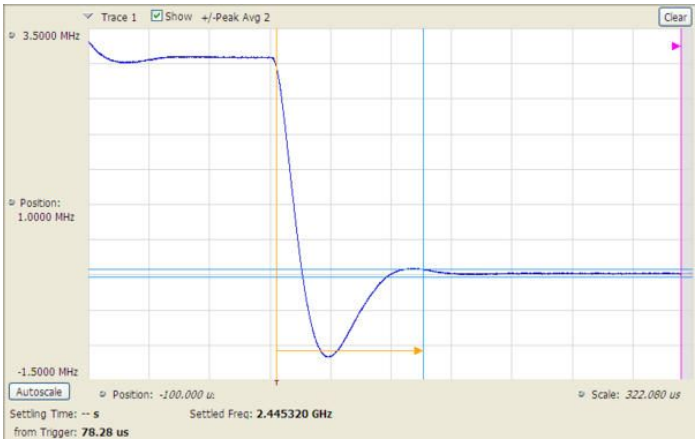
EMC 사전 규정 준수 솔루션은 옵션 32로 추가 할 수 있습니다. 사전 정의 된 여러 제한 라인을 지원합니다. 또한 원 버튼 푸시로 권장 안테나, LISN 및 기타 EMC 액세서리를 쉽게 설정할 수 있는 마법사가 추가되었습니다. 새로운 EMC-EMI 디스플레이를 사용하는 경우 시간이 많이 걸리는 준 첨두를 장애시 에만 적용하여 테스트를 가속화 할 수 있습니다. 이 디스플레이는 또한 푸시 버튼 주변 측정을 제공합니다. 검사 도구를 사용하면 관심 있는 주파수를 로컬로 측정하여 스캔 할 필요가 없습니다.



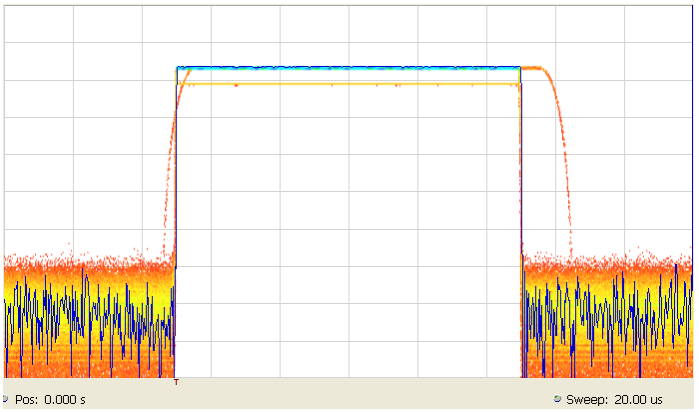
오디오 모니터링 및 변조 측정은 동시에 스펙트럼 관리를 보다 쉽고 빠르게 수행할 수 있습니다. 여기에서 DPX 스펙트럼 디스플레이는 관심 있는 신호의 라이브 스펙트럼을 보여 주며 동시에 복조 된 오디오를 내부 악기 라우드 스피커에 제공합니다. FM 편차 측정은 동일한 신호에 대해 디스플레이 오른쪽에 표시됩니다.



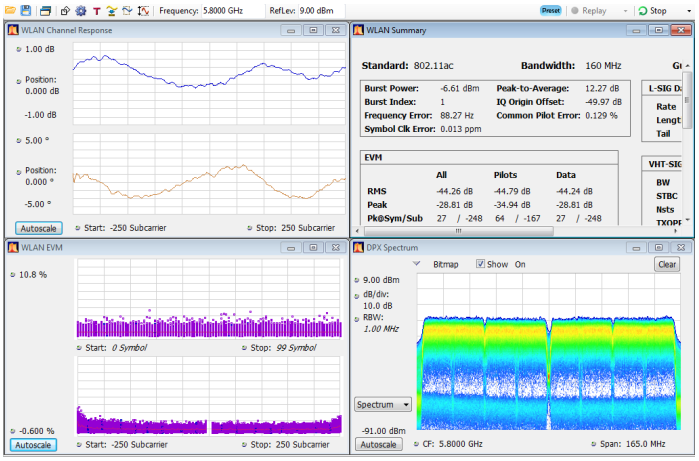
RSA5000 시리즈의 위상 노이즈 및 지터 측정 (10 월 11 일)은 전용 위상 노이즈 테스터의 필요성을 줄여 측정 비용을 절감 할 수 있습니다. 작동 범위에서 뛰어난 위상 노이즈는 많은 응용 분야에서 한계를 제공합니다. 여기서 13MHz 반송파의 위상 노이즈는 -119dBc / Hz에서 측정됩니다. 10kHz 오프셋. 이 주파수에서 <-134 dBc/Hz의 계측기 위상 노이즈는 작업에 대한 충분한 측정 마진을 제공합니다.



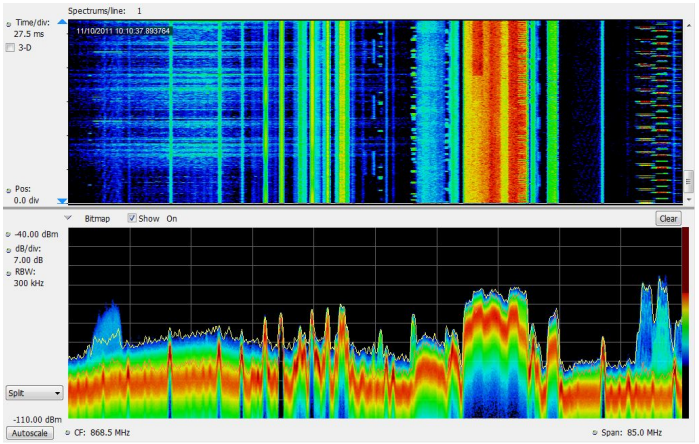
정착 시간 측정 (10 월 12 일)은 쉽고 자동화됩니다. 사용자는 측정 대역폭, 공차 대역, 기준 주파수 (자동 또는 수동)를 선택하고 통과 / 실패 테스트 시간에 대해 최대 3 개의 공차 대역을 설정할 수 있습니다. 안정화 시간은 외부 또는 내부 트리거와 마지막으로 설정된 주파수 또는 위상을 기준으로 할 수 있습니다. 그림에서 호핑 발진기의 주파수 안정화 시간은 테스트 대상 장치의 외부 트리거 지점에서 측정됩니다.



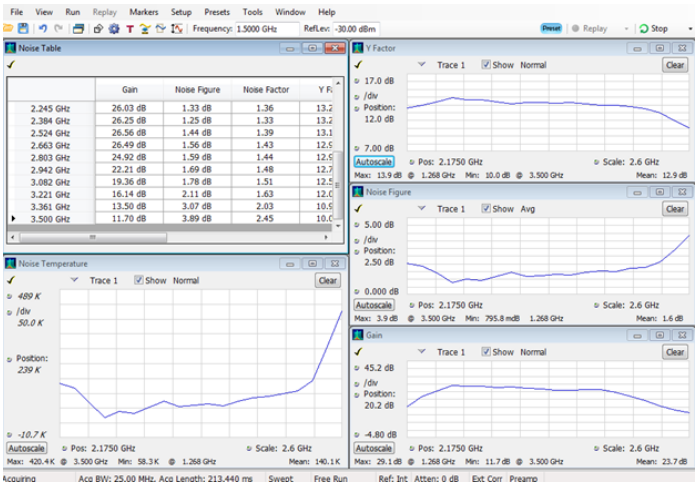
DPX Zero-span은 진폭, 주파수 또는 위상 대 시간을 실시간으로 분석합니다. 초당 최대 50,000 개의 파형이 처리됩니다. DPX Zero-Span은 모든 시간 영역 이상을 즉시 발견하여 오류 발생 시간을 줄입니다. 여기에서, 세 가지 다른 펄스 형태가 제로 스팬 진폭 대 시간으로 캡처 됩니다. 3 개의 파형 중 2 개는 10,000 펄스에서 한 번만 발생하지만 모두 DPX와 함께 표시됩니다.



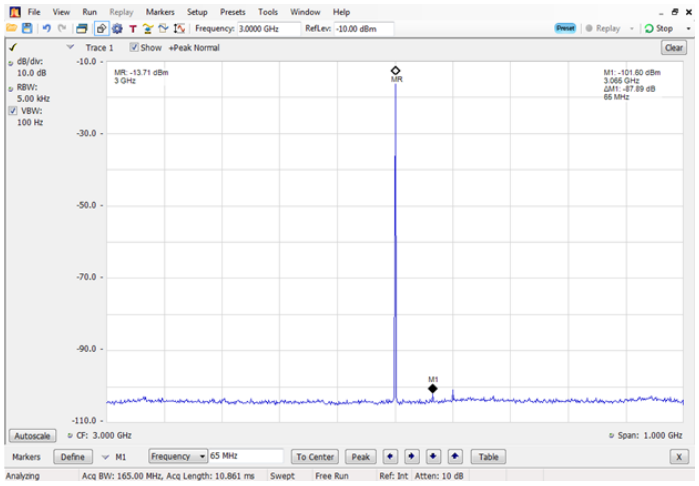
802.11 표준에 대한 분석 옵션을 사용할 수 있습니다. 여기서, 802.11ac 160 MHz 대역폭 신호는 EVM 대 서브 캐리어 번호 및 심벌 번호, WLAN 응답의 요약을 갖는 채널 응답 대 서브 캐리어 및 분석 된 신호의 DPX 스펙트럼의 디스플레이로 분석된다. -44.26dB의 EVM 및 기타 신호 측정 값이 요약 패널에 표시됩니다.



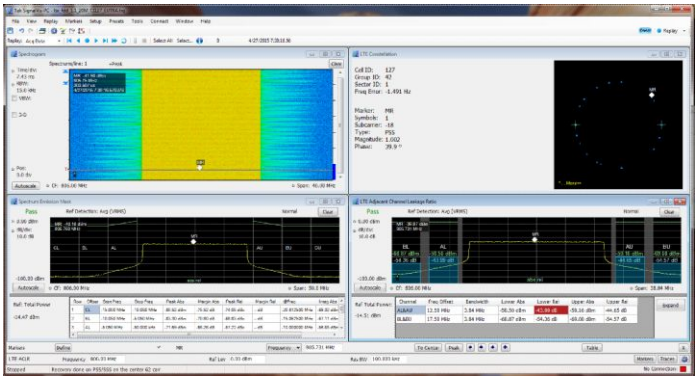
DPX 스펙트로 그램은 한 번에 최대 며칠 동안 갭이없는 스펙트럼 모니터링을 제공합니다. 라인 당 해상도는 125µs ~ 6400s 범위에서 60,000 개의 트레이스를 기록하고 검토 할 수 있습니다.



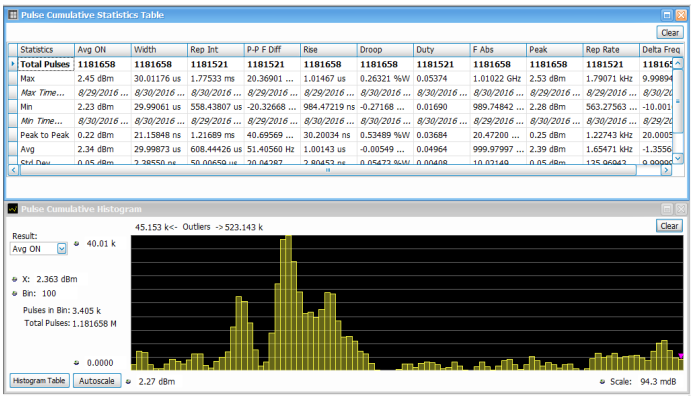
노이즈 피겨 및 게인 측정 (옵션 14)을 통해 RTSA 및 노이즈 소스를 사용하여 장치를 빠르고 쉽게 측정 할 수 있습니다. 이 이미지는 잡음 온도, 게인, 잡음 지수 및 Y- 인자 그래프가 있는 측정 요약 표를 보여줍니다.



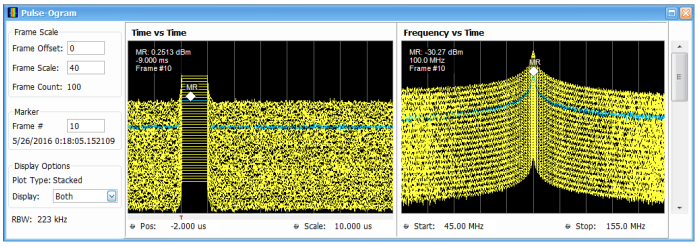
광대역, 높은 동적 범위 옵션 (B85HD, B125HD 및 B16xHD)은 비교할 수 없는 실시간 스펙트럼 분석 동적 범위를 제공합니다. 16 비트, 200MS / sec 디지타이저 2 개가 인터리브 되므로, 시판되는 다른 계측기 보다 -10dBc의 일반적인 스퓨리어스 프리다이나믹 레인지가 최대 -80dBc 인 400MS / sec 획득이 가능합니다. 여기서 3GHz의 신호는 -13.71dBm에서 측정되며, 디지타이저의 가장 큰 스퓨리어스 신호는 캐리어 아래 -87.89dB입니다.



푸시 버튼 사전 설정 및 통과 / 실패 정보로 LTE 기지국 송신기의 빠른 검증



누적 통계는 최소, 최대 값뿐만 아니라 여러 획득에 대한 피크 대 피크, 평균 및 표준 편차에 대한 타임 스탬프를 제공하여 분석을 더욱 확장합니다. 히스토그램은 오른쪽과 왼쪽에 특이 치를 표시합니다.



Pulse-Ogram은 각 펄스의 진폭과 시간 및 스펙트럼을 서로 관련하여 여러 세그먼트 화 된 캡처로 구성된 폭포를 표시합니다. 외부 트리거와 함께 사용하여 대상 범위 및 속도를 표시 할 수 있습니다.

Specifications

달리 명시되지 않는 한 모든 사양이 보장됩니다. 달리 명시되지 않는 한 모든 사양은 모든 모델에 적용됩니다.

Model overview

	RSA5103B	RSA5106B	RSA5115B	RSA5126B
Frequency range	1 Hz - 3 GHz	1 Hz - 6.2 GHz	1 Hz - 15 GHz	1 Hz - 26.5 GHz
Real-time acquisition bandwidth	25 MHz, 40 MHz, 85 MHz, 125 MHz, 165 MHz			
Minimum Event Duration for 100% POI at 100% amplitude	2.7 µs at 165 MHz BW (0.434 us, Opt. 300) 2.8 µs at 85 MHz BW (0.551 us, Opt. 300) 3.0 µs at 40 MHz BW (0.79 us, Opt. 300) 3.2 µs at 25 MHz BW (0.915 us, Opt. 300)			
SFDR (typical)	>75 dBc (25/40 MHz) >73 dBc (85/165 MHz) ≥ 80 dBc (Opts. B85HD, B125HD, B16xHD)			
Trigger modes	Free run, Triggered, FastFrame			
Trigger types	Power, Frequency mask, Frequency edge, DPX density, Runt, Time qualified			

Frequency related

Reference frequency

Specification	Standard	Option PFR	Conditions
Initial accuracy at cal	± 1 x 10^{-6}	± 1 x 10^{-7}	After 10 minute warm-up
Aging per day	1 x 10^{-8}	1 x 10^{-9}	After 30 days of operation
First year aging (typical)	1 x 10^{-6}	7.5 x 10^{-8}	After 1 year of operation
Aging per 10 years		3 x 10^{-7}	After 10 years of operation
Temperature drift	2 x 10^{-6}	1 x 10^{-7}	From 5 to 40 °C
Cumulative error (temperature + aging, typical)	3 x 10^{-6}	4 x 10^{-7}	Within 10 years after calibration

Reference output level

>0 dBm (internal or external reference selected), +4 dBm, typical

External reference input frequency

Every 1 MHz from 1 to 100 MHz plus 1.2288 MHz, 4.8 MHz, and 19.6608 MHz.

External input must be within ± 1 x 10^{-6} (Std), ± 3 x 10^{-7} (Opt PFR) to stated input

External reference input frequency requirements

Spurious level on input must be < –80 dBc within 100 kHz offset to avoid on-screen spurs

- **Spurious**: < –80 dBc within 100 kHz offset
- **Input level range**: –10 dBm to +6 dBm

Center frequency setting resolution

0.1 Hz

Frequency marker readout accuracy

±(RE × MF + 0.001 × Span + 2) Hz

(RE = Reference frequency error)

(MF = Marker frequency (Hz))

Span accuracy

±0.3% of span (Auto mode)

Trigger related

Trigger event source	RF input, Trigger 1 (front panel), Trigger 2 (rear panel), Gated, Line
Trigger setting	Trigger position settable from 1 to 99% of total acquisition length
Trigger combinatorial logic	Trigger 1 AND trigger 2 / gate may be defined as a trigger event
Trigger actions	Save acquisition and/or save picture on trigger

Power level trigger

Level range	0 dB to –100 dB from reference level
Accuracy	For trigger levels >30 dB above noise floor, 10% to 90% of signal level
Level ≥ –50 dB from reference level	±0.5 dB
From < –50 dB to –70 dB from reference level	±1.5 dB
Trigger bandwidth range	At maximum acquisition bandwidth
Standard (Opt. B25)	4 kHz to 10 MHz + wide open
Opt. B40	4 kHz to 20 MHz + wide open
Opt. B85/B16x	11 kHz to 40 MHz + wide open
Trigger position timing uncertainty	
25/40 MHz acquisition BW, 20 MHz trigger BW	Uncertainty = ±15 ns
25/40 MHz acquisition BW, Max Trigger BW	Uncertainty = ±12 ns
85/125/165 MHz acquisition BW, 60 MHz Trigger BW	Uncertainty = ±5 ns
85/125/165 MHz acquisition BW, Max Trigger BW	Uncertainty = ±4 ns
Trigger re-arm time, minimum (fast frame on)	
10 MHz acquisition BW	≤25 µs
40 MHz acquisition BW	≤10 µs
85/125 MHz acquisition BW	≤5 µs
165 MHz acquisition BW	≤5 µs
Minimum event duration	
25 MHz acquisition BW	25 ns
40 MHz acquisition BW	25 ns
85/125 MHz acquisition BW	6.2 ns
165 MHz acquisition BW	6.2 ns

External trigger 1

Level range	-2.5 V to +2.5 V
Level setting resolution	0.01 V
Trigger position timing uncertainty	50 Ω input impedance
>20 MHz to 40 MHz acquisition BW:	±20 ns
>40 MHz to 80 MHz acquisition BW:	±13.5 ns
>80 MHz to 165 MHz acquisition BW:	±11 ns
Input impedance	Selectable 50 Ω/5 kΩ impedance (nominal)

External trigger 2

Threshold voltage	Fixed, TTL
Input impedance	10 kΩ (nominal)
Trigger state select	High, Low

Trigger output

Voltage	Output current <1 mA
High	>2.0 V
Low	<0.4 V

Frequency mask trigger

Mask shape	User defined
Mask point horizontal resolution	<0.12% of span
Level range	0 dB to –80 dB from reference level
Level accuracy[1]	
0 to –50 dB from reference level	±(Channel response + 1.0 dB)
–50 dB to –70 dB from reference level	±(Channel response + 2.5 dB)
Span range	100 Hz to 25 MHz (Opt. B25) 100 Hz to 40 MHz (Opt. B40) 100 Hz to 85 MHz (Opt. B85, B85HD) 100 Hz to 125 MHz (Opt. B125, B125HD) 100 Hz to 165 MHz (Opt. B16x, B16xHD)

1 For masks >30 dB above noise floor.

Frequency mask trigger

Trigger position uncertainty

Span = 25 MHz (Opt. B25)	±13 µs (RBW ≥ 300 kHz)
	±7 µs (Opt. 09)
Span = 40 MHz (Opt. B40)	±13 µs (RBW ≥ 300 kHz)
	±6 µs (Opt. 09)
Span = 85 MHz (Opt. B85)	±10 µs (RBW ≥ 1 MHz)
	±3 µs (Opt. 09)
Span = 165 MHz (Opt. B16x)	±9 µs (RBW ≥ 1 MHz)
	±3 µs (Opt. 09)

Frequency mask trigger

100 % 진폭에서 100 % 트리거 확률에 대한 최소 신호 지속 시간

Frequency-Mask and DPX signal processing				Minimum signal duration, 100% probability of intercept, Frequency-Mask and DPX density trigger (µs) [2]			
Span (MHz)	RBW (kHz)	FFT Length (points)	Spectrums / sec	Standard		Opt. 09	
				Full amplitude	-3 dB	Full amplitude	-3 dB
165 MHz	20000	1024	390,625	15.5	15.4	2.7	2.6
	10000	1024	390,625	15.6	15.4	2.8	2.6
	1000	1024	390,625	17.8	15.7	5.0	2.9
	300	2048	195,313	23.4	16.3	13.1	6.1
	100	8192	48,828	44.5	23.4	44.5	23.4
	30	32768	12,207	161.9	91.7	161.9	91.7
	25	32768	12,207	178.0	93.6	178.0	93.6
125 MHz	10000	1024	390,625	15.6	15.4	2.8	2.6
	1000	1024	390,625	17.8	15.7	5.0	2.9
	500	1024	390,625	20.2	15.9	7.4	3.1
	300	2048	195,313	23.4	16.3	13.1	6.1
	100	4096	97,656	44.5	23.4	34.2	13.2
	30	16384	24,414	120.9	50.7	120.9	50.7
	20	32768	24,414	201.9	96.5	201.9	96.5
85 MHz	10000	1024	390,625	15.6	15.4	2.8	2.6
	1000	1024	390,625	17.8	15.7	5.0	2.9
	500	1024	390,625	20.2	15.9	7.4	3.1
	300	1024	390,625	23.4	16.3	10.6	3.5
	100	4096	97,656	44.5	23.4	34.2	13.2
	30	16384	24,414	121.0	50.7	121.0	50.7
	20	16384	24,414	161.0	55.6	161.0	55.6
40 MHz	5000	1024	390,625	15.8	15.4	3.0	2.6
	1000	1024	390,625	17.8	15.7	5.0	2.9
	300	1024	390,625	23.3	16.3	10.5	3.5
	100	2048	195,313	39.4	18.3	29.1	8.1
	30	4096	97,656	90.4	21.8	90.4	21.8
	20	8192	48,828	140.7	36.3	140.7	36.3
	10	16384	24,414	281.3	72.6	281.3	72.6
25 MHz	3800	1024	390,625	16.0	15.4	3.2	2.6
	1000	1024	390,625	17.7	15.7	4.9	2.9
	300	1024	390,625	23.4	16.3	10.6	3.5
	200	1024	390,625	27.4	16.8	14.6	4.1

2 Values displayed by the instrument may differ by 0.1µs

Frequency mask trigger

Frequency-Mask and DPX signal processing (Option 300 with Option 09)					Minimum signal duration, 100% probability of intercept, Frequency-Mask and DPX density trigger (µs) [3]	
Span (MHz)	RBW (kHz)	FFT Length (points)	Spectrums / sec		Option 300 + Option 09	
			Standard	Option 300 + Option 09	Full amplitude	-3 dB
165 MHz	20000	1024	390,625	3,125,000	0.434	0.334
	10000	1024	390,625	3,125,000	0.557	0.349
	1000	1024	390,625	3,125,000	2.7	0.662
	300	2048	195,313	195,313	13.1	6.1
	100	8192	48,828	48,828	44.5	23.4
	30	32768	12,207	12,207	161.9	91.7
	25	32768	12,207	12,207	178.0	93.6
125 MHz	10000	1024	390,625	3,125,000	0.551	0.348
	1000	1024	390,625	3,125,000	2.7	0.662
	500	1024	390,625	3,125,000	5.1	1.2
	300	2048	195,313	195,313	13.1	6.1
	100	4096	97,656	97,656	44.5	13.2
	30	16384	24,414	24,414	120.9	50.7
	20	32768	24,414	24,414	201.9	96.5
85 MHz	10000	1024	390,625	3,125,000	0.55	0.348
	1000	1024	390,625	3,125,000	2.7	0.662
	500	1024	390,625	3,125,000	5.1	1.2
	300	1024	390,625	3,125,000	8.3	1.9
	100	4096	97,656	97,656	34.2	13.2
	30	16384	24,414	24,414	121.0	50.7
	20	16384	24,414	24,414	161.0	55.6
40 MHz	5000	1024	390,625	3,125,000	0.79	0.377
	1000	1024	390,625	3,125,000	2.7	0.663
	300	1024	390,625	3,125,000	8.3	1.9
	100	2048	195,313	195,313	29.1	8.1
	30	4096	97,656	97,656	90.4	21.8
	20	8192	48,828	48,828	140.7	36.3
	10	16384	24,414	24,414	281.3	72.6
25 MHz	3800	1024	390,625	3,125,000	0.915	0.392
	1000	1024	390,625	3,125,000	2.7	0.664
	300	1024	390,625	3,125,000	8.3	1.9
	200	1024	390,625	3,125,000	12.3	2.8

3 Values displayed by the instrument may differ by 0.1µs

Advanced triggers

DPX density trigger

Density range	0 to 100% density
Horizontal range	0.25 Hz to 25 MHz (Opt. B25)
	0.25 Hz to 40 MHz (Opt. B40)
	0.25 Hz to 85 MHz (Opt. B85, B85HD)
	0.25 Hz to 125 MHz (Opt. B125, B125HD)
	0.25 Hz to 165 MHz (Opt. B16x, B16xHD)
Minimum signal duration for 100% probability of trigger	See minimum signal duration for 100% probability of trigger at 100% amplitude table

Frequency edge trigger

Range	±(½ × (ACQ BW or TDBW if TDBW is active))
Minimum event duration	6.2 ns (ACQ BW = 165 MHz, no TDBW, Opt. 16x)
	6.2 ns (ACQ BW = 85 MHz, no TDBW, Opt. B85)
	25 ns (ACQ BW = 40 MHz, no TDBW, Opt. B40)
	25 ns (ACQ BW = 25 MHz, no TDBW, Opt. B25)
Timing uncertainty	Same as power trigger position timing uncertainty

Runt trigger

Runt definitions	Positive, Negative
Accuracy (for trigger levels >30 dB above noise floor, 10% to 90% of signal level)	±0.5 dB (level ≥ -50 dB from reference level)
	±1.5 dB (from < -50 dB to -70 dB from reference level)

Time qualified triggering

Trigger types and source	Time qualification may be applied to: Level, Frequency mask, DPX Density, Runt, Frequency edge, Ext. 1, Ext. 2
Time qualification range	T1: 0 to 10 seconds
	T2: 0 to 10 seconds
Time qualification definitions	Shorter than T1
	Longer than T1
	Longer than T1 AND shorter than T2
	Shorter than T1 OR longer than T2

Holdoff trigger

Range	0 to 10 seconds

Acquisition related

A/D converter

200 MS/s, 16 bit (Option B25, B40, B85, B16x); 400 MS/s, 14 bit (Option B85, B16x); 200 MS/s and 400 MS/s, 16 bit (Opt B85HD, B125HD, B16xHD)

Acquisition memory size

1 GB (4 GB, opt. 53)

Minimum acquisition length

64 samples

Acquisition length setting resolution

1 sample

Fast frame acquisition mode [4]

Up to 1 Million records can be stored in a single acquisition (for pulse measurements and spectrogram analysis (with option 53))

Memory depth (time) and minimum time domain resolution

Acq. BW (max span)	Sample rate (for I and Q)	Record length (Std.)	Record length (Opt. 53)	Time resolution
165 MHz	200 MS/s	1.34 s	5.37 s	5 ns
85 MHz	200 MS/s	1.34 s	5.37 s	5 ns
80 MHz	100 MS/s	2.68 s	10.74 s	10 ns
40 MHz	50 MS/s	4.77 s	19.09 s	20 ns
25 MHz	50 MS/s	4.77 s	19.09 s	20 ns
20 MHz	25 MS/s	4.77 s	38.18 s	20 ns
10 MHz	12.5 MS/s	19.09 s	76.35 s	80 ns
5 MHz	6.25 MS/s	38.18 s	152.71 s	160 ns
2 MHz [5]	3.125 MS/s	42.9 s	171.8 s	320 ns
1 MHz	1.563 MS/s	85.9 s	343.6 s	640 ns
500 kHz	781.25 kS/s	171.8 s	687.2 s	1.28 µs
200 kHz	390.625 kS/s	343.6 s	1374.4 s	2.56 µs
100 kHz	195.313 kS/s	687.2 s	2748.8 s	5.12 µs
50 kHz	97.656 kS/s	1374.4 s	5497.6 s	10.24 µs
20 kHz	48.828 kS/s	2748.8 s	10955.1 s	20.48 µs
10 kHz	24.414 kS/s	5497.6 s	21990.2 s	40.96 µs
5 kHz	12.207 kS/s	10955.1 s	43980.5 s	81.92 µs
2 kHz	3.052 kS/s	43980.4 s	175921.8 s	328 µs
1 kHz	1.526 kS/s	87960.8 s	351843.6 s	655 µs
500 Hz	762.9 S/s	175921.7 s	703687.3 s	1.31 ms
200 Hz	381.5 S/s	351843.4 s	1407374.5 s	2.62 ms
100 Hz	190.7 S/s	703686.8 s	2814749.1 s	5.24 ms

4 Exact number depends on Bandwidth, Sample Rate, Acquisition time. Achieved up to 200,000 pulses

5 In spans ≤2 MHz, higher resolution data is stored.

Displays and measurements

Frequency views	Spectrum (amplitude vs linear or log frequency)
	DPX® spectrum display (live RF color-graded spectrum)
	Spectrogram (amplitude vs frequency over time)
	Spurious (amplitude vs linear or log frequency)
	Phase noise (phase noise and Jitter measurement) (Opt. 11)
Time and statistics views	Amplitude vs time
	Frequency vs time
	Phase vs time
	DPX amplitude vs time
	DPX frequency vs time
	DPX phase vs time
	Amplitude modulation vs time
	Frequency modulation vs time
	RF IQ vs time
	Time overview
	CCDF
	Peak-to-Average ratio
Settling time, frequency, and phase (Opt. 12) views	Frequency settling vs time, Phase settling vs time
Noise figure and gain (Opt. 14) views	Noise figure vs. frequency
	Gain vs. frequency
	Noise figure, gain at a single frequency
	Y-factor vs. frequency
	Noise temperature vs. frequency
	Uncertainty calculator
	Results table of all measurements
Advanced Pulse Analysis	Pulse results table
	Pulse trace (selectable by pulse number)
	Pulse statistics (trend of pulse results, FFT of time trend and histogram)
	Cumulative Statistics, Cumulative Histogram and Pulse-Ogram
Digital demod (Opt. 21) views	Constellation diagram
	EVM vs time
	Symbol table (binary or hexadecimal)
	Magnitude and phase error versus time, and signal quality
	Demodulated IQ vs time
	Eye diagram
	Trellis diagram
	Frequency deviation vs time

Displays and measurements

Flexible OFDM analysis (Opt. 22) views	Constellation, scalar measurement summary EVM or power vs carrier Symbol table (binary or hexadecimal)
Frequency offset analysis	Signal analysis can be performed either at center frequency or the assigned measurement frequency up to the limits of the instrument's acquisition and measurement bandwidths.
WLAN 802.11a/b/g/j/p measurement application (Opt. 23)	WLAN Power vs time, WLAN symbol table, WLAN constellation, Spectrum emission mask Error vector magnitude (EVM) vs symbol (or time), vs subcarrier (or frequency) Mag error vs symbol (or time), vs subcarrier (or frequency) Phase error vs symbol (or time), vs subcarrier (or frequency) Channel frequency response vs symbol (or time), vs subcarrier (or frequency) Spectral flatness vs symbol (or time), vs subcarrier (or frequency)
WLAN 802.11n measurement application (Opt. 24)	WLAN Power vs time, WLAN symbol table, WLAN constellation, Spectrum emission mask Error vector magnitude (EVM) vs symbol (or time), vs subcarrier (or frequency) Mag error vs symbol (or time), vs subcarrier (or frequency) Phase error vs symbol (or time), vs subcarrier (or frequency) Channel frequency response vs symbol (or time), vs subcarrier (or frequency) Spectral flatness vs symbol (or time), vs subcarrier (or frequency)
WLAN 802.11ac measurement application (Opt. 25)	WLAN Power vs time, WLAN symbol table, WLAN constellation, Spectrum emission mask Error vector magnitude (EVM) vs symbol (or time), vs subcarrier (or frequency) Mag error vs symbol (or time), vs subcarrier (or frequency) Phase error vs symbol (or time), vs subcarrier (or frequency) Channel frequency response vs symbol (or time), vs subcarrier (or frequency) Spectral flatness vs symbol (or time), vs subcarrier (or frequency)
APCO P25 measurement application (Opt. 26)	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
Bluetooth Measurements (Opt. 27 and Opt. 31)	Peak power, average power, adjacent channel power or inband emission mask, -20dB 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, editable limits.

Displays and measurements

LTE Downlink RF measurements (Opt. 28)	Adjacent Channel Leakage Ratio (ACLR), Spectrum Emission Mask (SEM), Channel Power, Occupied Bandwidth, Power vs. Time displaying Transmitter OFF power for TDD signals and LTE constellation diagram for PSS, SSS with Cell ID, Group ID, Sector ID and Frequency Error.
EMC pre-compliance and troubleshooting Opt. 32	EMC-EMI display, Pre-compliance Setup Wizard, Measure Ambient, Re-measure Spot, Report. Troubleshooting tools: Inspect, Harmonic Markers, Level Target, Compare Traces, Persistence display

Bandwidth related

Resolution bandwidth

Resolution bandwidth range (spectrum analysis)	0.1 Hz to 5 MHz (10 MHz with Opt. B85, 20 MHz with Opt. B16x) (1, 2, 3, 5 sequence, Auto-coupled), or user selected (arbitrary)
Resolution bandwidth shape	Approximately Gaussian, shape factor 4.1:1 (60:3 dB) ±3%, typical
Resolution bandwidth accuracy	±0.5% (Auto-coupled RBW mode)
Alternative resolution bandwidth types	Kaiser window (RBW, Gaussian), –6 dB mil, CISPR, Blackman-Harris 4B window, Uniform (none) window, Flat-top (CW ampl.) window, Hanning window

Video bandwidth

Video bandwidth range	1 Hz to 10 MHz plus wide open
RBW/VBW maximum	10,000:1
RBW/VBW minimum	1:1 plus wide open
Resolution	5% of entered value
Accuracy (typical)	±10%

Time domain bandwidth (amplitude vs time display)

Time domain bandwidth range	At least 1/10 to 1/10,000 of acquisition bandwidth, 1 Hz minimum
Time domain BW shape	20 MHz (60 MHz, Opt. B85/B16x), shape factor <2.5:1 (60:3 dB) typical
Time domain bandwidth accuracy	≤10 MHz, approximately Gaussian, shape factor 4.1:1 (60:3 dB), ±10% typical 1 Hz to 20 MHz, and (>20 MHz to 60 MHz Opt. B85/B16x), ±10%

Minimum settable spectrum analysis RBW vs. span

Frequency span	RBW
>10 MHz	100 Hz
>1.25 MHz to 10 MHz	10 Hz
≤1 MHz	1 Hz
≤100 kHz	0.1 Hz

Spectrum display

Traces	Three traces + 1 math waveform + 1 trace from spectrogram for spectrum display
Detector	Peak, –Peak, Average (VRMS), ±Peak, Sample, CISPR (Avg, Peak, Quasi-peak average (of logs))
Trace functions	Normal, Average, Max hold, Min hold, Average (of logs)
Spectrum trace length	801, 2401, 4001, 8001, 10401, 16001, 32001, 64001 points
Sweep speed (typical-mean)	RBW = auto, RF/IF optimization: minimize sweep time
Opt. B25	2000 MHz/s
Opt. B40	3300 MHz/s
Opt. B85	8000 MHz/s (RSA5103B/RSA5106B) 6000 MHz/s (RSA5115B/RSA5126B)
Opt. B16x	11000 MHz/s (RSA5103B/RSA5106B) 8000 MHz/s (RSA5115B/RSA5126B)

Minimum FFT Length vs. Trace Length (Independent of Span and RBW)

Trace length (points)	Minimum FFT length
801	4001
1024	8192
2401	10401
4096	16384

DPX related

DPX® digital phosphor spectrum processing

Characteristic	Performance
Spectrum processing rate (RBW = auto, trace length 801)	390,625 per second
Spectrum processing rate (RBW = auto, trace length 801) (Option 300 with Option 09)	3,125,000 per second for Span/RBW ratio ≤ 333
	390,625 per second for Span/RBW ratio > 333
DPX bitmap resolution	201 × 801
DPX bitmap color dynamic range	2^{33} levels
Marker information	Amplitude, frequency, and signal density on the DPX display
Minimum signal duration for 100% probability of detection (Max-hold on)	See minimum signal duration for 100% probability of trigger at 100% amplitude table
Span Range (Continuous processing)	100 Hz to 25 MHz (Opt. B25) (40 MHz with Opt. B40) (85 MHz with Opt. B85, B85HD) (125 MHz with Opt. B125, B125HD) (165 MHz with Opt. B16x, B16xHD)
Span range (Swept)	Up to instrument frequency range
Dwell time per step	50 ms to 100 s
Trace processing	Color-graded bitmap, +Peak, –Peak, average
Trace length	801, 2401, 4001, 10401
Resolution BW accuracy (Auto-Coupled)	±0.5%

DPX related

Resolution BW Range vs. Acquisition Bandwidth (DPX®)

Acquisition bandwidth	RBW (Min)	RBW (Max)
165 MHz	25 kHz	20 MHz
85 MHz	12.9 kHz	10 MHz
40 MHz	6.06 kHz	10 MHz
25 MHz	3.79 kHz	3.8 MHz
20 MHz	3.04 kHz	3.04 MHz
10 MHz	1.52 kHz	1.52 MHz
5 MHz	758 Hz	760 kHz
2 MHz	303 Hz	304 kHz
1 MHz	152 Hz	152 kHz
500 kHz	75.8 Hz	76 kHz
200 kHz	30.3 Hz	30.4 kHz
100 kHz	15.2 Hz	15.2 kHz
50 kHz	7.58 Hz	7.6 kHz
20 kHz	3.03 Hz	3.04 kHz
10 kHz	1.52 Hz	1.52 kHz
5 kHz	758 Hz	760 Hz
2 kHz	0.303 Hz	304 Hz
1 kHz	0.152 Hz	152 Hz
500 Hz	0.1 Hz	76 Hz
200 Hz	0.1 Hz	30.4 Hz
100 Hz	0.1 Hz	15.2 Hz

Stability

Residual FM

<2 Hz_{p-p} in 1 second (95% confidence, typical).

Phase related

Phase noise sidebands

dBc/Hz at specified center frequency (CF)

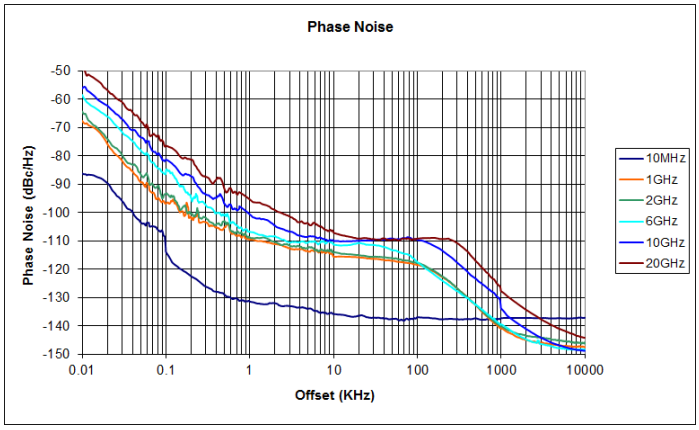
	CF = 10 MHz	CF = 1 GHz	CF = 2 GHz	CF = 6 GHz	CF = 10 GHz	CF = 20 GHz
Offset	**Typical**	**Spec/Typical**	**Typical**	**Typical**	**Typical**	**Typical**
1 kHz	–128	–103/–107	–107	–104	–99	–95
10 kHz	–134	–109/–113	–112	–108	–108	–106
100 kHz	–134	–112/–117	–115	–114	–108	–106
1 MHz	–135	–130/–139	–137	–135	–128	–125
6 MHz	–140	–137/–146	–142	–147	–145	–140
10 MHz	NA	–137/–146	–142	–147	–147	–144

Phase related

Integrated phase (RMS), typical Integrated from 1 kHz to 10 MHz.

Measurement frequency	Integrated phase, radians
1 GHz	1.01×10^{-3}
2 GHz	1.23×10^{-3}
6 GHz	1.51×10^{-3}
10 GHz	2.51×10^{-3}
20 GHz	3.27×10^{-3}

Typical phase noise performance as measured by Opt. 11.



Amplitude

Specifications excluding mismatch error

Measurement range	Displayed average noise level to maximum measurable input
Input attenuator range	0 dB to 55 dB, 5 dB step
Maximum safe input level	
Average continuous	+30 dBm (RF ATT ≥10 dB, preamp off)
Average continuous	+20 dBm (RF ATT ≥10 dB, preamp on)
Pulsed RF	50 W (RF ATT ≥30 dB, PW <10 µs, 1% duty cycle)
Maximum measurable input level	
Average continuous	+30 dBm (RF ATT: Auto)
Pulsed RF	10 W (RF Input, RF ATT: Auto, PW <10 µs, 1% duty cycle repetitive pulses)
Max DC voltage	±5 V
Log display range	0.01 dBm/div to 20 dB/div
Display divisions	10 divisions
Display units	dBm, dBmV, Watts, Volts, Amps, dBuW, dBuV, dBuA, dBW, dBV, dBV/m, and dBA/m
Marker readout resolution, dB units	0.01 dB

Amplitude

Marker readout resolution, Volts units	Reference-level dependent, as small as 0.001 µV
Reference level setting range	0.1 dB step, –170 dBm to +50 dBm (minimum ref. level –50 dBm at center frequency <80 MHz)
Level linearity	±0.1 dB (0 to –70 dB from reference level)

Amplitude accuracy

Absolute amplitude accuracy at calibration point	±0.31 dB (100 MHz, –10 dBm signal, 10 dB ATT, 18 °C to 28 °C)
Input attenuator switching uncertainty	±0.3 dB (RSA5103B/RSA5106B) ±0.15 dB (RSA5115B/RSA5126B)
Absolute amplitude accuracy at center frequency, 95% confidence[6]	
10 MHz to 3 GHz	±0.3 dB
3 GHz to 6.2 GHz (RSA5106B/ 15B/26B)	±0.5 dB
6.2 GHz to 15 GHz (RSA5115B/ 26B)	±0.75 dB
15 GHz to 26.5 GHz (RSA5126B)	±0.9 dB

6 18 °C to 28 °C, Ref Level ≤ -15 dBm, Attenuator Auto-coupled, Signal Level -15 dBm to -50 dBm. 10 Hz ≤ RBW ≤ 1 MHz, after alignment performed.

Amplitude accuracy

VSWR

Typical			
RSA5103B / RSA5106B [7]			
Frequency range	**Preamp OFF (95% confidence)**	**Preamp ON (Typical)**	**Preamp ON, 0 dB attenuation (Typical)**
>10 kHz to 10 MHz	<1.6	--	--
>10 MHz to 2.0 GHz	<1.1	<1.2	<1.5
>2 GHz to 3 GHz	<1.25	<1.4	<1.6
>3 GHz to 5 GHz	<1.25	<1.4	<1.4
>5 GHz to 5.5 GHz	<1.3	<1.4	<1.4
>5.5 GHz to 6.2GHz	<1.3	<1.4	<1.75

Typical			
RSA5115B / RSA5126B [7]			
Frequency range	**Preamp OFF (95% confidence)**	**Preamp ON (Typical)**	**Preamp ON, 0 dB attenuation (Typical)**
>10 kHz to 10 MHz	<1.6	--	--
10 MHz to 3.0 GHz	<1.3	<1.4	<1.9
>3.0 GHz to 6.2 GHz	<1.3	<1.5	<1.9
>6.2 GHz to 11 GHz	<1.5	<1.8	<1.9 (RSA5115B) <2.25 (RSA5126B)
>11 GHz to 15 GHz	<1.5	<1.8	<1.9
>15 GHz to 22 GHz	<1.5	<1.8	<1.9
>22 GHz to 25 GHz	<1.7	<2.0	<1.9
>25 GHz to 26.5 GHz	<1.7	<2.0	<2.1

Frequency response

18 °C to 28 °C, atten. = 10 dB, preamp off

10 MHz to 32 MHz (LF band)	±0.2 dB
10 MHz to 3 GHz	±0.35 dB
>3 GHz to 6.2 GHz (RSA5106B)	±0.5 dB
>6.2 GHz to 15 GHz (RSA5115B)	±1.0 dB
>15 GHz to 26.5 GHz (RSA5115B)	±1.2 dB

5 °C to 40 °C, all attenuator settings (typical, preamp off)

100 Hz to 32 MHz (LF band)	±0.8 dB
9 kHz to 3 GHz	±0.5 dB
1 MHz to 3 GHz (RSA5115B/ 26B)	±0.5 dB
>3 GHz to 6.2 GHz (RSA5106B)	±1.0 dB

7 Atten. = 10 dB, CF set within 200 MHz of VSWR frequency

Frequency response

>6.2 GHz to 15 GHz (RSA5115B/26B)	±1.0 dB
>15 GHz to 26.5 GHz (RSA5126B)	±1.5 dB

5 °C to 40 °C, (RSA5103B/ RSA5106B Opt. 50) (typical, preamp on, atten.=10 dB)

1 MHz to 32 MHz (LF band)	±0.8 dB
1 MHz to 3 GHz	±0.8 dB
>3 GHz to 6.2 GHz (RSA5106B)	±1.3 dB

5 °C to 40 °C, (RSA5115B / RSA5126B Opt. 51) (typical, preamp on, atten.=10 dB)

1 MHz to 3 GHz	±0.8 dB
>3 GHz to 6.2 GHz	±1.3 dB
>6.2 GHz to 15 GHz	±1.5 dB
>15 GHz to 26.5 GHz (RSA5126B)	±2.0 dB

Noise and distortion

3rd order intermodulation distortion at 2.13 GHz [8]

RSA5103B / RSA5106B	–84 dBc
RSA5115B / RSA5126B	–80 dBc

3rd order intermodulation distortion – typical [9]

Note: 3rd order intercept point is calculated from 3rd order intermodulation performance.

Frequency range	3rd order intermodulation distortion, dBc (typical)		3rd order intercept, dBm (typical)	
	RSA5103B/5106B	RSA5115B/5126B	RSA5103B/5106B	RSA5115B/5126B
10 kHz to 32 MHz (LF band)	–75	–75	+12.5	+12.5
1 MHz to 120 MHz	–70	–70	+10	+10
>80 MHz to 300 MHz	–76	–76	+13	+13
>300 MHz to 6.2 GHz	–84	–82	+17	+16
>6.2 GHz to 15 GHz	--	–72	--	+11
15 GHz to 26.5 GHz	--	–72	--	+11

8 Each signal level –25 dBm, Ref level –20 dBm, Attenuator = 0 dB, 1 MHz tone separation.

9 Each signal level –25 dBm, Ref level –20 dBm, Attenuator = 0 dB, 1 MHz tone separation.

Noise and distortion

3rd order intermodulation distortion (preamp ON) – typical [10]

Note: 3rd order intercept point is calculated from 3rd order intermodulation performance.

Frequency range	3rd order intermodulation distortion, dBc (typical)		3rd order intercept, dBm (typical)	
	RSA5103B/5106B	RSA5115B/5126B	RSA5103B/5106B	RSA5115B/5126B
1 MHz to 32 MHz (LF band)	-75	-75	-12.5	-12.5
1 MHz to 120 MHz	-70	-80	-15	-10
>120 MHz to 300 MHz	-75	-80	-12.5	-10
>300 MHz to 3.0 GHz	-80	-90	-10	-5
>3.0 GHz to 6.2 GHz	-90	-90	-5	-5
>6.2 GHz to 15 GHz	--	-80	--	-10
>15 GHz to 126.5 GHz	--	-80	--	-10

RSA5103B / RSA5106B 2nd harmonic distortion [11]

10 MHz to 1 GHz	< –80 dBc
>1 GHz to 3.1 GHz	< –83 dBc

RSA5115B / RSA5126B 2nd harmonic distortion [12]

10 MHz to 500 MHz	< –80 dBc
>500 MHz to 1 GHz	< –74 dBc
>1 GHz to 3.1 GHz	< –74 dBc
>3.1 GHz to 7.5 GHz	< –85 dBc
>7.5 GHz to 13.25 GHz	< –85 dBc

RSA5103B / RSA5106B displayed average noise level [13] **, preamp off**

Frequency range	Spec, dBm/Hz	Typical , dBm/Hz
LF Band (all models)		
1 Hz to 100 Hz	--	–129
>100 Hz to 2 kHz	–124	–143
>2 kHz to 10 kHz	–141	–152
>10 kHz to 32 MHz	–150	–153
RF band		
9 kHz to 1 MHz	–108	–111
>1 MHz to 10 MHz	–136	–139
>10 MHz to 2 GHz	–153	–157
>2 GHz to 3 GHz	–152	–156
>3 GHz to 4 GHz (RSA5106B)	–151	–155
>4 GHz to 6.2 GHz (RSA5106B)	–149	–153

10 Each signal level –25 dBm, Ref level –20 dBm, Attenuator = 0 dB, 1 MHz tone separation.

11 –40 dBm at RF input, attenuator = 0, preamp off, typical

12 –40 dBm at RF input, attenuator = 0, preamp off, typical

13 Measured using 1 kHz RBW, 100 kHz span, 100 averages, minimum noise mode, input terminated, log-average detector and trace function.

Noise and distortion

RSA5115B / RSA5126B displayed average noise level, preamp off [14]

Frequency range	Spec, dBm/Hz	Typical , dBm/Hz
LF Band (all models)		
1 Hz to 100 Hz		–129
>100 Hz to 2 kHz	–124	–143
>2 kHz to 10 kHz	–141	–152
>10 kHz to 32 MHz	–150	–153
RF band		
>1 MHz to 10 MHz	–136	–139
>10 MHz to 3 GHz	–152	–155
>3 GHz to 4 GHz	–151	–155
>4 GHz to 6.2 GHz	–149	–152
>6.2 GHz to 13 GHz	–146	–149
>13 GHz to 23 GHz	–144	–147
>23 GHz to 26.5 GHz (RSA5126B)	–140	–143

Preamplifier performance (Opt. 50)

Frequency range	1 MHz to 3.0 GHz or 6.2 GHz (RSA5106B)
Noise figure at 2 GHz	7 dB
Gain at 2 GHz	20 dB (nominal)

Preamplifier performance (Opt. 51)

Frequency range	1 MHz to 15 GHz or 26.5 GHz (RSA5115B or RSA5126B)
Noise figure at 15 GHz	<10 dB
Noise figure at 26.5 GHz	<13 dB
Gain at 10 GHz	20 dB (nominal)

Displayed Average Noise Level [15] **, preamp on (Opt. 50)**

Frequency range	Specification	Typical
LF band		
1 MHz to 32 MHz	–158 dBm/Hz	–160 dBm/Hz
RF band		
1 MHz to 10 MHz	–158 dBm/Hz	–160 dBm/Hz
>10 MHz to 2 GHz	–164 dBm/Hz	–167 dBm/Hz
>2 GHz to 3 GHz	–163 dBm/Hz	–165 dBm/Hz
>3 GHz to 6.2 GHz (RSA5106B)	–162 dBm/Hz	–164 dBm/Hz

14 Measured using 1 kHz RBW, 100 kHz span, 100 averages, minimum noise mode, input terminated, log-average detector and trace function.

15 Measured using 1 kHz RBW, 100 kHz span, 100 averages, minimum noise mode, input terminated, log-average trace detector and function.

Noise and distortion

Displayed average noise level[16], preamp on (Opt. 51)

Frequency range	Specification	Typical
RF band		
1 MHz to 10 MHz	–158 dBm/Hz	–160 dBm/Hz
>10 MHz to 2 GHz	–164 dBm/Hz	–167 dBm/Hz
>2 GHz to 3 GHz	–163 dBm/Hz	–165 dBm/Hz
>3 GHz to 4 GHz	–160 dBm/Hz	–163 dBm/Hz
>4 GHz to 6.2 GHz	–159 dBm/Hz	–162 dBm/Hz
>6.2 GHz to 13 GHz	–159 dBm/Hz	–162 dBm/Hz
>13 GHz to 23 GHz	–157 dBm/Hz	–160 dBm/Hz
>23 GHz to 26.5 GHz	–153 dBm/Hz	–156 dBm/Hz

Residual response Input terminated, RBW = 1 kHz, attenuator = 0 dB, reference level –30 dBm

- **500 kHz to 32 MHz, LF band** < –100 dBm (typical)
- **1 MHz to 80 MHz, RF band** < –75 dBm (typical)
- **>80 MHz to 200 MHz** < –95 dBm (typical)
- **>200 MHz to 3 GHz** –95 dBm
- **>3 GHz to 6.2 GHz (RSA5106B / RSA5115B / RSA5126B)** –95 dBm
- **>6.2 GHz to 15 GHz (RSA5115B / RSA5126B)** –95 dBm
- **>15 GHz to 26.5 GHz (RSA5126B)** –95 dBm

Image response, up to 165 MHz bandwidth Ref = –30 dBm, attenuator = 10 dB, RF input level = –30 dBm, RBW = 10 Hz.

- **100 Hz to 30 MHz** < –75 dBc
- **30 MHz to 3 GHz** < –75 dBc
- **>3 GHz to 6.2 GHz (RSA5106B)** < –70 dBc
- **>6.2 GHz to 15 GHz (RSA5115B / RSA5126B)** < –76 dBc
- **>15 GHz to 26.5 GHz (RSA5126B)** < –72 dBc

16 Measured using 1 kHz RBW, 100 kHz span, 100 averages, minimum noise mode, input terminated, log-average trace detector and function.

Noise and distortion

Spurious response with signal at CF, offset ≥400 kHz [17]

	Span ≤25 MHz (Opt. B25)		Span ≤40 MHz (Opt. B40) [18]		Opt. B85/B125/B16x [18]		Opt. B85HD, B125HD, B16xHD [18]
	Swept spans >25 MHz		Swept spans >40 MHz		40 MHz < span ≤ 160 MHz		40 MHz < span ≤160 MHz
Frequency	**Specification**	**Typical**	**Specification**	**Typical**	**Specification**	**Typical**	**Typical**
10 kHz to 32 MHz (LF band)	–80 dBc	–85 dBc	--	--	--	--	--
30 MHz to 3 GHz	–73 dBc	–80 dBc	–73 dBc	–80 dBc	–73 dBc	–75 dBc	–80 dBc
>3 GHz to 6.2 GHz (RSA5106B / RSA5115B / RSA5126B)	–73 dBc	–80 dBc	–73 dBc	–80 dBc	–73 dBc	–75 dBc	–80 dBc
6.2 GHz to 15 GHz (RSA5115B / RSA5126B)	–70 dBc	–80 dBc	–70 dBc	–80 dBc	–70 dBc	–73 dBc	–80 dBc
15 GHz to 26.5 GHz (RSA5126B)	–66 dBc	–76 dBc	–66 dBc	–76 dBc	–66 dBc	–73 dBc	–76 dBc

Spurious response with signal at CF (10 kHz ≤ offset < 400 kHz, Span = 1 MHz) [19]

Frequency	Typical
10 kHz to 32 MHz (LF band)	–75 dBc
30 MHz to 3 GHz	–75 dBc
3 GHz to 6.2 GHz (RSA5106B)	–75 dBc
6.2 GHz to 15 GHz (RSA5115B / RSA5126B)	–75 dBc
15 GHz to 26.5 GHz (RSA5126B)	–68 dBc

Spurious response with signal at Half-IF (3.532.75 GHz)

<–80 dBc (RF input level, –30 dBm)

17 RF input level = –15 dBm, Attenuator = 10 dB, Mode: Auto. Input signal at center frequency. Center Frequency > 90 MHz, Opt. B40/B85/B16x. For acquisition bandwidth 15 - 25 MHz with signals at center frequency and at ±(37.5 MHz to 42.5 MHz): 65 dBc.

18 CF> 150 MHz for Opt.B40 / B85 / B16x / B85HD / B125HD / B16xHD

19 RF Input Level = –15 dBm, Attenuator = 10 dB, Mode: Auto. Input signal at center frequency. Center frequency > 90 MHz, Opt. B40/B85/B16x. For acquisition bandwidth 15 - 25 MHz with signals at center frequency and at ±(37.5 MHz to 42.5 MHz): 65 dBc.

Noise and distortion

Spurious response with signal, other than CF (typical)

Frequency	Span ≤25MHz, swept spans >25MHz	Opt. B40, Span ≤40MHz, swept spans >40 MHz [20]	Opt. B85, 40MHz < Span ≤ 85 MHz [20]	Opt. B16x, 85MHz < Span ≤ 165 MHz [20], [21]	Opt. B85HD, B125HD, B16xHD, 40 MHz < span ≤160 MHz [20]
1 MHz - 32 MHz (LF Band)	–80 dBc	--	--	--	--
30 MHz - 3 GHz	–80 dBc	–80 dBc	–76 dBc	–73 dBc	-80 dBc
3 GHz - 6.2 GHz (RSA5106B)	–80 dBc	–80 dBc	–76 dBc	–73 dBc	-80 dBc
6.2 GHz - 15 GHz (RSA5115B)	–80 dBc	–80 dBc	–73 dBc	–73 dBc	-80 dBc
15 GHz - 26.5 GHz (RSA5126B)	–76 dBc	–76 dBc	–73 dBc	–73 dBc	-76 dBc

Local oscillator feed-through to input connector (attenuator = 10 dB)

< –60 dBm (RSA5103B / RSA5106B)

< –90 dbm (RSA5115B / RSA5126B)

Adjacent channel leakage ratio dynamic range

Measured with test signal amplitude adjusted for optimum performance (CF = 2.13 GHz)

		ACLR, typical	
Signal type, measurement mode		**Adjacent**	**Alternate**
3GPP downlink, 1 DPCH			
	Uncorrected	–69 dB	–70 dB
	Noise corrected	–75 dB	–77 dB

IF frequency response and phase linearity, includes all preselection and image rejection filters [22]

Measurement frequency (GHz)	Acquisition bandwidth	Amplitude flatness (Spec)	Amplitude flatness (Typ, RMS)	Phase linearity (Typ, RMS)
0.001 to 0.032 (LF band)	≤20 MHz	±0.4 dB	0.3 dB	0.5°
Opt. B25				
0.01 to 6.2 [23]	≤300 kHz	±0.1 dB	0.05 dB	0.1°
0.03 to 6.2	≤25 MHz	±0.3 dB	0.2 dB	0.5°
Opt. B40				
0.03 to 6.2	≤40 MHz	±0.3 dB	0.2 dB	0.5°
Opt. B85/B85HD				
0.07 to 3.0	≤85 MHz	±0.5 dB	0.3 dB	1.5°
>3.0 to 6.2	≤85 MHz	±0.5 dB	0.4 dB	1.5°
Opt. B125/B125HD				
0.07 to 6.2	≤125 MHz	±1.0 dB	0.70 dB	1.5°
Opt. B16x/B16xHD				
0.07 to 6.2	≤165 MHz	±0.5 dB	0.4 dB	1.5°

20 CF ≥ 150 MHZ for Opt. B40 / B85 / B125 / B16x.

21 -70 dBc for input signals 20 MHz above or below instrument center frequency.

22 Amplitude flatness and phase deviation over the acquisition BW, includes RF frequency response. Attenuator setting: 10 dB.

23 High dynamic range mode selected.

Noise and distortion

RSA5115B / RSA5126B IF frequency response and phase linearity

Includes all preselection and image rejection filters [24]

Measurement frequency (GHz)	Span	Amplitude flatness (Spec)	Amplitude flatness (Typ, RMS)	Phase linearity (Typ, RMS)
6.2 to 26.5	≤300 kHz	±0.10 dB [25]	0.05 dB	0.2°
6.2 to 26.5	≤25/40 MHz	±0.50 dB	0.40 dB	1.0°
6.2 to 26.5	≤80 MHz	±0.75 dB	0.70 dB	1.5°
6.2 to 26.5	≤125 MHz	±1.0 dB	0.70 dB	1.5°
6.2 to 26.5	≤165 MHz	±1.0 dB	0.70 dB	1.5°

DPX zero-span performance

Zero-span amplitude, frequency, phase performance (nominal)

Measurement BW range	100 Hz to maximum acquisition bandwidth of instrument
Time domain BW (TDBW) range	At least 1/10 to 1/10,000 of acquisition bandwidth, 1 Hz minimum
Time domain BW (TDBW) accuracy	±1%
Sweep time range	100 ns (minimum) 2000 s (maximum, Measurement BW >80 MHz)
Time accuracy	±(0.5% + Reference frequency accuracy)
Zero-span trigger timing uncertainty (Power trigger)	±(Zero-span sweep time/400) at trigger point
DPX frequency display range	±100 MHz maximum
DPX phase display range	±200 degrees maximum
DPX waveforms/s	50,000 triggered waveforms/s for sweep time ≤20 µs

DPX spectrogram trace detection	+Peak, –Peak, Avg (V_{RMS})
DPX spectrogram trace length	801 to 10401
DPX spectrogram memory depth	Trace length = 801: 60,000 traces Trace length = 2401: 20,000 traces Trace length = 4001: 12,000 traces Trace length = 10401: 4,600 traces
Time resolution per line	User settable 125 µs to 6400 s
Maximum recording time vs line resolution	7.5 seconds (801 points/trace, 125 µs/line) to 4444 days (801 points/trace, 6400 s/line)

24 Amplitude flatness and phase deviation over the acquisition BW, includes RF frequency response. Attenuator setting: 10 dB.

25 High dynamic range mode selected

Digital IQ Output (Opt. 65)

Connector type	MDR (3M) 50 pin × 2
Data output	Data is corrected for amplitude and phase response in real time
Data format	I data: 16 bit LVDS Q data: 16 bit LVDS
Control output	Clock: LVDS, Max 50 MHz (200 MHz, Opt. B85, B16x) DV (Data valid), MSW (Most significant word) indicators, LVDS
Control input	IQ data output enabled, connecting GND enables output of IQ data
Clock rising edge to data transition time (Hold time)	8.4 ns (typical, Opt. B25 or B40), 1.58 ns (typical, Opt. B85 or B16x)
Data transition to clock rising edge (Setup time)	8.2 ns (typical, Opt. B25 or B40), 1.54 ns (typical, Opt. B85 or Opt. B16x)

Zero-span analog output (Opt. 66)

General information	Option 66 provides for a real-time analog representation of the detected output of the analyzer. This output is available when either the DPX spectrum or DPX zero span function is used in spans up to the maximum acquisition bandwidth. The bandwidth of the analog output is adjustable using the resolution bandwidth control of the DPX spectrum analyzer, or can be made independent of the spectrum analyzer. The output is "OFF" when the instrument is in swept spectrum analyzer mode, as it does not correspond to the output of the swept output
Connector type	BNC - Female
Output impedance	On: 50 Ω, Off: 5 kΩ
Output voltage	
Typical	1.0V @ 0 dBm input 0 dBm reference level, 10 dB/div vertical scale, measured into a 50 Ω load. Full-scale voltage is relative to reference level.
Maximum	1.25 V
Accuracy	± 5% of full-scale voltage
Slope	10 mV/dB 10 dB/div vertical scale, measured into a 50 Ω load. Slope will vary with vertical scale setting.
Output range log fidelity	> 60 dB @ 1 GHz CF
Output log accuracy	± 0.75 dB within range
Output delay accuracy	
RF Input to Analog Out	± (1 µs + 10%)
Output bandwidth	Up to maximum RBW
Continuous output	Continuous output for spans up to the maximum real-time acquisition bandwidth of the instrument. Output is disabled for swept spans.
Output reverse power protection	±20 V

AM/FM/PM and direct audio measurement (Opt. 10)

Analog demodulation	
Carrier frequency range (for modulation and audio measurements)	(1/2 × audio analysis bandwidth) to maximum input frequency
Maximum audio frequency span	10 MHz
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 (Modulation Index >0.1)	
FM 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
Carrier power accuracy (10 MHz to 2 GHz, -20 to 0 dBm input power)	±0.85 dB
Carrier frequency accuracy (deviation: 1 to 10 kHz)	±0.5 Hz + (transmitter frequency × reference frequency error)
FM deviation accuracy (rate: 1 kHz to 1 MHz)	±(1% of (rate + deviation) + 50 Hz)
FM rate accuracy (deviation: 1 to 100 kHz)	±0.2 Hz
Residuals (FM) (rate: 1 to 10 kHz, deviation: 5 kHz)	
THD	0.10%
Distortion	0.7%
SINAD	43 dB
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
Carrier power accuracy (10 MHz to 2 GHz, –20 to 0 dBm input power)	±0.85 dB
AM depth accuracy (rate: 1 to 100 kHz, depth: 10% to 90%)	±0.2% + 0.01 × measured value
AM rate accuracy (rate: 1 kHz to 1 MHz, depth: 50%)	±0.2 Hz
Residuals (AM)	
THD	0.16%
Distortion	0.13%
SINAD	58 dB

AM/FM/PM and direct audio measurement (Opt. 10)

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
Carrier power accuracy (10 MHz to 2 GHz, -20 to 0 dBm input power)	±0.85 dB
Carrier frequency accuracy (deviation: 0.628 rad)	±0.02 Hz + (transmitter frequency × reference frequency error)
PM deviation accuracy (rate: 10 to 20 kHz, deviation: 0.628 to 6 rad)	±100% × (0.005 + (rate / 1 MHz))
PM rate accuracy (rate: 1 to 10 kHz, deviation: 0.628 rad)	±0.2 Hz

Residuals (PM) (rate: 1 to 10 kHz, deviation: 0.628 rad)

THD	0.1%
Distortion	1%
SINAD	40 dB

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 156 kHz
Maximum audio frequency span	156 kHz
Audio frequency accuracy	±0.2 Hz
Signal power accuracy	±1.5 dB

Residuals (Rate: 1 to 10 kHz, Input level: 0.316 V)

THD	0.1%
Distortion	0.1%
SINAD	60 dB

Phase noise and jitter measurement (Opt. 11)

Carrier frequency range	1 MHz to maximum instrument frequency
Measurements	Carrier power, Frequency error, RMS phase noise, Jitter (time interval error), Residual FM
Residual Phase Noise	See Phase noise specifications
Phase noise and jitter integration bandwidth range	Minimum offset from carrier: 10 Hz Maximum offset from carrier: 1 GHz
Number of traces	2
Trace and measurement functions	Detection: average or ±Peak Smoothing Averaging Optimization: speed or dynamic range

Settling time, frequency, and phase (Opt. 12) [26]

Settled frequency uncertainty

95% confidence (typical), at stated measurement frequencies, bandwidths, and # of averages

	Frequency uncertainty at stated measurement bandwidth			
Measurement frequency, averages	**85 MHz**	**10 MHz**	**1 MHz**	**100 kHz**
1 GHz				
Single measurement	2 kHz	100 Hz	10 Hz	1 Hz
100 averages	200 Hz	10 Hz	1 Hz	0.1 Hz
1000 averages	50 Hz	2 Hz	1 Hz	0.05 Hz
10 GHz				
Single measurement	5 kHz	100 Hz	10 Hz	5 Hz
100 averages	300 Hz	10 Hz	1 Hz	0.5 Hz
1000 averages	100 Hz	5 Hz	0.5 Hz	0.1 Hz
20 GHz				
Single measurement	2 kHz	100 Hz	10 Hz	5 Hz
100 averages	200 Hz	10 Hz	1 Hz	0.5 Hz
1000 averages	100 Hz	5 Hz	0.5 Hz	0.2 Hz

Settled phase uncertainty

95% confidence (Typical), at stated measurement frequencies, bandwidths, and # of averages

	Frequency uncertainty at stated measurement bandwidth		
Measurement frequency, averages	**85 MHz**	**10 MHz**	**1 MHz**
1 GHz			
Single measurement	1.00°	0.50°	0.50°
100 averages	0.10°	0.05°	0.05°
1000 averages	0.05°	0.01°	0.01°
10 GHz			
Single measurement	1.50°	1.00°	0.50°
100 averages	0.20°	0.10°	0.05°
1000 averages	0.10°	0.05°	0.02°
20 GHz			
Single measurement	1.00°	0.50°	0.50°
100 averages	0.10°	0.05°	0.05°
1000 averages	0.05°	0.02°	0.02°

26 Measured input signal level > –20 dBm, Attenuator: Auto

Gain and Noise Figure (Option 14)

Measurements (tabular)	Noise Figure, Gain, Y-Factor, Noise Temperature, P-Hot, P-Cold
Measurements (displays)	Noise Figure, Gain, Y-Factor, Noise Temperature, Uncertainty Calculator
Single frequency measurements	When Single Frequency mode is selected, each display acts as a meter and single-value readout for each selected trace in the measurement
Measurement configurations	Direct, Up-Converter, Down-Converter
Frequency modes	Single Frequency, Swept (Center+Span or Start-Stop), Frequency Table; 1 to 999 measurement points
Noise source	Constant ENR or tabular entry; entry fields for noise source model and type
Noise sources supported	NoiseCom NC346 series and similar models from other manufacturers
Noise source control	+28 V switched output, rear panel
External gain/loss tables	3 tables or constants available for gain or loss
Measurement control settings	Source settling time, reference temperature, RBW(50 Hz to 10 MHz), Average count(1 to 100)
Instrument input control settings	Attenuator value, Preamp On/Off
Trace controls	3 traces per display: Ave(V_{RMS}), Max-hold, Min-hold trace functions
Display scaling	Auto or manual: Auto resets scale after each measurement
Markers	Up to 5 markers on any trace; Absolute and Delta marker functions
Limit mask testing	Positive and negative limits may be applied to noise figure, gain, Y-factor traces; limits and Pass/Fail indicated on screen
Uncertainty calculator	Provides noise figure and gain measurement uncertainty based on user-entered values for ENR, external preamp, external preamp, and spectrum analyzer parameters
Application preset for Noise Figure and Gain	Sets the analyzer to measure Gain, Noise Figure, and the Measurement Table. Sets attenuation to zero, preamplifier ON, and acquisition mode to best for minimum noise

Performance

Specification	Description
Frequency range	10 MHz to maximum frequency of instrument (nominal)
Noise figure measurement range	0 to 30 dB (nominal)
Gain measurement range	-10 to 30 dB (nominal)
Noise figure and gain measurement resolution	0.01 dB (nominal)
Noise figure measurement error	±0.1 dB (typical) [27]
Gain measurement error	±0.1 dB (typical) [27]

Note: These conditions for Noise Figure and Gain specifications apply: Operating temperature 18 to 28 deg. C, after 20 minute warmup with internal preamp ON, immediately after internal alignment. Specified error includes only the error of the spectrum analyzer. Uncertainty from errors in ENR source level, external amplifier gain, low SN ratio and measurement system mismatch are not included, and can all be estimated using the uncertainty calculator included in the software.

27 For (ENR of noise source) > (measured noise figure + 4 dB)

Pulse measurements (Opt. 20)

Measurements	Average on power, Peak power, Average transmitted power, Pulse width, Rise time, Fall time, Repetition interval (seconds), Repetition rate (Hz), Duty factor (%), Duty factor (ratio), Ripple (dB), Ripple (%), Droop (dB), Droop (%), Overshoot (dB), Overshoot (%), Pulse frequency, Delta frequency, 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
Minimum pulse width for detection	150 ns (Opt. B25/B40), 50 ns (Opt. B85/B16x)
Number of pulses [28]	1 to 200,000; offline analysis of more than 40,000 continuous pulses is recommended using fast frame mode and fast save option
System rise time (typical)	<40 ns (Opt. B25), <25 ns (Opt. B40), <12 ns (Opt. B85), <7 ns (Opt. B16x)
Pulse measurement accuracy	Signal conditions: Unless otherwise stated, Pulse width >450 ns (150 ns, Opt. B85/B16x), S/N Ratio ≥30 dB, Duty cycle 0.5 to 0.001, Temperature 18 °C to 28 °C
Impulse response	Measurement range: 15 to 40 dB across the width of the chirp Measurement accuracy (typical): ±2 dB for a signal 40 dB in amplitude and delayed 1% to 40% of the pulse chirp width [29]
Impulse response weighting	Taylor window

Pulse measurement performance

Pulse amplitude and timing (typical)	
Average on power [30]	±0.3 dB + Absolute amplitude accuracy
Average transmitted power [30]	±0.4 dB + Absolute amplitude accuracy
Peak power [30]	±0.4 dB + Absolute amplitude accuracy
Pulse width	±0.25% of reading
Duty factor	±0.2% of reading

28 Actual number depends on time length, pulse bandwidth and instrument configuration.

29 Chirp width 100 MHz, pulse width 10 µs, minimum signal delay 1% of pulse width or 10/(chirp bandwidth), whichever is greater, and minimum 2000 sample points during pulse on-time.

30 Pulse width >300 ns (100 ns, Opt. B85/B16x) SNR ≥30 dB

Pulse measurement performance

Frequency and phase error referenced to nonchirped signal

At stated frequencies and measurement bandwidths [31], typical, 95% confidence

Bandwidth	CF	RMS frequency error	Pulse to pulse frequency	Pulse to pulse delta frequency	Pulse to pulse phase
25 MHz	2 GHz	±2.5 kHz	±15 kHz	±500 Hz	±0.2°
	10 GHz	±2.5 kHz	±20 kHz	±1.5 kHz	±0.5°
	20 GHz	±3.5 kHz	±25 kHz	±2 kHz	±0.8°
40 MHz	2 GHz	±3.5 kHz	±20 kHz	±1 kHz	±0.2°
	10 GHz	±5 kHz	±30 kHz	±2 kHz	±0.5°
	20 GHz	±7.5 kHz	±40 kHz	±3 kHz	±0.8°
60 MHz	2 GHz	±8 kHz	±50 kHz	±1.5 kHz	±0.3°
	10 GHz	±15 kHz	±75 kHz	±3 kHz	±0.5°
	20 GHz	±20 kHz	±100 kHz	±4 kHz	±0.8°
85 MHz	2 GHz	±15 kHz	±100 kHz	±2 kHz	±0.3°
	10 GHz	±20 kHz	±125 kHz	±3 kHz	±0.5°
	20 GHz	±25 kHz	±175 kHz	±4 kHz	±0.8°
160 MHz	2 GHz	±20 kHz	±100 kHz	±4.5 kHz	±0.3°
	10 GHz	±25 kHz	±125 kHz	±6 kHz	±0.5°
	20 GHz	±40 kHz	±175 kHz	±8 kHz	±0.8°

Frequency and phase error referenced to a linear chirp

At stated frequencies and measurement bandwidths [32], typical

Bandwidth	CF	RMS frequency error	Pulse to pulse frequency	Pulse to pulse phase
25 MHz	2 GHz	±5 kHz	±15 kHz	±0.25°
	10 GHz	±8 kHz	±20 kHz	±0.5°
	20 GHz	±10 kHz	±25 kHz	±0.8°
40 MHz	2 GHz	±5 kHz	±20 kHz	±0.25°
	10 GHz	±8 kHz	±30 kHz	±0.5°
	20 GHz	±10 kHz	±50 kHz	±0.8°
60 MHz	2 GHz	±25 kHz	±125 kHz	±0.3°
	10 GHz	±30 kHz	±150 kHz	±0.5°
	20 GHz	±30 kHz	±150 kHz	±0.8°
85 MHz	2 GHz	±25 kHz	±125 kHz	±0.3°
	10 GHz	±30 kHz	±150 kHz	±0.5°
	20 GHz	±30 kHz	±175 kHz	±0.8°
160 MHz	2 GHz	±35 kHz	±125 kHz	±0.3°
	10 GHz	±40 kHz	±150 kHz	±0.5°
	20 GHz	±40 kHz	±200 kHz	±0.8°

31 Pulse ON Power ≥ -20 dBm, Signal peak at reference Level, Attenuator = Auto, $t_{meas} - t_{reference} \leq 10$ ms, Frequency estimation: Manual. Pulse-to-Pulse measurement time position excludes the beginning and ending of the pulse extending for a time = (10 / Measurement BW) as measured from 50% of the $t_{(rise)}$ or $t_{(fall)}$. Absolute frequency error determined over center 50% of pulse.

32 Signal type: Linear chirp, Peak-to-Peak chirp deviation: ≤0.8 Measurement BW, Pulse ON Power ≥ -20 dBm, Signal peak at reference Level, Attenuator = 0 dB, $t_{meas} - t_{reference} \leq 10$ ms, Frequency estimation: Manual. Pulse-to-Pulse measurement time position excludes the beginning and ending of the pulse extending for a time = (10 / Measurement BW) as measured from 50% of the $t_{(rise)}$ or $t_{(fall)}$. Absolute frequency error determined over center 50% of pulse.

Digital modulation analysis (Opt. 21)

Modulation formats	π/2DBPSK, BPSK, SBPSK, QPSK, DQPSK, π/4DQPSK, D8PSK, D16PSK, 8PSK, OQPSK, SOQPSK, CPM, 16/32-APSK, 16/32/64/128/256QAM, MSK, GMSK, 2-FSK, 4-FSK, 8-FSK, 16-FSK, C4FM
Analysis period	Up to 81,000 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 100 MS/s (modulated signal must be contained entirely within acquisition BW of the instrument)
QPSK residual EVM [33]	
100 kHz symbol rate	<0.35%
1 MHz symbol rate	<0.35%
10 MHz symbol rate	<0.4%
30 MHz symbol rate (Opt. B40/ B85/B16x)	<0.75%
60 MHz symbol rate (Opt. B85/ B16x)	<1.0%
120 MHz symbol rate (Opt. B16x)	<1.5%
Offset QPSK residual EVM [34]	
100 kHz symbol rate, 200 kHz measurement BW	<0.5%
1 MHz symbol rate, 2 MHz measurement BW	<0.5%
10 MHz symbol rate, 20 MHz measurement BW	<1.1%
256 QAM residual EVM [35]	
10 MHz symbol rate	<0.4%
30 MHz symbol rate (Opt. B40/ B85/B16x)	<0.6%
60 MHz symbol rate (Opt. B85/ B16x)	<0.6%
120 MHz symbol rate (Opt. B16x)	<1.0%

33 CF = 2 GHz, Measurement filter = Root raised cosine, Reference filter = Raised cosine, Analysis length = 200 symbols.

34 CF = 2 GHz, Measurement filter = Root raised cosine, Reference filter = Raised cosine, Analysis length = 200 symbols.

35 CF = 2 GHz, Measurement filter = Root raised cosine, Reference filter = Raised cosine, Analysis length = 400 symbols 20 averages.

Digital modulation analysis (Opt. 21)

S-OQPSK (MIL) residual EVM [36]

4 kHz symbol rate, 64 kHz measurement bandwidth, CF = 250 MHz	<0.3%
20 kHz symbol rate, 320 kHz measurement bandwidth, CF = 2 GHz	<0.5%
100 kHz symbol rate, 1.6 MHz measurement bandwidth, CF = 2 GHz	<0.5%
1 MHz symbol rate, 16 MHz measurement bandwidth, CF = 2 GHz	<0.5%

S-OQPSK (ARTM) residual EVM [37]

4 kHz symbol rate, 64 kHz measurement bandwidth, CF = 250 MHz	<0.3%
20 kHz symbol rate, 320 kHz measurement bandwidth, CF = 2 GHz	<0.4%
100 kHz symbol rate, 1.6 MHz measurement bandwidth, CF = 2 GHz	<0.4%
1 MHz symbol rate, 16 MHz measurement bandwidth, CF = 2 GHz	<0.4%

S-BPSK (MIL) residual EVM [38]

4 kHz symbol rate, 64 kHz measurement bandwidth, CF = 250 MHz	<0.25%
20 kHz symbol rate, 320 kHz measurement bandwidth, CF = 2 GHz	<0.5%
100 kHz symbol rate, 1.6 MHz measurement bandwidth, CF = 2 GHz	<0.5%
1 MHz symbol rate, 1.6 MHz measurement bandwidth, CF = 2 GHz	<0.5%

CPM (MIL) residual EVM [39]

4 kHz symbol rate, 64 kHz measurement bandwidth, CF = 250 MHz	<0.3%
20 kHz symbol rate, 320 kHz measurement bandwidth, CF = 2 GHz	<0.4%

36 Reference Filter: MIL STD Measurement Filter: none.

37 Reference Filter: MIL STD Measurement Filter: none.

38 Reference Filter: MIL STD.

39 Reference Filter: MIL STD.

Digital modulation analysis (Opt. 21)

100 kHz symbol rate, 1.6 MHz measurement bandwidth, CF = 2 GHz	<0.4%
1 MHz symbol rate, 16 MHz measurement bandwidth, CF = 2 GHz	<0.4%
2/4/8/16 FSK residual RMS FSK error[40]	
2FSK, 10 kHz symbol rate, 10 kHz frequency deviation, CF = 2 GHz	<0.3%
4/8/16FSK, 10 kHz symbol rate, 10 kHz frequency deviation, CF = 2 GHz	<0.4%

Adaptive equalizer

Type	Linear, decision-directed, feed-forward (FIR) equalizer with co-efficient adaptation and adjustable convergence rate
Modulation types supported	BPSK, QPSK, OQPSK, π/2DBPSK, π/4DQPSK, 8PSK, 8DPSK, 16DPSK, 16/32/64/128/256QAM
Reference filters for all modulation types except OQPSK	Raised cosine, rectangular, none
Reference filters for OQPSK	Raised cosine, half sine
Filter length	3 to 2001 taps
Taps/Symbol: raised cosine, half sine	1, 2, 4, 8
Taps/Symbol: rectangular filter, no filter	1
Equalizer controls	Off, train, hold, reset

Flexible OFDM (Opt. 22)

Recallable standards	WiMAX 802.16-2004, WLAN 802.11 a/g/j
Parameter settings	Guard interval, subcarrier spacing, channel bandwidth
Advanced parameter settings	Carrier detect: 802.11, 802.16-2004 - Auto-detect; Manual select BPSK; QPSK, 16QAM, 64QAM Channel estimation: Preamble, Preamble + Data Pilot tracking: Phase, Amplitude, Timing Frequency correction: On, Off

40 Reference filter: None, Measurement filter: None.

Flexible OFDM (Opt. 22)

Summary measurements	Symbol clock error, Frequency error, Average power, Peak-to-Average, CPE
	EVM (RMS and peak) for all carriers, plot carriers, data carriers
	OFDM parameters: Number of carriers, Guard interval (%), Subcarrier spacing (Hz), FFT Length
	Power (Average, Peak-to-Average)
Displays	EVM vs symbol, vs subcarrier
	Subcarrier power vs symbol, vs subcarrier
	Mag error vs symbol, vs subcarrier
	Phase error vs symbol, vs subcarrier
	Channel frequency response
Residual EVM	-49 dB (WiMAX 802.16-2004, 5 MHz BW)
	-49 dB (WLAN 802.11g, 20 MHz BW)
	Signal input power optimized for best EVM

WLAN IEEE802.11a/b/g/j/p (Opt. 23)

Modulation formats	DBPSK (DSSS-1M), DQPSK (DSSS-2M), CCK 5.5M, CCK 11M , OFDM (BPSK, QPSK, 16QAM, 64QAM)
Measurements and displays	Burst index, Burst power, Peak to average burst power, IQ origin offset, Frequency error, Common pilot error, Symbol clock error
	RMS and Peak EVM for Pilots/Data, Peak EVM located per symbol and subcarrier
	Packet header format information
	Average power and RMS EVM per section of the header
	WLAN power vs time, WLAN symbol table, WLAN constellation
	Spectrum emission mask, spurious
	Error vector magnitude (EVM) vs symbol (or time), vs subcarrier (or frequency)
	Mag error vs symbol (or time), vs subcarrier (or frequency)
	Phase error vs symbol (or time), vs subcarrier (or frequency)
	WLAN channel frequency response vs symbol (or time), vs subcarrier (or frequency)
	WLAN spectral flatness vs symbol (or time), vs subcarrier (or frequency)
Residual EVM - 802.11b (CCK-11 Mbps)	RMS-EVM over 1000 chips, EQ On
	Signal input power optimized for best EVM
2.4 GHz:	1%(–40 dB) typical, 0.9% (–40.9 dB) typical-mean
Residual EVM - 802.11a/g/j (OFDM, 20 MHz, 64-QAM)	RMS-EVM averaged over 20 bursts, 16 symbols each
	Signal input power optimized for best EVM
2.4 GHz	–49 dB typical, –50 dB typical-mean
5.8 GHz	–49 dB typical, –50 dB typical-mean

WLAN IEEE802.11n (Opt. 24)

Modulation formats	OFDM (BPSK, QPSK, 16 or 64QAM)
Measurements and displays	Burst index, Burst power, Peak to average burst power, IQ origin offset, Frequency error, Common pilot error, Symbol clock error
	RMS and Peak EVM for Pilots/Data, Peak EVM located per symbol and subcarrier
	Packet header format information
	Average power and RMS EVM per section of the header
	WLAN power vs time, WLAN symbol table, WLAN constellation
	Spectrum emission mask, spurious
	Error vector magnitude (EVM) vs symbol (or time), vs subcarrier (or frequency)
	Mag error vs symbol (or time), vs subcarrier (or frequency)
	Phase error vs symbol (or time), vs subcarrier (or frequency)
	WLAN channel frequency response vs symbol (or time), vs subcarrier (or frequency)
	WLAN spectral flatness vs symbol (or time), vs subcarrier (or frequency)
Residual EVM - 802.11n (40 MHz, 64-QAM)	RMS-EVM over averaged over 20 bursts, 16 symbols each
	Signal input power optimized for best EVM
5.8 GHz	–48 dB typical, –48.5 dB typical-mean

WLAN IEEE802.11ac (Opt. 25)

Modulation formats	OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Measurements and displays	Burst index, Burst power, Peak to average burst power, IQ origin offset, Frequency error, Common pilot error, Symbol clock error
	RMS and Peak EVM for Pilots/Data, Peak EVM located per symbol and subcarrier
	Packet header format information
	Average power and RMS EVM per section of the header
	WLAN power vs time, WLAN symbol table, WLAN constellation
	Spectrum emission mask, spurious
	Error vector magnitude (EVM) vs symbol (or time), vs subcarrier (or frequency)
	Mag error vs symbol (or time), vs subcarrier (or frequency)
	Phase error vs symbol (or time), vs subcarrier (or frequency)
	WLAN channel frequency response vs symbol (or time), vs subcarrier (or frequency)
	WLAN spectral flatness vs symbol (or time), vs subcarrier (or frequency)
Residual EVM - 802.11ac	RMS-EVM averaged over 20 bursts, 16 symbols each
	Signal input power optimized for best EVM
5.8 GHz (80 MHz, 256-QAM)	–48 dB typical, –48.5 dB typical-mean
5.8 GHz (160 MHz, 256-QAM)	–45 dB typical, –45.5 dB typical-mean

EMC pre-compliance and troubleshooting (Opt. 32)

EMC pre-compliance and troubleshooting	
Standards	EN55011, EN55012, EN55013, EN55014, EN55015, EN55025, EN55032, EN60601, DEF STAN, FCC Part 15, FCC Part18, MIL-STD 461G
Features	EMC-EMI display, Wizard to setup accessories and limit lines, Inspect, Harmonic Markers, Level Target, Compare Traces, Measure Ambient, Report generation, Re-measure Spot
Detectors	+Peak, Avg, Avg (of logs), Avg (VRMS), CISPR QuasiPeak, CISPR Peak, CISPR Average, CISPR Average of Logs, MIL +Peak, DEF STAN Avg, DEF STAN Peak
Limit lines	Up to 3 Limit Lines with corresponding margins
Resolution BW	Set per standard or user definable
Dwell time	Set per standard or user definable
Report format	PDF, HTML, MHT,RTF, XLSX, Image File format
Accessory type	Antenna, Near Field Probe, Cable, Amplifier, Limiter, Attenuator, Filter, Other
Correction format	Gain/Loss Constant, Gain/loss table, Antenna Factor
Traces	Save/recall up to 5 traces, Math trace (trace1 minus trace2), Ambient trace

APCO P25 (Option 26)

Modulation formats	Phase 1 (C4FM), Phase 2 (HCPM, HDQPSK)
Measurements and displays	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
Residual modulation fidelity	
Phase 1 (C4FM)	≤1.0% typical
Phase 2 (HCPM)	≤0.5% typical
Phase 2 (HDQPSK)	≤0.4% typical
Adjacent channel power ratio [41]	
25 kHz offset from the center and bandwidth of 6 kHz	Phase 1 (C4FM): -74 dBc typical Phase 2 (HCPM): -74 dBc typical Phase 2 (HDQPSK): -75 dBc typical
62.5 kHz offset from the center and bandwidth of 6 kHz	-75 dBc typical

41 Measured with test signal amplitude adjusted for optimum performance if necessary. Measured with Averaging, 10 waveforms.

APCO P25 (Option 26)

Bluetooth (Options 27 and 31)

	Basic Rate, Bluetooth Low Energy, Enhanced Data Rate - Revision 4.2, Bluetooth® 5 when option 31 is enabled
Measurements and displays	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
Output power (average and peak)	
Level uncertainty	Refer to instrument amplitude and flatness specification
Measurement range	> -70 dBm
Modulation characteristics (ΔF_1avg, ΔF_2avg, ΔF_2avg/ ΔF_1avg, ΔF_2max ≥115 kHz)	
Deviation range	± 280 kHz
Deviation uncertainty (at 0 dBm)	< 2 kHz + instrument freq. uncertainty
Measurement resolution	10 Hz
Measurement range	Nominal channel frequency ±100 kHz
Initial Carrier Frequency Tolerance (ICFT)	
Measurement uncertainty (at 0 dBm)	<1 kHz + instrument frequency uncertainty
Measurement resolution	10 Hz
Measurement range	Nominal channel frequency ±100 kHz
Carrier frequency drift	
Supported measurements	Max freq. offset, drift f_1- f_0, max drift f_n-f_0, max drift f_n-f_{n-5} (50 µs)
Measurement uncertainty	< 1 kHz + instrument frequency uncertainty
Measurement resolution	10 Hz
Measurement range	Nominal channel frequency ±100 kHz
In-band emissions and ACP	
Level uncertainty	Refer to instrument amplitude and flatness specification

LTE Downlink RF measurements (Opt. 28)

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 PSS, SSS with Cell ID, Group ID, Sector ID and Frequency Error.
ACLR with E-UTRA bands (Nominal, with Noise Correction)	
1st Adjacent Channel	73 dB
2nd Adjacent Channel	74 dB

Mapping and field strength (Option MAP)

RF field strength	
Signal strength indicator	Located at right-side of display
Measurement bandwidth	Up to 165 MHz, dependent on span and RBW setting
Tone type	Variable frequency
Mapping	
Map types directly supported	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

Analog modulation analysis accuracy (typical)

AM	±2% (0 dBm input at center, carrier frequency 1 GHz, 10 to 60% modulation depth)
FM	±1% of span (0 dBm input at center) (Carrier frequency 1 GHz, 400 Hz/1 kHz Input/Modulated frequency)
PM	±3° (0 dBm input at center) (Carrier frequency 1 GHz, 1 kHz/5 kHz Input/Modulated frequency)

Inputs and outputs

Front panel	
Display	Touch panel, 10.4 in. (264 mm)
RF input connector	N-type female, 50 Ω (RSA5103B, RSA5106B) N-Type Female Planar Crown (RSA5115B) 3.5mm Female Planar Crown (RSA5126B)
Trigger out	BNC, High: >2.0 V, Low: <0.4 V, Output current 1 mA (LVTTL)
Trigger in	BNC, 50 Ω/5 kΩ impedance (nominal), ±5 V max input, -2.5 V to +2.5 V trigger level
USB ports	(2) USB 2.0
Audio	Speaker
Rear panel	
10 MHz REF OUT	50 Ω, BNC, >0 dBm
External REF IN	50 Ω, 10 MHz, BNC
Trig 2 / gate IN	BNC, High: 1.6 to 5.0 V, Low: 0 to 0.5 V
GPIB interface	IEEE 488.2
LAN interface ethernet	RJ45, 10/100/1000BASE-T
USB ports	(2) USB 2.0
VGA output	VGA compatible, 15 DSUB
Audio out	3.5 mm headphone jack
Noise source drive	BNC, +28 V, 140 mA (nominal) Turn ON time: 100 µs, Turn OFF time: 500 µs
Digital I and Q out	2 connectors, LVDS (Opt. 65)
Analog Zero Span Out	1 connector, BNC (Opt. 66)

General characteristics

Temperature range	
Operating	+5 °C to +40 °C
Storage	–20 °C to +60 °C
Warm-up time	20 minutes
Altitude	
Operating	Up to 3000 m (approximately 10,000 ft.)
Nonoperating	Up to 12,190 m (40,000 ft.)
Relative humidity	
Operating and nonoperating	+40 °C at 95% relative humidity, meets intent of EN 60068-2-30. [42]
Vibration	
Operating (except when equipped with option 56 removable SSD)	$0.22G_{RMS}$. Profile = 0.00010 g^2 /Hz at 5-350 Hz, -3 dB/Octave slope from 350-500 Hz, 0.00007 g^2 /Hz at 500 Hz, 3 Axes at 10 min/axis
Nonoperating	$2.28G_{RMS}$. Profile = 0.0175 g^2 /Hz at 5-100 Hz, -3 dB/Octave slope from 100-200 Hz, 0.00875 g^2 /Hz at 200-350 Hz,-3 dB/Octave slope from 350-500 Hz, 0.006132 g^2 /Hz at 500 Hz, 3 Axes at 10 min/axis

42 Frequency amplitude response may vary up to ±3 dB at +40 °C and greater than 45% relative humidity.

General characteristics

Shock	
Operating	15 G, half-sine, 11 ms duration, three shocks per axis in each direction (18 shocks total)
Nonoperating	30 G, half-sine, 11 ms duration, three shocks per axis in each direction (18 shocks total)
Data storage	Internal HDD (Opt. 59), USB ports, removable SSD (Opt. 56)

Power

Power requirements	90 V_{AC} to 264 V_{AC}, 50 Hz to 60 Hz 90 V_{AC} to 132 V_{AC}, 400 Hz
Power consumption	400 W max

EMC and safety compliance

Safety	UL 61010-1:2004 CSA C22.2 No.61010-1-04
Electromagnetic compatibility, complies with	EU council EMC Directive 2004/108/EC EN61326, CISPR 11, Class A ACMA (Australia/New Zealand) FCC 47CFR, Part 15, Subpart B, Class A (USA)

Physical characteristics

With feet

Dimensions (with feet)	
Height	282 mm (11.1 in.)
Width	473 mm (18.6 in.)
Depth	531 mm (20.9 in.)
Weight	29 kg (64.7 lb.) With all options.

Ordering information

Models

RSA5103B	Real Time Signal Analyzer, 1 Hz to 3 GHz
RSA5106B	Real Time Signal Analyzer, 1 Hz to 6.2 GHz
RSA5115B	Real Time Signal Analyzer, 1 Hz to 15 GHz
RSA5126B	Real Time Signal Analyzer, 1 Hz to 26.5 GHz

All Include: Quick-start Manual (Printed), Application Guide, Printable Online Help File, Programmer's manual (on CD), power cord, BNC-N adapter, USB Keyboard, USB Mouse, Front Cover.

RSA5115B also includes: Planar Crown RF Input Connector - Type N Female PN 131-4329-00

RSA5126B also includes: Planar Crown RF Input Connector - 3.5 mm Female

Note: Please specify power plug and language options when ordering.

Warranty

One year

Options, accessories, and upgrades

Options

Product	Options	Description
RSA5103B		Real Time Signal Analyzer, 1 Hz to 3 GHz
RSA5106B		Real Time Signal Analyzer, 1 Hz to 6.2 GHz
RSA5115B		Real Time Signal Analyzer, 1 Hz to 15 GHz
RSA5126B		Real Time Signal Analyzer, 1 Hz to 26.5 GHz
	Opt. B25	25 MHz Acquisition Bandwidth (no-cost option)
	Opt. B40	40 MHz Acquisition Bandwidth
	Opt. B85	85 MHz Acquisition Bandwidth
	Opt. B125	125 MHz Acquisition Bandwidth
	Opt. B16x	165 MHz Acquisition Bandwidth
	Opt. B85HD	85 MHz Acquisition Bandwidth, High Dynamic Range
	Opt. B125HD	125 MHz Acquisition Bandwidth, High Dynamic Range
	Opt. B16xHD	165 MHz Acquisition Bandwidth, High Dynamic Range
	Opt. 300	High performance real time **(Opt. 09 required)**
	Opt. 09	Enhanced Real Time
	Opt. 10	AM/FM/PM Modulation and Audio Measurements **(Opt. 300 required)**
	Opt. 11	Phase Noise / Jitter Measurement
	Opt. 12	Settling Time (Frequency and Phase)
	Opt. 14	Noise Figure and Gain **(Internal preamp recommended)**
	Opt. 20	Pulse Measurements
	Opt. 21	General Purpose Modulation Analysis
	Opt. 22	Flexible OFDM Analysis
	Opt. 23	WLAN 802.11a/b/g/j/p measurement application

Product	Options	Description
	Opt. 24	WLAN 802.11n measurement application **(requires opt 23)**
	Opt. 25	WLAN 802.11ac measurement application **(requires opt 24)**
	Opt. 26	APCO P25 measurement application
	Opt. 27	Bluetooth Basic LE Tx Measurements
	Opt. 28	LTE Downlink RF measurements
	Opt. 31	Bluetooth 5 Measurements **(requires opt 27)**
	Opt. 32	EMC pre-compliance and troubleshooting
	Opt. MAP	Mapping and signal strength
	Opt. 50	Internal Preamp, 1 MHz to 3/6.2 GHz, RSA5103B/5106B only
	Opt. 51	Internal Preamp, 1 MHz to 15/26.5 GHz, RSA5115B/5126B only
	Opt. 53	Memory Extension, 4 GB Acquisition Memory Total
	Opt. 56 [43]	Removable SSD, **incompatible with Opt. 59**
	Opt. 59 [43]	Internal HDD, incompatible with Opt. 56 (no cost option)
	Opt. 65	Digital I and Q outputs
	Opt. 66	Zero-span analog output
	Opt. 6566	Digital I and Q outputs and Zero-span analog output
	Opt. PFR	Precision Frequency Reference
	Opt. 54	Signal Classification and Survey

International power plugs

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

Language options

Opt. L0	English manual
Opt. L5	Japanese manual
Opt. L7	Simplified Chinese manual
Opt. L10	Russian manual

43 Must order either Opt. 56 or 59.

Service options

Opt. C3	Calibration Service 3 Years
Opt. C5	Calibration Service 5 Years
Opt. CA1	Single Calibration or Functional Verification
Opt. D1	Calibration Data Report
Opt. D3	Calibration Data Report 3 Years (with Opt. C3)
Opt. D5	Calibration Data Report 5 Years (with Opt. C5)
Opt. G3	Complete Care 3 Years (includes loaner, scheduled calibration, and more)
Opt. G5	Complete Care 5 Years (includes loaner, scheduled calibration, and more)
Opt. R5	Repair Service 5 Years (including warranty)

Recommended accessories

Accessory	Description
RTPA2A Spectrum Analyzer Probe Adapter compatibility	Supports TekConnect® probes. **Compatibility** P7225 - 2.5 GHz Active Probe, P7240 - 4 GHz Active Probe, P7260 - 6 GHz Active Probe, P7330 - 3.5 GHz Differential Probe, P7350 - 5 GHz Differential Probe, P7350SMA - 5 GHz Differential SMA Probe, P7340A - 4 GHz Z-Active Differential Probe, P7360A - 6 GHz Z-Active Differential Probe, P7380A - 8 GHz Z-Active Differential Probe, P7380SMA - 8 GHz Differential Signal Acquisition System, P7313 - >12.5 GHz Z-Active Differential Probe, P7313SMA - 13 GHz Differential SMA Probe, P7500 Series - 4 GHz to 20 GHz TriMode Probes
RSAVu	Software based on the RSA3000 Series platform for analysis supporting 3G wireless standards, WLAN (IEEE802.11a/b/g/n), RFID, Audio Demodulation, and more measurements.
SignalVu-PC	Software based on the RSA5000 Series Real Time Spectrum Analyzers puts the power of your RTSA signal analysis tools on your Windows 64-bit PC. Performs measurements on stored signals from RSA3000/5000/6000 series, RSA306/306B, RSA500A/600A series, RSA7100A, and MDO4000B/C oscilloscope RF captures.
Additional Removable Hard Drive	Order RSA5BUP Opt. SSD. This is an additional solid-state drive for instrument with Option 56 installed. (Windows 7 and instrument software preinstalled).
DC Block	Order 119-7902-00. 9 kHz-18 GHz. Type N Male to Type N Female. Voltage Rating: 50 V DC Max. Insertion Loss 0.9 dB. Aeroflex model 7003.
EMI-DEBUG-HWPARTS	Bundle of EMI accessories for debug (includes EMI-NF-Probe & EMI-NF-AMP)
EMI-RE-HWPARTS	Bundle of EMI accessories for radiated pre-compliance test (includes: EMI-BICON-ANT, EMI-CLP-ANT, EMI-PREAMP, EMI-TRIPOD, CABLE-5M, CABLE-1M)
EMI-BICON-ANT	25 MHz to 300 MHz Biconical antenna
EMI-CLP-ANT	300 MHz to 1 GHz Compact Log Periodic antenna
EMI-PREAMP	1 MHz to 1 GHz Preamplifier
EMI-TRIPOD	Antenna Tripod 0.8 to 1.5 m
EMI-LISN50uH-US [44]	50uH AC line impedance stabilization network to test devices that use a US (United States) NEMA 5-15 power plug, 120V Max
EMI-LISN50uH-EU [44]	50uH AC line impedance stabilization network to test devices that use an EU (European) Schuko CE7/4 power plug, 240V Max
EMI-LISN50uH-GB [44]	50uH AC line impedance stabilization network to test devices that use a GB (Great Britian) BS1363 power plug, 240V Max
EMI-LISN5uH	5uH DC line impedance stabilization network
EMI-NF-PROBE	Near Field Probe set
EMI-TRANS-LIMIT	Transient Limiter 150 kHz to 30 MHz
CABLE-1M	Cable, 1 m
CABLE-3M	Cable, 3 m

44 Not available in Canada

Accessory	Description
CABLE-5M	Cable, 5 m
EMI-NF-AMP	Near Field Probe Amplifier
Noise source	NoiseCom NC346C Series. Provides supported sources up to 55 GHz in a variety of connector types and ENR values. Contact NoiseCom for full information and to order: http://noisecom.com
131-4329-xx	Planar Crown RF Input Connector - 7005A-3 Type-N Female
600 Ω BNC pass-through	Required for higher-speed noise figure measurements when ordering RSA5UP Opt 14 for RSA5000A. POMONA 4119-600 RF/ COAXIAL ADAPTER, BNC PLUG-BNC JACK. Contact Pomona Electronics and distributors worldwide to order: http:// pomonaelectronics.com
131-9062-xx	Planar Crown RF Input Connector - 7005A-6 3.5 mm Female
131-8822-xx	Planar Crown RF Input Connector - 7005A-7 3.5 mm Male
131-8689-xx	Planar Crown RF Input Connector – 7005A-1 SMA Female
015-0369-xx	RF Adapter – N (male) to SMA (male)
119-6599-xx	Power Attenuator – 20 dB, 50 W, 5 GHz
Transit Case	016-2026-xx
RSA56KR	Rackmount Retrofit
Additional Quick-start Manual (Paper)	071-3224-xx
Additional Application Examples Manual (Paper)	071-3283-xx

RSA5BUP – Upgrade options for the RSA5100B series

RSA5BUP	Option description	HW or SW	Factory calibration required?
Opt. PFR	Precision Frequency Reference	HW	Yes
Opt. SSD	Additional removable solid-state drive for units equipped with Option 56. Minimum capacity 480 GB. Windows 7 and instrument software preinstalled.	HW	No
Opt. 50	Internal Preamp 1 MHz to 3 GHz (RSA5103B) or 1 MHz to 6.2 GHz (RSA5106B)	HW	Yes
Opt. 51	Internal Preamp 1 MHz to 15 GHz (RSA5115B) or 1 MHz to 26.5 GHz (RSA5126B)	SW	No
Opt. 53	Memory Extension, 4 GB Acquisition Memory total	HW	No
Opt. 54	Signal Classification and Survey	SW	No
Opt. 65	Digital I and Q outputs	HW	No
Opt. 66	Zero-span analog output	HW	No
Opt. 6566	Digital I and Q outputs and Zero-span analog output	HW	No
Opt. 56	Removable Solid-State Drive (460 GB), incompatible with Opt. 59	HW	No
Opt. 59	Internal HDD (160 GB), **incompatible with Opt. 56**	HW	No
Opt. 09	Enhanced Real Time	SW	No
Opt. 10	AM/FM/PM Modulation and Audio Measurements **(requires opt 300)**	SW	No
Opt. 11	Phase Noise / Jitter Measurements	SW	No
Opt. 12	Settling Time (Frequency and Phase)	SW	No

RSA5BUP	Option description	HW or SW	Factory calibration required?
Opt. 14	Noise Figure and Gain **(Internal preamp recommended)**	SW	No
Opt. 20	Pulse Measurements	SW	No
Opt. 21	General Purpose Modulation Analysis	SW	No
Opt. 22	Flexible OFDM Analysis	SW	No
Opt. 23	WLAN 802.11a/b/g/j/p measurement application	SW	No
Opt. 24	WLAN 802.11n measurement application **(requires opt 23)**	SW	No
Opt. 25	WLAN 802.11ac measurement application **(requires opt 24)**	SW	No
Opt. 26	APCO P25 measurement application	SW	No
Opt. 27	Bluetooth Basic LE Tx Measurements	SW	No
Opt. 28	LTE Downlink RF measurements	SW	No
Opt. 31	Bluetooth 5 Measurements **(requires opt 27)**	SW	No
Opt. 32	EMC pre-compliance and troubleshooting	SW	No
Opt. MAP	Mapping and signal strength	SW	No
Opt. B40	40 MHz Acquisition Bandwidth (from 25 MHz BW)	SW	No
Opt. B85	85 MHz Acquisition Bandwidth (from 25 MHz BW)	HW	Yes
Opt. B85E	85 MHz Acquisition Bandwidth (from 40 MHz BW)	HW	Yes
Opt. B16x	165 MHz Acquisition Bandwidth (from 25 MHz BW)	HW	Yes
Opt. B16xE	165 MHz Acquisition Bandwidth (from 40 MHz BW)	HW	Yes
Opt. B16xH	165 MHz Acquisition Bandwidth (from 85 MHz BW)	SW	No
Opt. B125	125 MHz acquisition bandwidth (from 25 MHz BW)	HW	Yes
Opt. B125E	125 MHz acquisition bandwidth (from 40 MHz BW)	HW	Yes
Opt. B125H	125 MHz acquisition bandwidth (from 85 MHz BW)	SW	No
Opt. B125HD-125	High dynamic range, 125 MHz acquisition bandwidth (from 125 MHz BW)	HW	Yes
Opt. B125HD-25	High dynamic range, 125 MHz acquisition bandwidth (from 25 MHz BW)	HW	Yes
Opt. B125HD-40	High dynamic range, 125 MHz acquisition bandwidth (from 40 MHz BW)	HW	Yes
Opt. B125HD-85	High dynamic range, 125 MHz acquisition bandwidth (from 85 MHz BW)	HW	No
Opt. B16xHD-125	High dynamic range, 165 MHz acquisition bandwidth (from 125 MHz BW)	HW	No
Opt. B16xHD-165	High dynamic range, 165 MHz acquisition bandwidth (from 165 MHz BW)	HW	No
Opt. B16xHD-25	High dynamic range, 165 MHz acquisition bandwidth (from 25 MHz BW)	HW	Yes
Opt. B16xHD-40	High dynamic range, 165 MHz acquisition bandwidth (from 40 MHz BW)	HW	Yes
Opt. B16xHD-85	High dynamic range, 165 MHz acquisition bandwidth (from 85 MHz BW)	HW	No
Opt. B16xK	165 MHz acquisition bandwidth (from 125 MHz BW)	HW	No
Opt. B85HD-25	High dynamic range, 85 MHz acquisition bandwidth (from 25 MHz BW)	HW	Yes
Opt. B85HD-40	High dynamic range, 85 MHz acquisition bandwidth (from 40 MHz BW)	HW	Yes

RSA5BUP	Option description	HW or SW	Factory calibration required?
Opt. B85HD-85	High dynamic range, 85 MHz acquisition bandwidth (from 85 MHz BW)	HW	No
Opt. 300	High performance real time **(requires opt 09)**	HW	No

CE

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ASEAN / Australasia (65) 6356 3900
Belgium 00800 2255 4835*
Central East Europe and the Baltics +41 52 675 3777
Finland +41 52 675 3777
Hong Kong 400 820 5835
Japan 81 (3) 6714 3086
Middle East, Asia, and North Africa +41 52 675 3777
People's Republic of China 400 820 5835
Republic of Korea +822 6917 5084, 822 6917 5080
Spain 00800 2255 4835*
Taiwan 886 (2) 2656 6688

Austria 00800 2255 4835*
Brazil +55 (11) 3759 7627
Central Europe & Greece +41 52 675 3777
France 00800 2255 4835*
India 000 800 650 1835
Luxembourg +41 52 675 3777
The Netherlands 00800 2255 4835*
Poland +41 52 675 3777
Russia & CIS +7 (495) 6647564
Sweden 00800 2255 4835*
United Kingdom & Ireland 00800 2255 4835*

Balkans, Israel, South Africa and other ISE Countries +41 52 675 3777
Canada 1 800 833 9200
Denmark +45 80 88 1401
Germany 00800 2255 4835*
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Norway 800 16098
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* European toll-free number. If not accessible, call: +41 52 675 3777

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