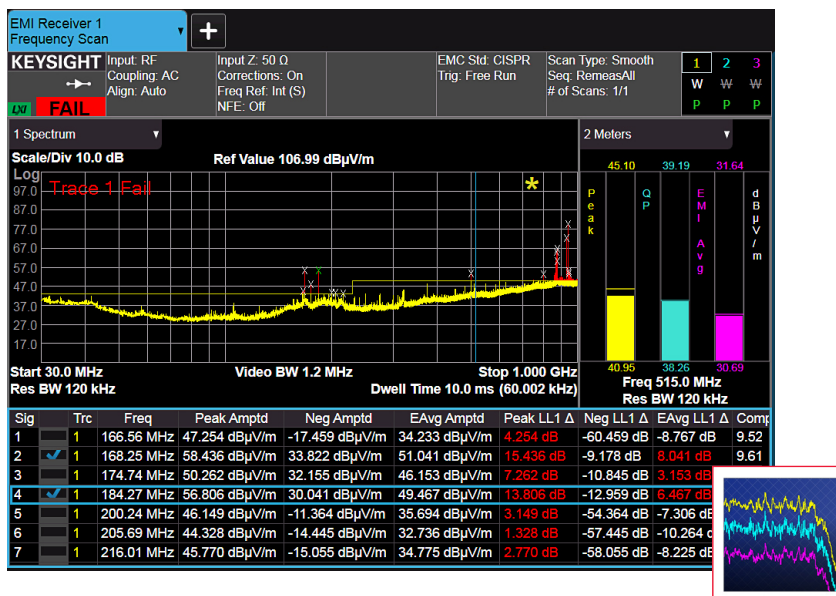


Keysight Technologies

EMI Receiver X-Series Measurement Application, Multi-Touch

N6141C

Technical Overview



- Measure emissions with built-in commercial and MILSTD compliant bandwidths, detectors, and band presets
- Compare measured emissions to regulatory limits
- Continuously monitor signal with bar meters to detect maximum amplitude
- Collect lists of suspect emissions
- Differentiate between ambient signals and device emissions
- Generate reports in HTML format including signal list, images and trace, and correction data
- Multi-touch user interface and SCPI remote user interface
- Extend test assets with transportable licenses between X-Series signal analyzers with multi-touch user interface

EMI Measurement Application

To avoid costly delays that can result from failed compliance testing, Keysight's EMI measurement application on X-Series signal analyzers allows you to perform precompliance measurements and diagnostic evaluation of your designs. Find and fix problems before they enter the test chamber with the N6141C measurement application on the N9040B UXA, N9030B PXA, N9020B MXA, N9010B EXA, or N9000B CXA.

The application's wide range of features enables you to:

- Use the scan table to set up frequency ranges, gains, bandwidths, and dwell time
- Scan a frequency range and display the results in log or linear format
- Identify suspect signals in the frequency scan
- Measure the peak, quasi-peak, EMI-average or RMS-average values of these suspect signals and place the results in the signal list
- Easily identify signals that fail the regulatory agency limit

X-Series measurement applications

X-Series measurement applications increase the capability and functionality of Keysight Technologies, Inc. signal analyzers to speed time to insight. They provide essential measurements for specific tasks in general-purpose, cellular communications, wireless connectivity applications, covering established standards or modulation types.

EMI precompliance measurements

Performing precompliance radiated and conducted emissions measurements early in the design cycle can reduce development expense by ensuring new designs will pass final compliance testing at an accredited facility, avoiding costly redesign and re-testing. For a step-by-step guide on how to make precompliance measurements according to regulatory agency limits, refer to the application note, Making Conducted and Radiated Emissions Measurements, literature number 5990-6152EN.

Conducted emissions measurements

The EMI measurement application allows you to measure the emissions that are conducted along a power line. The transducer used to couple the emissions of the power line to the signal analyzer is a line impedance stabilization network (LISN). The frequency range of conducted emissions is 9 kHz to 30 MHz, depending on the regulatory agency.

Radiated emissions measurements

Performing precompliance radiated emissions measurements is not as straight forward as conducted emissions measurements. When measuring to commercial standards, the antenna is placed 3 to 10 meters from the device under test (DUT) and the DUT should be rotated in order to find the maximum radiation. With the addition of the EMI receiver measurement application, the X-Series signal analyzer becomes a powerful EMI precompliance measurement analyzer. Measure designs to the latest CISPR 16-1-1 or MIL-STD requirements. The robust signal list feature enables you to quickly differentiate between the DUT and the ambient signal environment.

Regulatory standards

X-Series signal analyzers with the EMI measurement application can be used for making precompliance measurements to any international EMC standard. Simply select the performance level and frequency range for your application.

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Measurement Summary

EMI measurement application vs. Option EMC

There are two EMI options for X-Series signal analyzers: Option EMC and the N6141C measurement application. Option EMC enables basic EMC measurements. It contains CISPR 16-1-1 compliant bandwidths and detectors (peak, quasi-peak, EMI average, RMS average) as well as CISPR band presets (bands A through E), and MIL-STD bandwidths that meet MIL-STD 461D/E/F requirements. The EMI measurement application includes Option EMC and provides a wide range of additional features that enable the user to perform precompliance conducted and radiated emissions tests to both commercial and MIL-STD requirements. The following table summarizes a comparison of features.

Comparison of EMI measurement application and Option EMC features

Feature	EMI Measurement Application	Option EMC
CISPR 16-1-1 detectors	•	•
CISPR 16-1-1 bandwidths	•	•
MIL-STD 461 bandwidths	•	
Log and linear display	•	
Signal list	•	
Scan table	•	
Simultaneous detectors	•	
Automatic limit testing	•	
Measure at marker	•	
Delta to limit	•	
Strip chart	•	
Step and swept scans	•	
Report generation	•	
Time domain scan ¹	•	
Monitor spectrum ¹	•	
Amplitude probability distribution (APD) ¹	•	
Disturbance analyzer (click measurements)	•	
UI commonality with MXE receiver	•	

1. Requires Options DP2 or B40. Not available for CXA

Top Features

Easily identify out-of-limit device emissions

Signal list, frequency scan, and active detector meters are displayed on a single screen for easy review of the measurement results. Continuously scan a specified frequency range or scan and search for signals above a margin or limit and place them in the signal list. Use the simultaneous detector meters to continuously measure a selected signal while maximizing the amplitude. Measure all the signals with the search and measure function using up to three detectors. Choose between peak, quasi-peak, EMI average, or RMS average detectors. The measurement results are compared to regulatory agency limits in the delta to limit column.

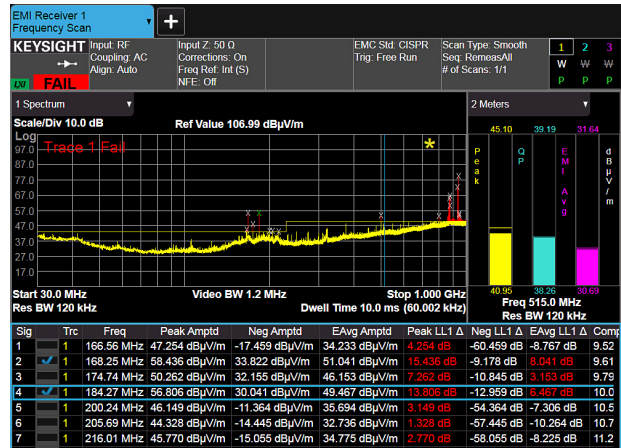


Figure 1. Frequency scan

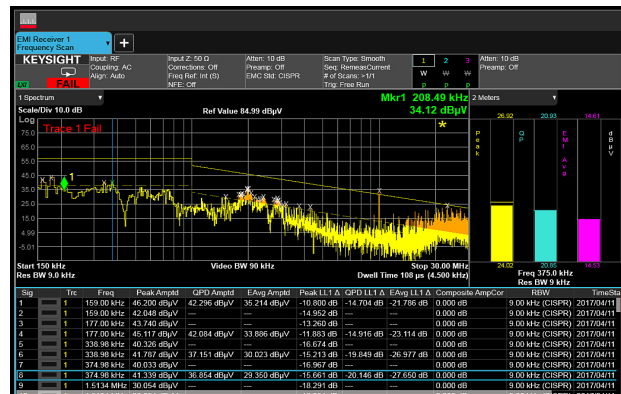


Figure 2. Conducted emissions with delta to limit

Use the scan table to set up frequency ranges

The EMI measurement application includes a scan table with up to 10 ranges that can be set up for the specific frequency ranges of interest. The scan table also includes resolution bandwidths selection, step sizes, points per RBW, attenuation selection, and preamp selection. Use the CISPR band presets to easily set a range in the scan table.

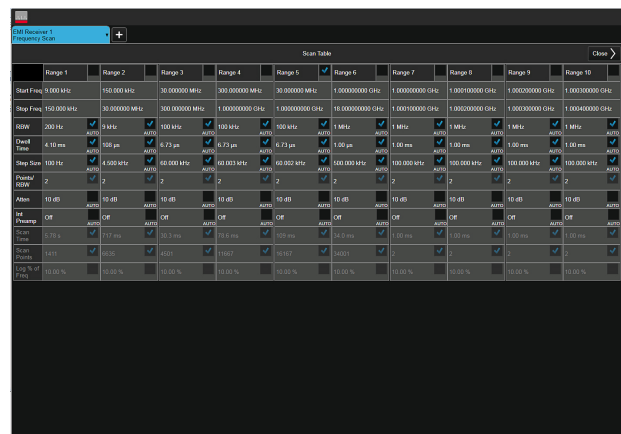


Figure 3. Scan table

Tune and listen to signals in the frequency scan list

Testing in an open area test site means that you have to deal with signals in the ambient environment. To help distinguish between DUT signals and signals in the ambient environment, you can use the tune and listen function to demodulate AM, FM, or phase modulation.

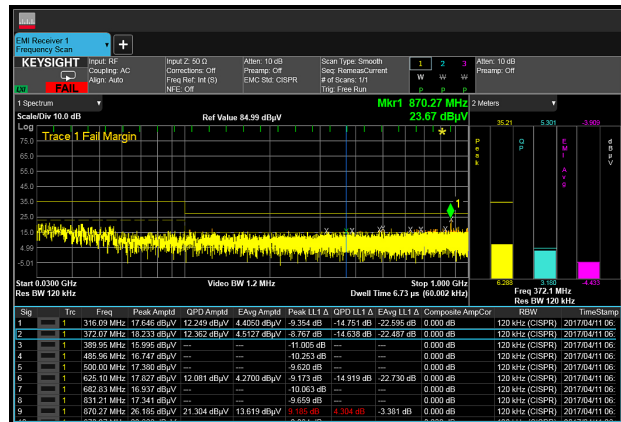


Figure 4. Radiated scan with meters

View signals over time using strip chart

Strip chart lets you view signal over a long time period to identify widely spaced discontinuities. Limit lines can be placed on the display for regulatory agency comparison.

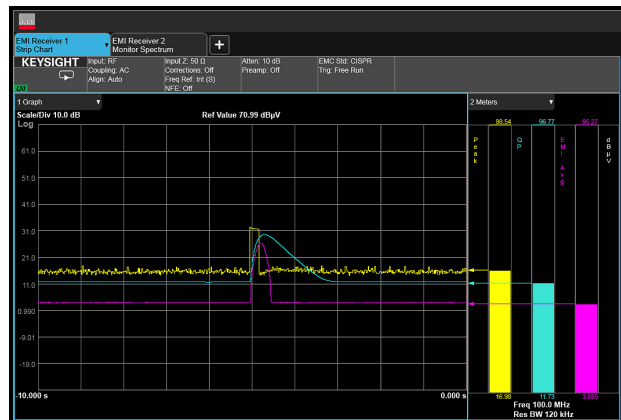


Figure 5. Strip Chart

Generate a report of the test results

Develop a report in HTML format that includes screen image, signal list, correction factors, trace data, and limit lines along with test and product descriptions.

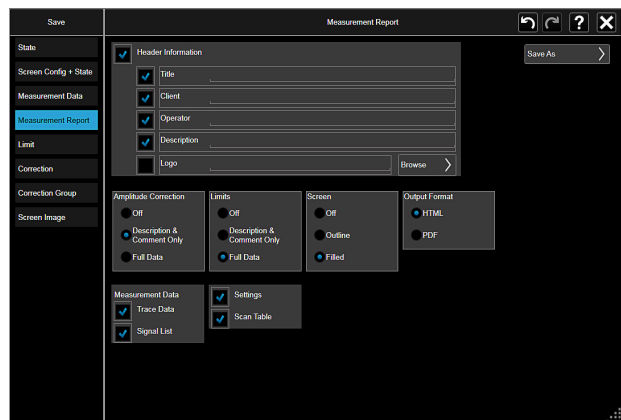


Figure 6. Report generation

Go faster with time domain scanning

The EMI measurement application offers three types of frequency scanning: swept, stepped, and time domain.¹ Time domain scan decreases total test time by reducing overall prescan collection times when longer measurement dwell times are required. Time domain scan speeds measurements by using high-overlap fast Fourier transforms (FFTs) to collect emissions data simultaneously over an acquisition bandwidth that is multiple resolution bandwidths wide. This is in contrast to frequencydomain measurements, which collect data in individual resolution bandwidths. With time domain testing, you can collect suspect lists rapidly, greatly improving overall test time and throughput.

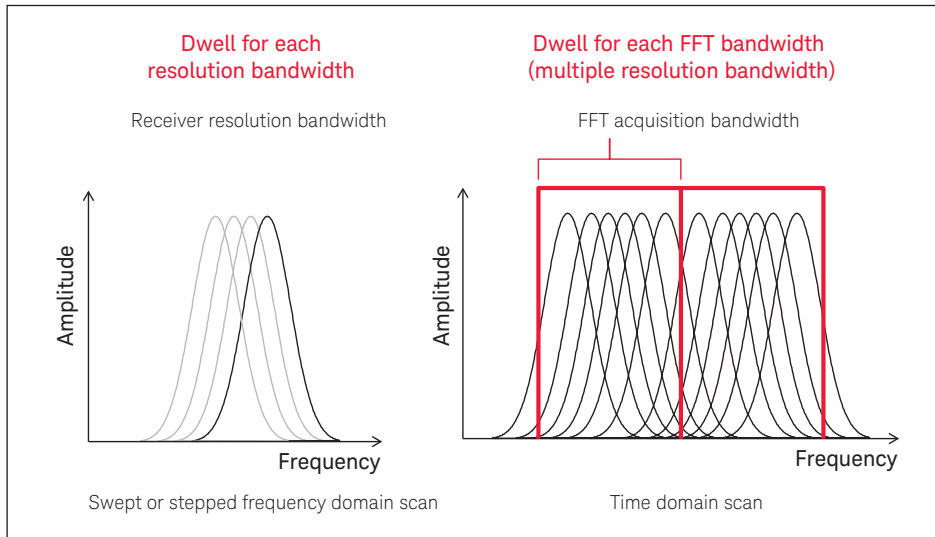


Figure 7. Comparison of resolution and FFT acquisition bandwidths

1. Requires Options DP2 or B40. Not available for CXA.

Automate click measurements

Use the built-in disturbance analyzer to easily make discontinuous disturbance, or click, precompliance measurements as specified in CISPR 14-1. Simplify and automate data collection, analysis, and report generation for these commonly tested emissions for more efficient testing.

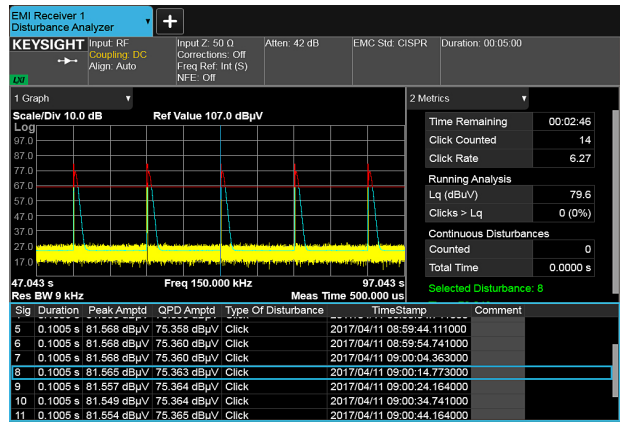


Figure 8. Simplify and automate data collection, analysis, and report generation for click measurements

Find the maximum with monitor spectrum

To ensure that you have identified the frequencies of maximum emissions in your suspect list, the EMI measurement application offers a new feature called monitor spectrum.¹ This feature offers both live-spectrum and meter displays that make it easy to see emission levels and find the maximum while adjusting the center frequency. Ultimately, monitor spectrum improves overall measurement time by reducing the time it takes to prepare your signal list for final measurements.



Figure 9. Simplify and automate data collection, analysis, and report generation for click measurements

Be ready for APD measurements

The EMI measurement application helps future-proof your lab by offering the amplitude probability distribution (APD) function that is being considered by CISPR for emissions testing of microwave ovens.¹

To characterize slowly-varying emissions, the APD function displays the probability of an emission reaching or exceeding a given level. To facilitate use of this new function, the EMI measurement application also offers specific limit-line types that can be used with built-in evaluation capabilities to simplify DUT testing.

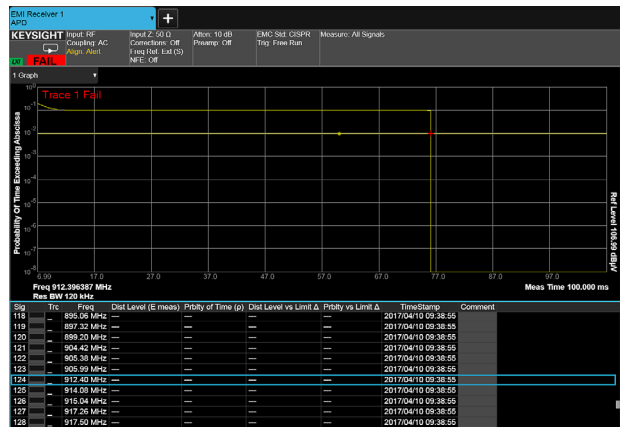


Figure 10. APD measurement example

1. Requires Options DP2 or B40. Not available for CXA.

Software Licensing and Configuration

Choose from two license types:

- Fixed, perpetual license:
This allows you to run the application in the X-Series analyzer in which it is initially installed.
- Transportable, perpetual license:
This allows you to run the application in the X-Series analyzer in which it is initially installed, plus it may be transferred from one X-Series analyzer to another (UXA, PXA, MXA, EXA, CXA) signal analyzers.

You Can Upgrade!

Options can be added after your initial purchase.

All of our X-Series application options are license-key upgradeable.



For more information, please visit the respective product Web pages.

N6141C EMI measurement application

Model-Option	Description	Additional information
N6141C-2FP	Fixed perpetual license	For N9000B CXA, N9010B EXA, N9020B MXA, N9030B PXA and N9040B UXA signal analyzers
N6141C-2TP	Transportable perpetual license	For N9000B CXA, N9010B EXA, N9020B MXA, N9030B PXA and N9040B UXA signal analyzers

Hardware configuration

For optimizing measurements with the EMI receiver measurement applications, Keysight recommends a minimum level of X-Series multi-touch instrument hardware functionality at each instrument performance point.

Supported instruments include:

- UXA N9040B
- PXA N9030B
- MXA N9020B
- EXA N9010B
- CXA N9000B

Capability	Instrument Option	Benefit
Analysis bandwidth	40 MHz minimum (-B40) or wider on UXA, PXA, MXA or EXA	Required: For full EMI capability support, including time domain scan, APD measurement and monitor spectrum measurement
Enhanced display package	-EDP	Recommended: For use in the spectrum analyzer mode
Deep capture memory	-DP2 on MXA and EXA only	Recommended: For full EMI capability support, including time domain scan, APD measurement and monitor spectrum measurement
Time domain scan	-TDS	Recommended: For fast prescan speed. DP2 or B40 is required
Enhanced fast sweep speed	-FS2	Optional: Useful for maximizing sweep speed. TDS and FS2 are mutually exclusive

Additional Information

Literature

N6141A & W6141A EMI Self-Guided Demonstration, Technical Overview, literature number 5990-6158EN

Making Conducted and Radiated Measurements, Application Note, literature number 5990-6152EN

Web

Product web pages of the respective document libraries.

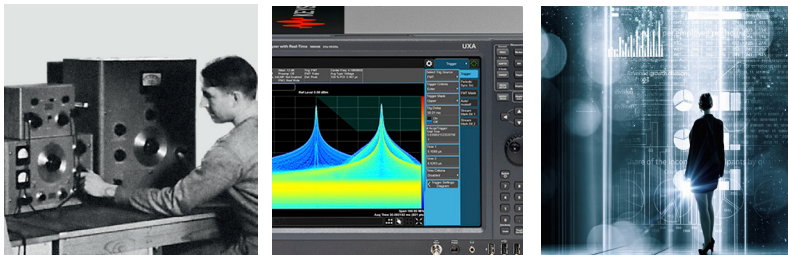
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