



N6141A & W6141A EMC

X-Series Measurement Application

Technical Overview

- Easily identify out-of-limit device emissions
- Maximize signals and compare against regulatory requirements
- Use the hardkey/softkey user interface or use SCPI remote interface
- Move application between X-Series signal analyzers with transportable licensing



Agilent Technologies

EMC Measurement Application

The EMC measurement application enables the user to perform pre-compliance conducted and radiated emissions tests to both commercial and MIL-STD requirements. It provides better sensitivity, accuracy and reduces test margins, across the X-Series signal analyzers, so you can make more precise measurements. The 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, search for signals, measure the peak, quasi-peak and average values of the signals and place the results in a table. Use the Signal List feature to mark and delete unwanted signals, leaving only those of interest. Easily identify signals that fail the regulatory agency limit.

The EMC measurement application is just one in a common library of more than 25 measurement applications in the Agilent X-Series, an evolutionary approach to signal analysis that spans instrumentation, measurements and software. The X-Series analyzers, with upgradeable CPU, memory, disk drives, and I/O ports, enable you to keep your test assets current and extend instrument longevity. Proven algorithms, 100% code-compatibility and a common UI across the X-Series create a consistent measurement framework for signal analysis that ensures repeatable results and measurement integrity so you can leverage your test system software through all phases of product development. You can further extend your test assets by transporting applications across multiple X-Series signal analyzers.

Key Features

- See device emissions typically hidden in the noise floor
- Differentiate between ambient signals and device emissions
- View signals over time to identify intermittent responses
- Built-in commercial and MIL-STD compliant bandwidths, detectors and band presets
- Continuously monitor signals with bar meters to detect maximum amplitude
- Compare measured emissions to regulatory limits

Choosing between the EMC measurement application and Option EMC for X-Series

Option EMC for X-Series signal analyzers is supplied with the EMC measurement application. It is also available as a standalone option for all X-Series signal analyzers. Option EMC contains the 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 EMC measurement application 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. See the following table for a summary comparison of features.

Table 1. Comparison of EMC measurement application and Option EMC features

Feature	EMC measurement application	Option EMC
CISPR 16-1-1 detectors	•	•
CISPR 16-1-1 bandwidths	•	•
Log and linear display	•	
Signal list	•	
Scan table	•	
Simultaneous detectors	•	
Measure at marker	•	•
Delta to limit	•	
Strip chart	•	
Step and swept scans	•	

EMC Precompliance Measurements

Over the past two decades, precompliance measurements have been gaining in popularity. The basic premise is to measure the conducted and radiated emissions performance of a product during the development phase to identify problems early and thereby solving these problems before moving on to the next phase of development. The goal is to be able to pass testing at a fully accredited compliance test facility without additional changes and getting the product to market on time and within budget.

Refer to the *Making Conducted and Radiated Emissions Measurements* application note, part number 5990-6152EN. This application note gives you a step-by-step approach to which regulatory agency limits to use and how to interconnect the device under test to the accessories and signal analyzer. It also steps you through the process of loading limits, correction factors, scan table setup and making measurements. Learn how to deal with ambient environments that could interfere with your measurements.

Conducted emissions measurements

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 LISN (line impedance stabilization network). The frequency range of conducted emissions is 9 kHz to 30 MHz depending on the regulatory agency.

Radiated emissions measurements

Performing radiated emissions measurements is not as straight forward as conducted emissions measurements. The antenna is usually placed 3 to 10 meters from the DUT. The device under test should be rotated in order to find the maximum radiation.

With the addition of the EMC measurement application, the X-Series signal analyzer becomes a fully-functional EMC 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 device under test and the ambient signal environment.

Regulatory standards

X-Series signal analyzers with the EMC measurement application meet the following regulatory agency requirements by country/region. MIL-STD applies only to the PXA and MXA.

Table 2. Worldwide regulatory agency requirements

Country	Standard/requirement	Type of test/measurement method
United States		
FCC	Part 15 Subpart B Part 18	Unintentional radiators Industrial, scientific and medical
MIL-STD (PXA and MXA)		
	CE101 CE102 RE101 RE102	Conducted emissions Conducted emissions Radiated emissions Radiated emissions
European Union European norms		
	EN55011 EN55013 EN55022	Industrial, scientific and medical Sound and TV broadcasting Information Technology Equip
Australia/New Zealand AS-NZS		
	1044 2064 3548	CISPR 14 Motors CISPR 11 ISM CISPR 22 ITE
China	GB9254	Information Technology Equip
Japan	VCCI	Radiated and conducted emissions

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EMC Precompliance Measurements, continued

Easily identify out-of-limit device emissions and maximize signals to compare against regulatory requirements

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.

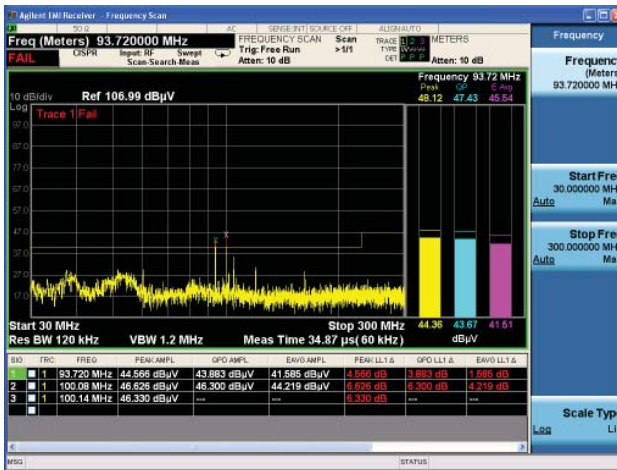


Figure 1. Frequency scan

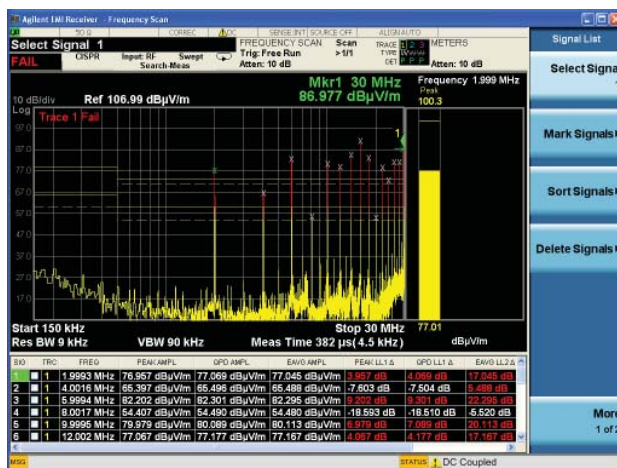


Figure 2. Conducted emissions with delta to limit

EMC Precompliance Measurements, continued

Use the scan table to set up frequency ranges

The EMC 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 setup a range in the scan table.

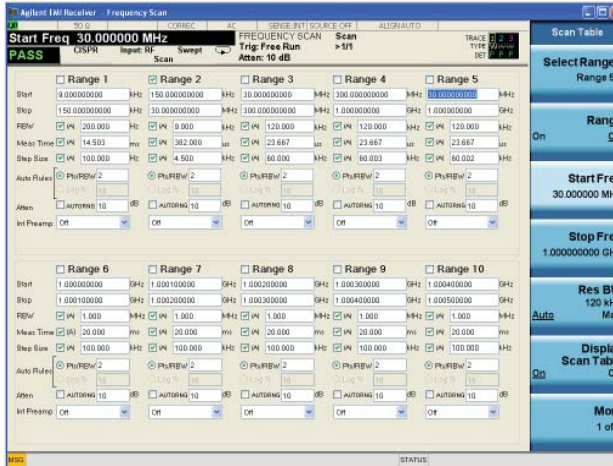


Figure 3. Scan table

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.

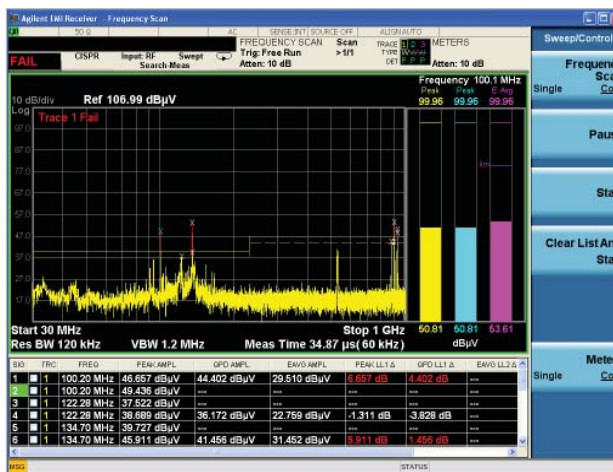


Figure 4. Radiated scan with meters

View signals over time using the strip chart

The strip chart lets you view signals 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

EMC Precompliance Measurements, continued

Option EDP enhanced display package for X-Series signal analyzers

Option EDP gives you three more diagnostic tools to be used with your X-Series signal analyzers. Use the spectrogram to view signal traces over time to identify intermittent signals. The trace zoom and zone span give you a closer look at signals that appear in broad measurement span.

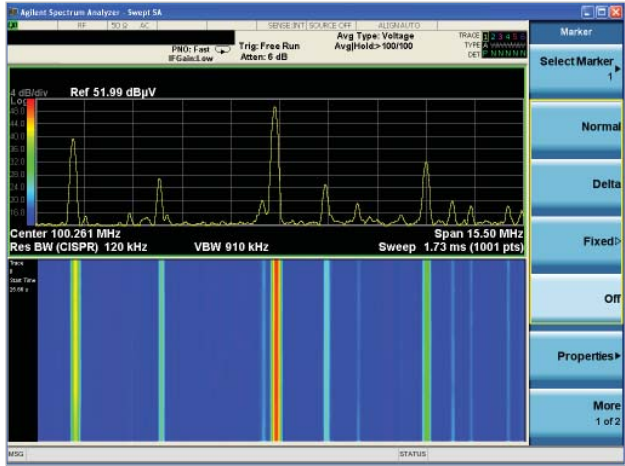


Figure 6. Spectrogram

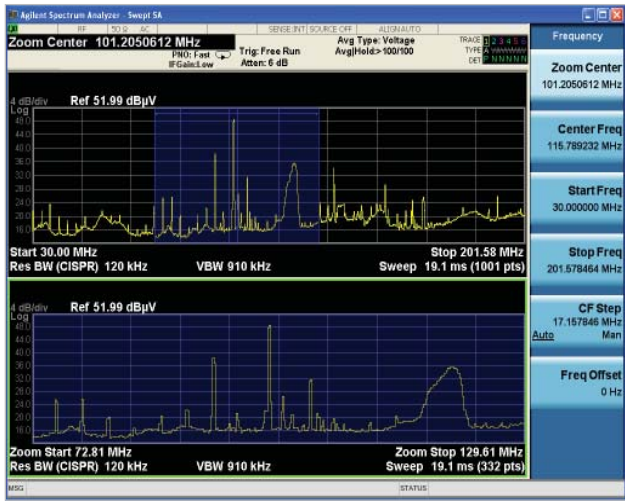


Figure 7. Trace zoom

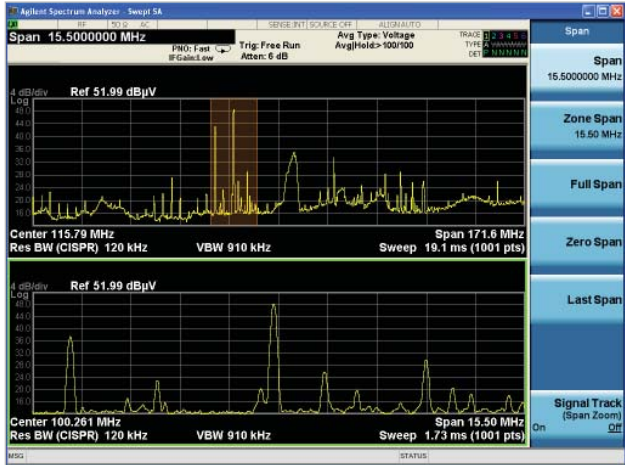


Figure 8. Zone span

Ordering Information

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 (PXA/MXA/EXA).

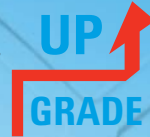
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N6141A EMC measurement application

Model-Option	Description	Notes
N6141A-2FP	Fixed perpetual license	For N9010A EXA, N9020A MXA and N9030A PXA signal analyzers
N6141A-2TP	Transportable perpetual license	For N9010A EXA, N9020A MXA and N9030A PXA signal analyzers

W6141A EMC measurement application

Model-Option	Description	Notes
W6141A-2FP	Fixed perpetual license	For the N9000A CXA signal analyzer

Ordering Information, continued

Hardware configurations

N9030A PXA signal analyzer

Model-Option	Description	Notes
N9030A-503, -508, -513, -526, -543, -544 or -550	3.6, 8.4, 13.6, 26.5, 42.98, 44 or 50 GHz frequency range	One required
N9030A-P03, -P08, -P13, -P26, -P43, -P44 or -P50	Preamplifier, 3.6, 8.4, 13.6, 26.5, 42.98, 44 or 50 GHz	One recommended
N9030A-EDP	Enhanced display package for use in the spectrum analyzer mode	Recommended

N9020A MXA signal analyzer

Model-Option	Description	Notes
N9020A-503, -508, -513 or -526	3.6, 8.4, 13.6, or 26.5 GHz frequency range	One required
N9020A-P03, -P08, -P13 or -P26	Preamplifier, 3.6, 8.4, 13.6 or 26.5 GHz	One recommended
N9020A-EDP	Enhanced display package for use in the spectrum analyzer mode	Recommended

N9010A EXA signal analyzer

Model-Option	Description	Notes
N9010A-503, -507, -513 or -526	3.6, 7.0, 13.6, or 26.5 GHz frequency range	One required
N9010A-P03, -P07	Preamplifier, 3.6 or 7.0 GHz	Recommended
N9010A-EDP	Enhanced display package for use in the spectrum analyzer mode	Recommended

N9000A CXA signal analyzer

Model-Option	Description	Notes
N9000A-503 or -507	3.0 or 7.5 GHz frequency range	One required
N9000A-P03 or -P07	Preamplifier, 3.0 or 7.5 GHz	One recommended
N9000A-EDP	Enhanced display package for use in the spectrum analyzer mode	Recommended

Additional Resources

Literature

5990-6158EN, N6141A & W6141A
ECM Self-Guided Demonstration

5990-6152EN, Making Conducted and
Radiated Measurements application
note

Web

Product page:

www.agilent.com/find/N6141A and
www.agilent.com/find/W6141A

X-Series applications:

www.agilent.com/find/X-Series_apps

X-Series signal analyzers:

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