

Application Note



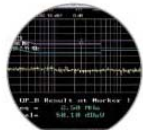
EMC Measurements with the 2399C Portable Spectrum Analyzer



Quasi-Peak Detector



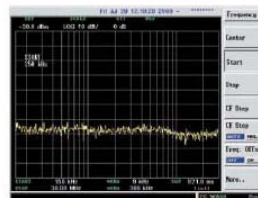
Pre-Amplifier



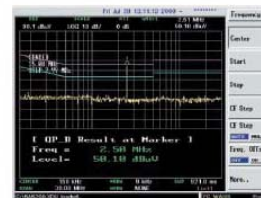
EMC Measurement Software



Spectrum Analyzer



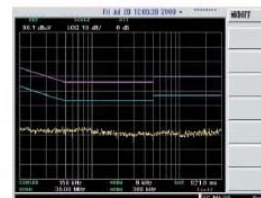
Linear / Log Scale Measurements



Peak & Quasi-Peak Measurements



Built-in Pre-amp



Limit line & Correction Factors

Introduction

The 2399C spectrum analyzer includes as an option a comprehensive EMC measurement suite and internal quasi-peak detectors and filters. This comprehensive package provides a low cost and yet high performance route into EMC testing and is ideal in any environment where pre-compliance testing at all stages of design and manufacture will save time in expensive EMC facilities.

Increasing regulation of EMC means that in many cases the EMC design has become the critical path in development and a low cost method to control this aspect means less risk during the design and faster time to market.

The 2399C is a 1 kHz to 3 GHz full featured portable spectrum analyzer which is ideal for many general purpose measurement tasks in the lab, in manufacture and in the field. The EMC personality option adds the capability to test all the functions of the radiation emission

measurement as well as the conductance emission measurement conforming to international standards.

It features dedicated hardware and software architecture including quasi-peak detector, built-in pre-amplifier, log scales, limit lines and correction factors for antennas, cables and amplifiers. It is very easy to use due to automatic measurement functions, menu keys and interactive software which do not require any special knowledge or training. So you can start EMC measurement easily and quickly.

Performance

Key to the performance of the 2399C spectrum analyzer is its low noise floor of -117 dBm at 1 GHz. This can be extended to measure as low as -137 dBm using the optional 20 dB pre-amplifier making the 2399C spectrum analyzer ideally suited to picking out low interfering signals in noise.

The transient signal optimization on the 2399C spectrum analyzer enables rapid capture and measurement of interfering sources. These capabilities make the 2399C spectrum analyzer uniquely suited to solving today's EMI problems.

Measurement

In particular, for conducted emission it is easy to show EMI interference by displaying normal mode and common mode noise separately. The Log scale of frequency bandwidth provided by the measurement option gives a precise measurement, to get the most advantage of the Log scale for the desired frequency.

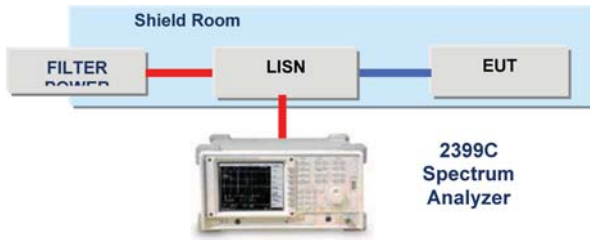


Fig. 1 conducted emission measurements

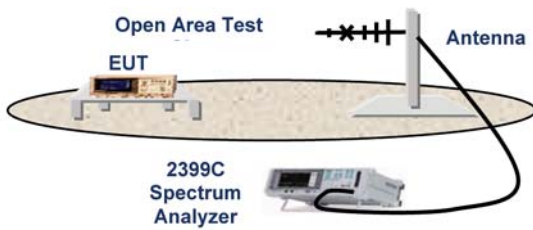


Fig. 2 radiated emission measurements

To make emission measurements using the EMC personality from a PRESET state you can follow the following straightforward procedure.

Procedure

[BOLD] – Hard key press, a dedicated front panel function key.

[Italic] – Soft key press, software menu key

Numeric entries are made using either keypad or rotary control. Key pad entries must be followed by a terminator Soft key or **[ENTER]**

The following shows the method of EMC measurement of this system.

1. Connect the equipment according to Figure 1 for conducted emission test or Figure 2 for radiated emission test.
2. Press **[PRESET]** **[Preset]** to set 2399C spectrum analyzer into default condition.
3. Press **[SYSTEM]** **[EMC Model]** to select the EMC measurement suite.

4. Load the state-file or directly modify the frequency, RBW and VBW.
5. Press **[Setup]** to enter setup menu. In this menu you can:
 - select **[Limit Table]** to enter, edit, and save limit files for EMC measurements
 - select **[X-ducer Factor]** to enter, edit, save and enable/disable transducer calibration values
 - select **[Cable Factor]** to enter, edit, save and enable/disable cable correction values
 - select **[Antenna Factor]** to enter, edit, save and enable/disable antenna correction values
 - select **[Other Factor]** to enter, edit, save and enable/disable any other correction factors for your environment
6. At any time, you can press **[FILE]** to access the file menu where you can load and delete existing limit and correction files. Press **[MEASURE]** to return to the EMC measurement menu
 - Load the state-file (*.sts) which stores spectrum analyzer state for the measurements.
 - Load the EMC measurement limit file (*.lim)
 - Load the EMC correction factor files for cable (*.cbl) antenna (*.ant), transducer (*.xdu) and other (*.oth)
7. Press **[Detect Mode]** to select from **[Normal]**, **[Sample]**, **[Positive peak]** **[Negative peak]** or **[Average]** detectors.
8. Press **[QP Type]** to select between Quasi Peak detectors for type B and type C measurements.
9. Press **[QP Meas]** to select between OFF and ON. When ON, the 2399A spectrum analyzer screen is split into measurement and QP result windows.
10. Press **[Disp Model]** to select between LINEAR and LOGARITHMIC display modes.
11. Press **[Single]** or **[Continuel]** to select between a single scan or a continuous measurement.

Conclusion

The 2399C 3 GHz spectrum analyzer equipped with the following options enables quick, easy and yet comprehensive pre-compliance measurements of EMC.

- Option 13 EMC Analyzer software
- Option 04 Quasi-peak detectors and filters
- Option 07 Internal pre-amplifier (if required)

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