

R&S®ESCI7: measuring disturbance up to 7 GHz in line with the latest standards

Starting in October 2011, disturbance measurements up to max. 6 GHz on information technology equipment (ITE) will become mandatory in the European Union in line with amendment A1:2007 of product standard EN 55022:2006. Even right now, the new R&S®ESCI7 EMI test receiver allows manufacturers to avoid costly, time-consuming reengineering and enables test houses to adapt their range of services to future requirements.

R&S®ESCI7: standard-compliant disturbance measurements, and much more

With the use of ever higher frequencies, e.g. in IT equipment such as computers, modems and printers, the issue of protecting radiocommunications frequencies against disturbance is becoming more important. In the frequency bands above 1 GHz, for example, even printed-board ground leads of slightly excessive length in this type of equipment or small slots in shielding cabinets can easily cause unwanted RF leakage. The frequency extension to 6 GHz in amendment A1:2007 to ITE product standards IEC/CISPR 22 [1] and EN 55022 [2] takes this development into account.

The R&S®ESCI7 EMI test receiver (FIG 1) was designed as a fully compliant radio disturbance measuring receiver for the frequency range from 9 kHz to 7 GHz. It supplements the R&S®ESCI EMI test receiver (9 kHz to 3 GHz) already established on the market [3]. Like the R&S®ESCI, it also reflects the latest version of the CISPR 16-1-1 basic standard, including the latest weighting detectors "average with meter time constant (CISPR-average)" and "RMS-average" [4].



The main field of application of the R&S®ESCI7 is product certification in line with applicable commercial EMC standards. With its integrated preselection, a 20 dB preamplifier up to 7 GHz and its highly linear frontend, it meets the requirements of standards such as CISPR, EN, FCC, ETS, ANSI and VCCI. Time-saving automatic test sequences support the user's work and reduce effort as well as the risk of measurement errors. Its additional analysis capabilities provide valuable assistance in disturbance measurements, including:

- Determining the timing behavior of disturbances, e.g. for optimal determination of the measurement time for intermittent disturbance (time domain analysis) or for click-rate measurement in line with product standard CISPR 14
- Representing the spectrum surrounding the receiver frequency in parallel with numeric measurement, evaluation and graphic level display (mixed mode)

These features allow faster identification and analysis of disturbance signals. The measuring receiver can be precisely tuned to the local maximum disturbance, which considerably simplifies the detection of drifting signals, for example. Using add-on near-field probes and test antennas from Rohde&Schwarz, the R&S®ESCI7 is a multifaceted measurement tool, e.g. for radiated disturbance measurements, even during the design and integration phase of a product. Extra efforts during product development to verify compliance with EMC limits are a thing of the past.

FIG 1 Measurement of radiated disturbance in line with the product standard CISPR 22:2005/A1:2005/EN 55022:2006/A1:2007 for IT equipment in the range from 1 GHz to max. 6 GHz using the R&S®ESCI7 EMI test receiver and the R&S®HF907 double-ridged waveguide horn antenna.

Highest frequency occurring in the device (f)	Measurement of radiated disturbance up to ...
$f < 108 \text{ MHz}$	1 GHz
$108 \text{ MHz} \leq f < 500 \text{ MHz}$	2 GHz
$500 \text{ MHz} \leq f < 1 \text{ GHz}$	5 GHz
$f > 1 \text{ GHz}$	$5 \times f$ or 6 GHz * *whichever is lower

FIG 2 Overview of the maximum measurement frequency for disturbance measurements in line with amendment A1:2005 to product standard CISPR 22:2005 (ITE); implemented for the EU in A1:2007 of EN 55022:2006.

Versatile use in the RF development lab thanks to an integrated spectrum analyzer

Like all modern Rohde&Schwarz EMI test receivers, the R&S®ESCI7 has an integrated spectrum analyzer. This combination's strengths are fast overview and preview measurements for detecting and analyzing disturbance behavior in the various phases of product development. In addition, it is ideal for performing many of the standard measurements encountered in RF development labs. Custom add-on functionality, such as adjacent channel power (ACP) measurement, determination of the third-order intercept point or of the occupied bandwidth, as well as statistics functions (APD, CCDF) make the R&S®ESCI7 suitable for applications beyond disturbance measurement.

Ready for the future – measurements in line with CISPR 22/EN 55022 up to 6 GHz

Amendment A1:2005 to the CISPR 22 international product standard for information technology equipment, such as PCs, modems and fixed-line telephones, defines measurements up to max. 6 GHz, depending on the highest frequency that is generated, used or tuned in the product (FIG 2). This CISPR standard has been published in the European Union as amendment A1:2007 to product standard EN 55022:2006. In August 2009, the European Commission set October 1, 2011, as the mandatory date for the standard to come into force. For the 1 GHz to 6 GHz frequency range, limit values for the peak detector were established, and also for the new CISPR-average detector in line with CISPR 22:2008. The product standard distinguishes between Class A limits for industrial areas and Class B limits for residential areas. The limits for residential areas are 6 dB lower than those for industrial areas. In addition, the standard specifies a minimum

Typical displayed average noise level of the R&S®ESCI7

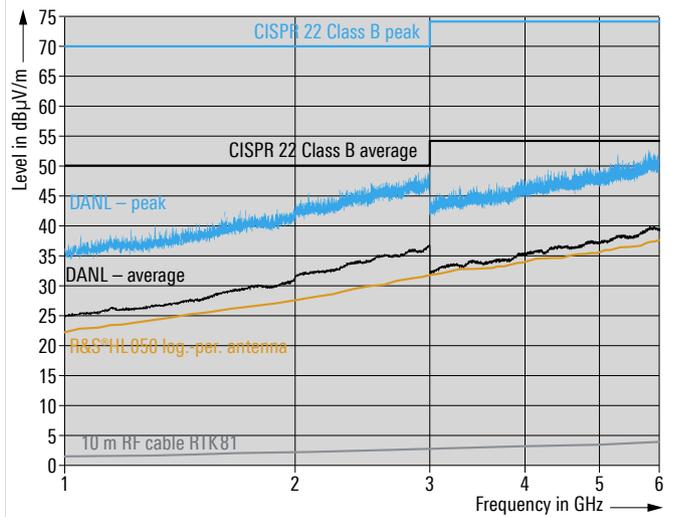


FIG 3 Measurement of the typical displayed average noise level of the R&S®ESCI7 with the R&S®EMC32-EB EMI measurement software for peak detector (blue trace) and average detector (black trace) in the range from 1 GHz to 6 GHz. The figure shows the limit lines in accordance with CISPR 22:2005 A1:2005/EN 55022:2006 A1:2007 for Class B (residential areas) as well as the antenna factor (here for the R&S®HL050 log.-per. antenna) and cable loss (10 m RF cable).

signal-to-noise ratio of 6 dB with regard to the relevant limit line. For disturbance measurements in residential areas, this requirement places particularly high demands on the sensitivity of the measuring receiver. With its integrated, low-noise preamplifier, the R&S®ESCI7 can easily meet this requirement and even offers ample margin (FIG 3). As a result, users must invest less in expensive low-loss cables, high-sensitivity antennas or other external preamplifiers that negatively affect the dynamic range.

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References

- [1] IEC / CISPR 22:2005 Amendment 1:2005: Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement.
- [2] EN 55022:2006 + A1:2007: Information technology equipment – Immunity to radio interference – Limits and methods of measurement.
- [3] R&S®ESCI EMI test receiver: Compact test receiver for full-compliance measurements up to 3 GHz. News from Rohde&Schwarz (2004) No. 182, pp. 40–43.
- [4] IEC / CISPR 16-1-1:2006 Amendment 2:2007 Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus.