



Measurement Techniques

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Overview

- Background on FCC Requirements for Measurement Techniques
- What Measurement Techniques Should Be Used?
- Recent Developments
- Where Can A List of Measurement Techniques Be Found?
- What does this mean to a TCB?

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Background

- **Section 2.947 - Measurement Procedures**
- The Commission will accept data which has been measured in accordance with the following standards or measurement procedures:
 - Those set forth in bulletins or reports prepared by the Commission's Office of Engineering and Technology.
 - Those acceptable to the Commission and published by national engineering societies such as the EIA, the IEEE, and ANSI.
 - Any measurement procedure acceptable to the Commission may be used to prepare data demonstrating compliance with the requirements of this chapter.



Background

- The test report should include:
 - Completely identify the specific standard or measurement procedures actually used
 - A listing of the test equipment used
 - Detailed description of measurement procedures actually used when they differ from published procedures
 - As necessary the Commission may require additional information concerning measurement procedure used



Background

- Measurement Standards - 15.31(b)
 - Strongly encouraged to use specific measurement procedures listed in Part 15.
 - When using other procedures you should contact the FCC staff to ensure that such procedures can be relied on to produce measurement results compatible with the FCC measurement procedures.
 - The description of the measurement procedure used in testing the equipment for compliance and a list of the test equipment actually employed shall be made part of an application/test report.



What Measurement Techniques Should Be Used?

- A number of measurement techniques have been identified and can be found in:
 - FCC Rules
 - Industry Standards
 - Text of the Report and Order
 - Public Notice Issued by the Commission
 - Knowledge Database



FCC Rules

- **Section 15.31(a) specifies a number of measurement techniques for use in demonstrating compliance:**
 - **FCC/OET MP-2** Measurement of UHF Noise Figures of TV
 - **ANSI C63.4–2003** American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
 - **ANSI C63.17–1998** Methods of Measurement of the Electromagnetic and Operational Compatibility of Unlicensed Personal Communications Services (UPCS)



Industry Standards

- **A number of industry standards of interest:**
 - **ANSI/TIA/EIA-603-B-2002** - Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
 - **IEEE 139-1988** - IEEE Recommended Practice for the Measurement of Radio Frequency Emission from Industrial, Scientific, and Medical (ISM) Equipment Installed on User's Premises
 - **IEEE 187-1990** - IEEE Standard on Radio Receivers: Open Field Method of Measurement of Spurious Radiation from FM and Television Broadcast Receivers
 - **IEEE 187-2003** - Measurement Methods of Emissions from FM and Television Broadcast Receivers in the Frequency Range of 9 kHz to 40 GHz



Report and Order

- The text of a Report and Order may provide measurement techniques:
 - Ultra Wideband Transmission Systems (ET Docket 98-153)
 - See Knowledge Database for further guidance on UWB measurements
 - Interim Measurement Procedures For DFS-Equipped U-NII Devices (ET Docket No. 03-122)

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Public Notice

- **Measurement techniques have been released by Public Notice:**
 - **DA 02-2138** - Measurement Procedure Updated for Peak Transmit Power in the Unlicensed National Information Infrastructure (U-NII) Bands
 - **DA-02-2850** - FCC Clarifies Equipment Certification Procedures For "Learned Mode" or "Trainable" Transmitters
 - **DA 00-705** - Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems
 - **DA-02-1097** - FCC Lab Provides Guidance On Certification Of Linear Power Amplifiers Used With Cellular And PCS Transmitters
 - **DA 00-1407** - Part 15 Unlicensed Modular Transmitter Approval

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Knowledge Database

- Measurement techniques are also provided in the knowledge database:
 - Frequently Asked Questions (FAQ) regarding Ultra Wide Band Compliance Measurements
 - Millimeter Wave Test Procedures
 - Guidance on Measurements for Digital Transmission Systems 15.247
 - Radar detector measurement procedures



Recent Developments

- Digitally Modulated Transmission Systems (DTS)
- Pulse Desensitization Correction Factor (PDCF)



New DTS measurements

- Digitally Modulated Transmission Systems in 15.247 have an option of continuing to use Peak measurements for determining Output power and Power Spectral Density or the new “Average”. Similar to UNII.
- New DTS test guidelines can be downloaded from FCC Knowledge Database



New DTS measurements

- If Peak output power is measured, then peak power spectral density must be measured.
- When the new “Average” measurement is chosen, compliance with the spurious emissions (not within a restricted band) must be down 30 dBc down from the fundamental rather than 20 dB in any 100 kHz band.



Where Can A List of Measurement Techniques Be Found?

FCC Home | Search | Updates | E-Filed | Initiatives | For Consumers | Find People

Equipment Authorization

FCC > OET > Equipment Authorization > Measurement Techniques

Search:

Equipment Authorization

Office of Engineering and Technology

MEASUREMENT TECHNIQUES

This series of documents is a non-exclusive list of measurement techniques that may be used when testing equipment to determine its compliance with FCC rules. This list is provided as a reference tool to aid interested parties in locating measurement techniques. Any party making measurements to show compliance with the FCC rules should select the appropriate measurement methods as required and specified in the particular part of the FCC rules. (For example, for Part 15 devices see §§ 15.31, 15.32, 15.33, and 15.35 of title 47 of the Code of Federal Regulations (C.F.R.)). The [FCC Interpretation Database](#) provides additional guidance on testing devices subject to the FCC's rules.

Publications	FCC/OET HP-2	Measurement of UHF Noise Figures of TV (October 1986)
Publications	IEEE 187-1990	IEEE Standard on Radio Receivers: Open Field Method of Measurement of Spurious Radiation from FM and Television Broadcast Receivers [Link to file website]
Publications	IEEE 187-2003	Measurement Methods of Emissions from FM and Television Broadcast Receivers in the Frequency Range of 9 kHz to 40 GHz [Link to file website]
Publications	Specific Absorption Rate (SAR)	Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields

<http://www.fcc.gov/oet/ea/Welcome.html>



Summary

- What does this mean to a TCB?
 - A TCB is only permitted to authorize products where *“appropriate procedures have been published”*.
 - Need to contact FCC if different procedures are used.
 - TCB is required to be accredited to 17025 with the applicable scope of accreditation.
 - See ANSI ANS-ACP-PR-044 for guidance on ISO/IEC 17025 scope of accreditation.



Summary

- What does this mean to a TCB?
 - When reviewing an application the TCB needs to be familiar with the appropriate measurement technique
 - Watch for Public Notice on Pulse Desensitization Correction Factor (PDCF)
 - New procedure just published for DTS
 - Watch for a listing of measurement techniques on EA webpage
 - Feedback is welcome!



Questions and Answers