



The New EURAMET cg-12 Guide

Guidelines on the Evaluation of Vector Network Analysers (VNA)

- EURAMET cg-12 (previously EA-10/12):
- ... is considered to be outdated and not applicable at higher frequencies
- Guide promotes Residual Error Model:
 - Formalism not GUM compliant
 - Scalar treatment, phase neglected
 - Assumptions questionable (ideal airlines, connector reflections ignored) and limits of applicability not defined
 - Promotes sometimes just «typical values»
 - Origin of equations not referenced (see ANAMET report 51)
- Revision of guide within EMRP project «HF Circuits»

HF-Circuits Task 5.4

Contributors to 5.4: METAS, LNE, NPL, PTB, SP, VSL

5.4.1	Layout of new EURAMET Guide defined. Timeline for rewrite defined and writing tasks assigned.	METAS	LNE, NPL, PTB, SP, VSL	Document	Dec 2014
5.4.2	First draft of new EURAMET Guide ready for review	METAS	LNE, NPL, PTB, SP, VSL	Draft Guide	June 2015
5.4.3	Second draft of new EURAMET Guide ready for review	METAS	LNE, NPL, PTB, SP, VSL	Draft Guide	Dec 2015
5.4.4	Revised EURAMET Guide submitted to EURAMET for publication.	METAS	LNE, NPL, PTB, SP, VSL	Guide	May 2016

Target Audience

- Industrial labs: not so much
- Calibration Laboratories: strongly
- NMIs: partly

Content of current Guide

- Reference Standards: «Traceability Kit» (enhanced verification kit)
- Mathematical Models: very brief
- Uncertainty evaluation
 - Rationale for Residual Error Model
 - One Port and Two Port Magnitude Residual Errors with ripple method device, cable and connector uncertainties (typical values) equations for mismatch and isolation

Content of revised Guide 1/3

- Introduction
 - How to read this guide
 - Why an updated guide
 - Scope and Applicability (primarily coaxial measurements)
- Traceability scheme, Reference standards
 - Traceability chain
 - Measurement standards
- VNA Calibration schemes
 - SOLT
 - Unknown Thru
 - ECUs

Content of new guide 2/3

- Verification
 - Purpose
 - Verification Standards
 - Plausibility checks
 - Verification criteria
- Uncertainty contributions in a VNA measurement
 - Identification of contributions
 - Characterization of contributions
- VNA measurement model

Content of new guide 3/3

- Uncertainty evaluation
 - Verification based uncertainty estimation
 - Revised ripple method
 - Rigorous uncertainty propagation through measurement model
- Practical advice, best measurement practice
- Appendix
 - Examples
 - Technical details
 - Waveguide section

Acknowledgement



This work is funded through the European Metrology Research Programme (EMRP) Project SIB62 Metrology for New Electrical Measurement Quantities in High-frequency Circuits. The EMRP is jointly funded by the EMRP participating countries within EURAMET and the European Union.

