BACL ND018

Estimating the Uncertainty of Measurement

The estimation of measurement uncertainty, in certain cases, may depend on the nature of the test method, the degree of rigor required, metrologically and statistically valid, or calculation of uncertainty of measurement. In those cases, BACL will attempt to identify all the components of uncertainty and make a reasonable estimation to ensure the reporting of the result does not give a wrong impression of the uncertainty. Reasonable estimation is based on knowledge of the performance of the method and on the measurement scope and makes use of previous experience and validation data.

The measurement uncertainty listed herein focuses on the radiated emission and conducted emission and is referenced to the NIS 80.

When BACL estimates the uncertainty of measurement is based on the consideration of test method requirements, clients' requirements and the existence of narrow limits on which decisions on conformance to a specification are placed.

All uncertainty components that are of importance in the situation mentioned above, shall be taken into account using appropriate methods of analysis.

When a measurement is made, the result will be different from the true or theoretically correct value. This difference is the result of an error in the measured value and it should be the aim of the measurement process to minimize this error. In practice the extent to which this can be achieved may be limited and a statement of uncertainty is used to reflect the quality/accuracy of the measured result as compared with the true value.

1. RADIATED EMISSIONS

The measurement of vertically polarized field strength over the frequency range 30 MHz to 1 GHz on an open test site at 3 m and 10 m, includes the uncertainties list below.

Contribution	Probability Distribution	Uncertain			
		Biconical Antenna		Log periodic Antenna	
		3 m	10 m	3 m	10 m
Ambient signals		-	-	-	-
Antenna factor cal	Normal (K=2)	± 1.0	± 1.0	± 1.0	± 1.0
Cable loss calibration	Normal (K=2)	± 0.5	± 0.5	± 0.5	± 0.5

Receiver specification	Rectangular	± 1.5	± 1.5	± 1.5	± 1.5
Antenna directivity	Rectangular	+ 0.5 0	0	+ 3.0 0	+ 0.5 0
Antenna factor variation with height	Rectangular	± 2.0	± 2.0	± 0.5	± 0.5
Antenna phase center variation	Rectangular	0	0	± 1.0	± 0.2
Antenna factor frequency interpolation	Rectangular	± 0.25	± 0.25	± 0.25	± 0.25
Measurement distance variation	Rectangular	± 0.6	± 0.4	± 0.6	± 0.4
Site imperfection	Rectangular	± 2.0	± 2.0	± 2.0	± 2.0
Mismatch	U-shaped	+ 1.1 - 1.25	+ 1.1 - 1.25	± 0.5	± 0.5
System repeatability	Std Deviation	± 0.5	± 0.5	± 0.5	± 0.5
Repeatability of EUT		-	-	-	-
Combined standard uncertainty	Normal	+ 2.19 - 2.21	+ 2.16 - 2.20	+ 2.52 - 1.82	+ 1.74 - 1.72
Expanded uncertainty U	Normal (K=2)	+ 4.38 - 4.42	+ 4.32 - 4.40	+ 5.04 - 3.64	+ 3.48 - 3.44

Unless the repeatability of the equipment Under Test is particularly poor, a coverage factor of k =2 will ensure that the level of confidence will be approximately 95%.

2. Conducted Emission

Measurements of conducted emission over the frequency range 9 kHz to 30 MHz.

Contribution	Probability Distribution	Uncertainty	
		9 kHz - 150 MHz	150 kHz -30 MHz
Receivers Specification	Rectangular	1.5	1.5
LISN coupling Specification	Rectangular	1.5	1.5
Cable and input att cal	Normal (K=2)	0.3	0.5
Mismatch	U-shaped	0.2	0.05
Repeatability of BUT		-	-
Combined standard uncertainty	Normal	1.26	1.3
Expanded uncertainty U	Normal (K=2)	2.5	2.6

3. Others

Equipment such as voltmeters and wattmeters may lead to variable effects in the measurement uncertainty due to the environmental conditions, such as temperature and/or humidity changes.