

12. MEASUREMENT UNCERTAINTIES

SAR Measurement Uncertainties

Measurement uncertainties in SAR measurements are difficult to quantify due to several variables including biological, physiological, and environmental. However, we estimate the measurement uncertainties in SAR to be less than 15-25 % [18].

According to ANSI/IEEE C95.3, the overall uncertainties are difficult to assess and will vary with the type of meter and usage situation. However, accuracy's of ± 1 to 3 dB can be expected in practice, with greater uncertainties in near-field situations and at higher frequencies (shorter wavelengths), or areas where large reflecting objects are present. Under optimum measurement conditions, SAR measurement uncertainties of at least ± 2 dB can be expected.[3]

According to CENELEC [19], typical worst-case uncertainty of field measurements is ± 5 dB. For well-defined modulation characteristics the uncertainty can be reduced to ± 3 dB.

Figure 12.1. Breakdown of Errors [20]

	SAR MEASUREMENT UNCERTAINTIES [5]				
	Error	Distribution	Weight	Standard Deviation	Offset
Probe Uncertainty					
Axial isotropy	± 0.2 dB	U-Shaped	0.5	± 2.4 %	
Spherical isotropy	± 0.4 dB	U-Shaped	0.5	± 4.8 %	
Isotropy from gradient	± 0.5 dB	U-Shaped	0.0	$\pm$	
Spatial resolution	± 0.5 %	Normal	1.0	± 0.5 %	
Linearity error	± 0.2 dB	Rectangle	1.0	± 2.7 %	
Calibration error	± 10.0 %	Normal	1.0	± 10.0 %	
SAR Evaluation Uncertainty					
Data acquisition error	± 1.00 %	Rectangle	1.0	± 0.6 %	
ELF and RF disturbances	± 0.25 %	Normal	1.0	± 0.25 %	
Conductivity assessment	± 10.0 %	Rectangle	1.0	± 5.8 %	
Spatial Peak SAR Evaluation Uncertainty					
Extrapolated boundary effect	± 3.00 %	Normal	1.0	± 3 %	± 5 %
Probe positioning error	± 0.1 mm	Normal	1.0	± 1 %	
Integrated and cube orientation	± 3.00 %	Normal	1.0	± 3 %	
Cube Shape inaccuracies	± 2.00 %	Rectangle	1.0	± 1.2 %	
Device positioning	± 6.00 %	Normal	1.0	± 6 %	
Combined Uncertainties				± 18.4 %	± 5 %

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