

Uncertainty System Check (Dipole Validation) – IEEE P1528

Error Description	Uncertainty value $\pm\%$	Probability distribution	divisor	c_i^1 1g	Standard unc. (1g)	v_i^2 or v_{eff}
Measurement System						
Probe calibration	± 4.4	normal	1	1	$\pm 4.4\%$	∞
Axial isotropy of the probe	± 4.7	rectangular	$\sqrt{3}$	$(1-c_p)^{1/2}$	$\pm 2.7\%$	∞
Sph. isotropy of the probe	± 9.6	rectangular	$\sqrt{3}$	$(c_p)^{1/2}$	$\pm 0\%$	∞
Boundary effects	± 5.5	rectangular	$\sqrt{3}$	1	$\pm 3.2\%$	∞
Probe linearity	± 4.7	rectangular	$\sqrt{3}$	1	$\pm 2.7\%$	∞
Detection limit	± 1.0	rectangular	$\sqrt{3}$	1	$\pm 0.6\%$	∞
Readout electronics	± 1.0	normal	1	1	$\pm 1.0\%$	∞
Response time	± 0.0	rectangular	$\sqrt{3}$	1	$\pm 0.0\%$	∞
Integration time	± 0.0	rectangular	$\sqrt{3}$	1	$\pm 0.0\%$	∞
RF ambient conditions	± 3.0	rectangular	$\sqrt{3}$	1	$\pm 1.7\%$	∞
Mech. constraints of robot	± 0.4	rectangular	$\sqrt{3}$	1	$\pm 0.2\%$	∞
Probe positioning	± 2.9	rectangular	$\sqrt{3}$	1	$\pm 1.7\%$	∞
Extrap. and integration	± 3.9	rectangular	$\sqrt{3}$	1	$\pm 2.3\%$	∞
Test Sample Related						
Distance dipole-liquid	± 1.0	rectangular	$\sqrt{3}$	1	$\pm 0.6\%$	∞
Input power	± 4.7	rectangular	$\sqrt{3}$	1	$\pm 2.7\%$	∞
Phantom and Setup						
Phantom uncertainty	± 4.0	rectangular	$\sqrt{3}$	1	$\pm 2.3\%$	∞
Liquid conductivity (target)	± 5.0	rectangular	$\sqrt{3}$	0.6	$\pm 1.7\%$	∞
Liquid conductivity (meas.)	± 10.0	rectangular	$\sqrt{3}$	0.6	$\pm 3.5\%$	∞
Liquid permittivity (target)	± 5.0	rectangular	$\sqrt{3}$	0.6	$\pm 1.7\%$	∞
Liquid permittivity (meas.)	± 5.0	rectangular	$\sqrt{3}$	0.6	$\pm 1.7\%$	∞
Combined Standard Uncertainty					$\pm 9.5\%$	
Extended Standard Uncertainty (k=2)					$\pm 19.0\%$	