

## Time and Frequency, Brazil, ON/DSHO (Observatório Nacional/Serviço Nacional da Hora)



Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					NMI Service Identifier	Comments
Quantity	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?		
Time scale difference	Local clock vs. UTC(ONRJ)	Procedure using an ensemble of Cs beam frequency standards and a microphase-stepper that compose the Brazilian Atomic Time Scale (ETAB); time interval counter method	-1	1	s	Averaging time	1 h	1	ns	2	95%	No	2421	Approved on 19 October 2009
Time scale difference	Local clock vs. UTC	Procedure using an ensemble of Cs beam frequency standards and a microphase-stepper that compose the Brazilian Atomic Time Scale (ETAB); time interval counter method, prediction time for 30 days	-1	1	s	Averaging time	5 days	46.6	ns	2	95%	No	2421	Approved on 19 October 2009
Frequency	Local frequency standard	Dual mixer time difference method	1	1	MHz	Averaging time	1 h	3.2E-13	Hz/Hz	2	95%	Yes	2423	Approved on 19 October 2009
Frequency	Local frequency standard	Dual mixer time difference method	5	5	MHz	Averaging time	1 h	3.2E-13	Hz/Hz	2	95%	Yes	2423	Approved on 19 October 2009
Frequency	Local frequency standard	Dual mixer time difference method	10	10	MHz	Averaging time	1 h	3.2E-13	Hz/Hz	2	95%	Yes	2423	Approved on 19 October 2009
Frequency	General frequency source	Time interval counter method	0.1	0.1	MHz	Averaging time	1 h	3.2E-13	Hz/Hz	2	95%	Yes	2423	Approved on 19 October 2009
Frequency	General frequency source	Dual mixer time difference method	1	1	MHz	Averaging time	1 h	3.2E-13	Hz/Hz	2	95%	Yes	2423	Approved on 19 October 2009
Frequency	General frequency source	Dual mixer time difference method	5	5	MHz	Averaging time	1 h	3.2E-13	Hz/Hz	2	95%	Yes	2423	Approved on 19 October 2009

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Quantity	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?		
Frequency	General frequency source	Dual mixer time difference method	10	10	MHz	Averaging time	1 h	3.2E-13	Hz/Hz	2	95%	Yes	2423	Approved on 19 October 2009
Frequency	Frequency counter	Procedure using frequency synthesizers with external atomic time base	200	< 1.0E+05	Hz	Averaging time	variable	6E-09	Hz/Hz	2	95%	Yes	2424	Approved on 19 October 2009
Frequency	Frequency counter	Procedure using frequency synthesizers with external atomic time base	1.0E+05	< 640.0E+06	Hz	Averaging time	variable	1E-08	Hz/Hz	2	95%	Yes	2424	Approved on 19 October 2009
Frequency	Frequency counter	Procedure using frequency synthesizers with external atomic time base	6.4E+08	< 1.28E+09	Hz	Averaging time	variable	4E-10	Hz/Hz	2	95%	Yes	2424	Approved on 19 October 2009
Frequency	Frequency counter	Procedure using frequency synthesizers with external atomic time base	1.28E+09	< 2.56E+09	Hz	Averaging time	variable	4E-10	Hz/Hz	2	95%	Yes	2424	Approved on 19 October 2009