PN 1997.2263.8 / PTB-Nr. 8392

TEST MEASUREMENTS REPORT

Test Laboratory: ONNUM - Costa Rica
Test Date: 09.08.01
Laboratory Head: Adrian Solano
PTB Partner: Patrik Keil
Reference SPRT: Pt25 Isotech, sn.563 / Bund 909 - calibrated on 27.07.01 in PTB - Berlin

Mediciones *Measurements*								
Medida *Measure*	Fuente de Calor *Heat Source*	Medida a 1 mA *Measure at 1 mA*	Medida a 1/√2 mA *Measure at 1/√2 mA*	Extrapolacion a 0 mA *Extrapolation at 0 mA*	Calculo a de W (0mA) *Calculated W (0mA)*	Valor R certificado (0mA) *Certified R value (0mA)*	W certificado (0mA) *Certified W(0mA)*	Differencia ΔW / ΔR *ΔW / ΔR difference*
Date 06.08.01 - First check measurement								
1	TP H_2O	25,395387Ω	25,395326Ω	25,395265Ω	-	25,394989Ω	-	ΔR=+276μΩ
Date 07.08.01 - Check measurement after 4 hours annealing at 450°C of the SPRT in furnace, Measurement at the FP Hg								
2	TP H_2O	25,395146Ω	25,395064Ω	25,394982Ω	-	25,394989Ω	-	ΔR=-7μΩ
3	FP Hg	21,437853Ω	21,437772Ω	21,437691Ω	0,8441703	21,437657Ω	0,844169	ΔW=1,3E-06
4	TP H_2O	25,395146Ω	25,395064Ω	25,394982Ω	-	25,394989Ω	-	ΔR=-7μΩ
Date 08.08.01 - FP Ga measurements								
5	TP H_2O	25,395073Ω	25,394992Ω	25,394911Ω	-	-	-	ΔR=-72μΩ
6	FP Ga	28,394685Ω	28,394594Ω	28,394504Ω	1.1181147	28,39449273Ω	1.118114	ΔW=+7E-07
Date 09.08.01 - FP Zn, Sn, Ga measurements, TP H2O renewal								
7	TP H_2O	25,395063Ω	25,394985Ω	25,394907Ω	-	-	-	ΔR=-75μΩ
8	FP Zn	65,22989Ω	65,22978Ω	65,22967Ω	2,568604	65,2297056Ω	2,568624	ΔW=-2E-05
9	TP H_2O	25,395044Ω	25,394967Ω	25,394891Ω	-	-	-	ΔR=-91μΩ
10	FP Sn	48,063488Ω	48,063391Ω	48,063294Ω	1,8926318	48,06332057Ω	1,892638	ΔW=-6,1E-06
11	TP H_2O	25,395103Ω	25,395027Ω	25,394951Ω	-	-	-	-
12	FP Ga	28,394743Ω	28,394656Ω	28,394569Ω	1.118117	28,39449273Ω	1.118114	ΔW=+3,0E-06
13	TP H_2O	25,395131Ω	25,395051Ω	25,394971Ω	-	-	-	-
Date 10.08.01 - New TP H20 measurements, FP In measurements								
14	TP H_2O	25,395182Ω	25,395089Ω	25,394996Ω	-	-	-	
15	FP In	Invalid measurement						
Date 12.08.01 – New TP measurements, FP Zn measurements								
16	TP H_2O	25.3950955Ω	25,395022 Ω	25,3949485 Ω	-	-	-	
17	FP Zn	65,22947 Ω	65,229856 Ω	65,229765 Ω	2,568611	65,2297056 Ω	2,568624	ΔW =-1,3E-05
18	TP H_2O	25,3950930 Ω	25,395025 Ω	25,3949570 Ω				

Notes:

1) The SPRT was initially checked on transport stress. Difference of 2,8mK with the PTB measurements at the TP-H2O showed annealing requirement. After annealing the difference between measurements and the PTB-stated data was within 0,15mK.
2) Ga measurement, showed a difference of 11μΩ in resistance (equivalent to 0,11mK) with reference to the PTB data. The TP-H2O measurement required for the W calculation showed a drift of 72μΩ equivalent to 0,72 mK, caused probabely by the upper TP-ice mantle melting and impurity temperature drop. TP-cell recovery will be tried and avaluated the next day during FP realization and measurement.
3) Measurements of FP gave suitable absolute resistance value but the TP-cell recovery failed on the measurements n°4-9, showing a systematic low temperature between 0,7mK and 0,9mK, when compared

to the TP-measurement n°4. Thus the TP-cell will be recovered and measurements repeated on the next day. Systematic difference will be corrected on the measurement evaluation.

4) Measurements at the fixed points showed consistency and thight correspondence with equivalent measurements carried out shortly before (ref. Report ONNUM Mr.Ancsin). Differences from expected data lay within +0,75mk and -1,5mK for all fixed points except for the FP-Zn, which showed a corrected difference of 5mK. These values include also the uncertainty of the SPRT.
5) Triple point realization dated 10.08.01 gave the expected results to what belongs its measurement, showing a small difference of +0,07mK, when compared with the last value stated in the PTB report and of +0,17mK, when compared with the first TP-measurement after annealing. Thus the measurement calculations will be done by considering the first value. This as all subsequent measurements at lower temperatures may have affected the SPRTs resistance by slight oxidation and resistance increase. Additional support to this decision lays in the fact that measurements at the FP-Zn are at a temperature laying very near to the annealing temperature, thus the TP-value is expected to be at his lowest in this phase, possibly lower than the one applied for calculation. In fact, due to the propagation of the TP-difference towards the FP-Zn, a lowering of an additional 2mK covers the whole stated discrepance. In the first annealing the temperautre drop was in the order of 2,8mK, thus an additional drop could be plausible. Unfortunately additional annealing time was not available.