

**Calibration Laboratory of  
Schmid & Partner  
Engineering AG**  
Zeughausstrasse 43, 8004 Zurich, Switzerland

Client

RFI

**CALIBRATION CERTIFICATE**

Object(s) **ET3DV6 - SN:1529**

Calibration procedure(s) **QA CAL-01.v2  
Calibration procedure for dosimetric E-field probes**

Calibration date: **June 10, 2004**



Condition of the calibrated item **In Tolerance (according to the specific calibration document)**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM E4419B	GB41293874	5-May-04 (METAS, No 251-00388)	May-05
Power sensor E4412A	MY41495277	5-May-04 (METAS, No 251-00388)	May-05
Reference 20 dB Attenuator	SN: 5086 (20b)	3-May-04 (METAS, No 251-00389)	May-05
Fluke Process Calibrator Type 702	SN: 6295803	8-Sep-03 (Sintrel SCS No. E-030020)	Sep-04
Power sensor HP 8481A	MY41092180	18-Sep-02 (SPEAG, in house check Oct-03)	In house check: Oct 05
RF generator HP 8684C	US3642U01700	4-Aug-99 (SPEAG, in house check Aug-02)	In house check: Aug-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-03)	In house check: Oct 05

	Name	Function	Signature
Calibrated by:	Nico Vetterli	Technician	
Approved by:	Katja Pokovic	Laboratory Director	

Date issued: June 10, 2004

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.



# Probe ET3DV6

SN:1529

Manufactured:	March 21, 2000
Last calibrated:	June 9, 2003
Recalibrated:	June 10, 2004

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)



## DASY - Parameters of Probe: ET3DV6 SN:1529

### Sensitivity in Free Space

NormX	1.73 $\mu\text{V}/(\text{V}/\text{m})^2$
NormY	2.02 $\mu\text{V}/(\text{V}/\text{m})^2$
NormZ	1.77 $\mu\text{V}/(\text{V}/\text{m})^2$

### Diode Compression<sup>A</sup>

DCP X	95	mV
DCP Y	95	mV
DCP Z	95	mV

### Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 7.

### Boundary Effect

Head                      900 MHz      Typical SAR gradient: 5 % per mm

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR <sub>be</sub> [%]	Without Correction Algorithm	9.9	5.4
SAR <sub>be</sub> [%]	With Correction Algorithm	0.1	0.3

Head                      1750 MHz      Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR <sub>be</sub> [%]	Without Correction Algorithm	14.5	9.9
SAR <sub>be</sub> [%]	With Correction Algorithm	0.2	0.2

### Sensor Offset

Probe Tip to Sensor Center	2.7 mm
Optical Surface Detection	in tolerance

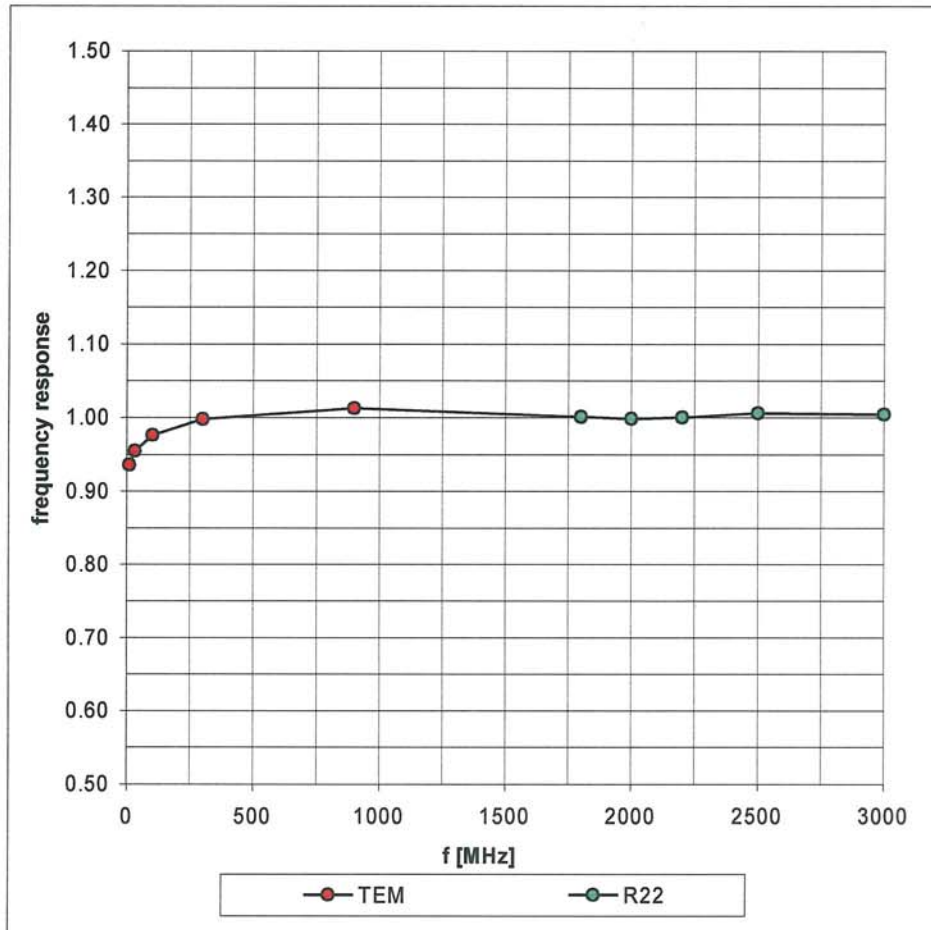
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.

<sup>A</sup> numerical linearization parameter: uncertainty not required



# Frequency Response of E-Field

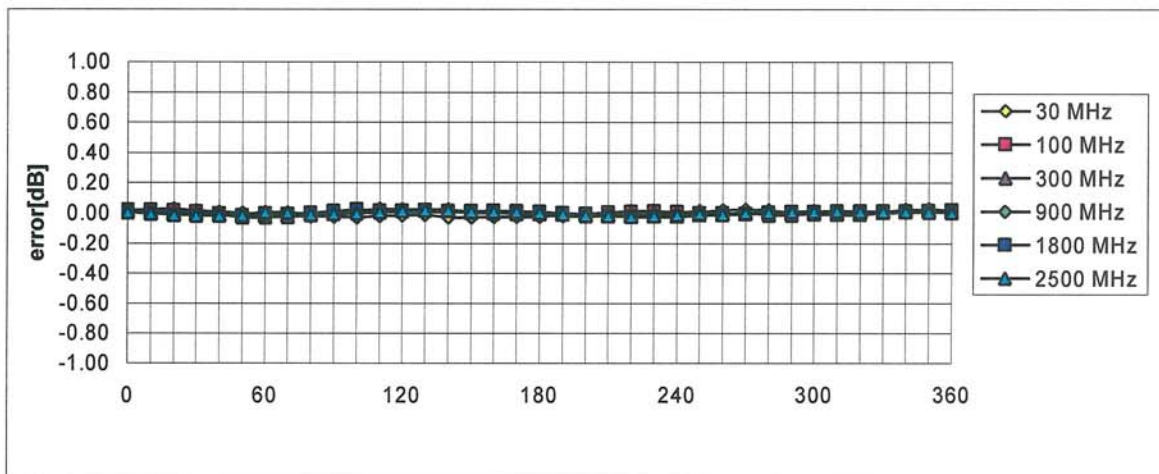
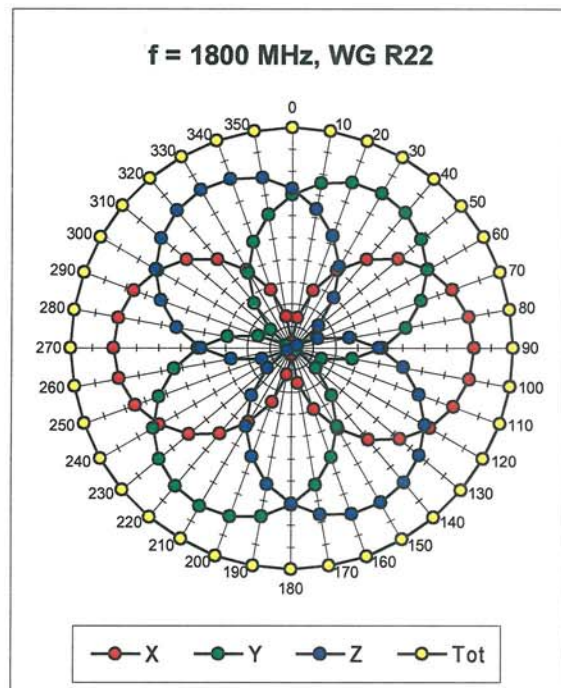
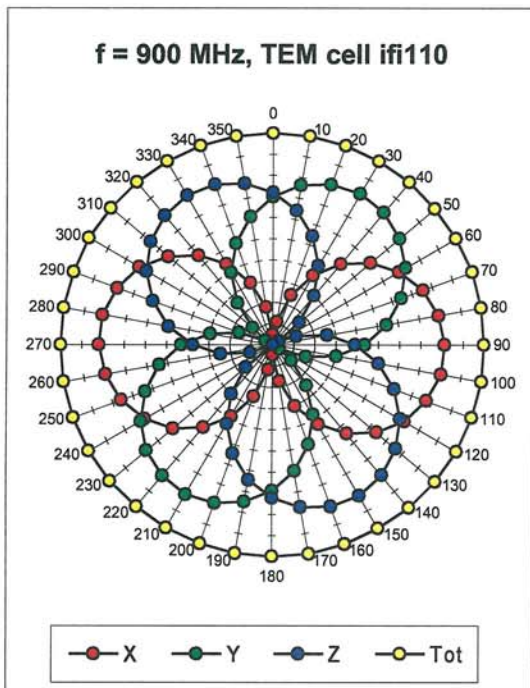
( TEM-Cell:ifi110, Waveguide R22)







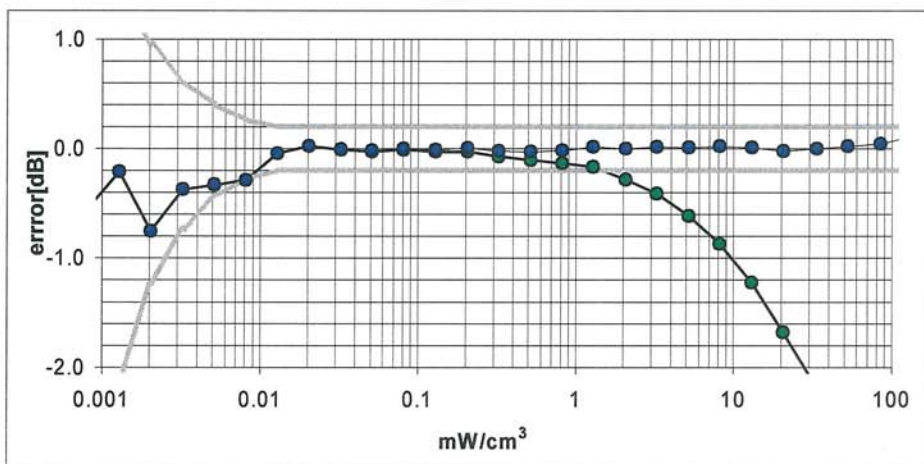
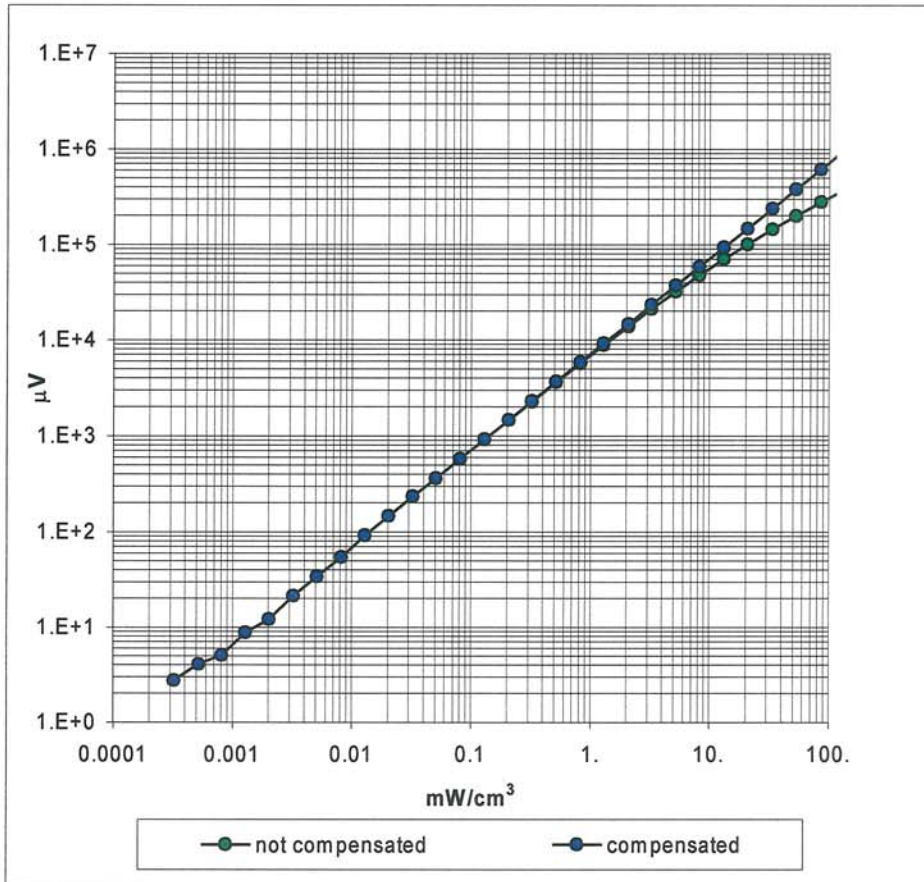
### Receiving Pattern ( $\phi$ ), $\theta = 0^\circ$



**Axial Isotropy Error <math>\lt; \pm 0.2 \text{ dB}</math>**



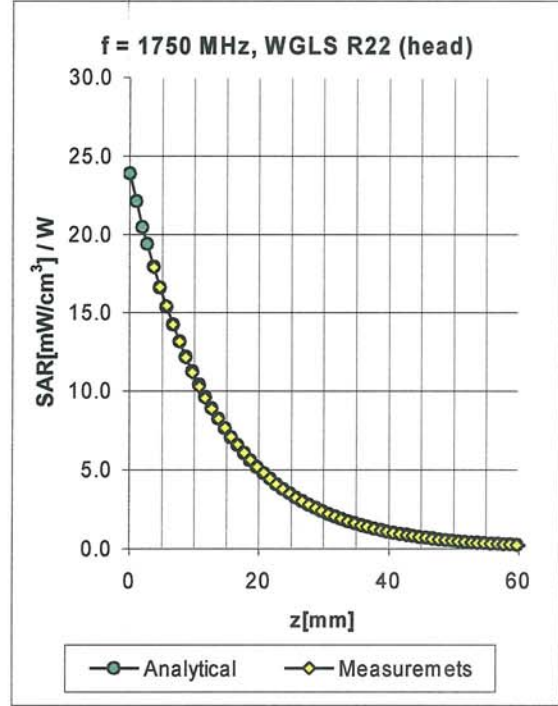
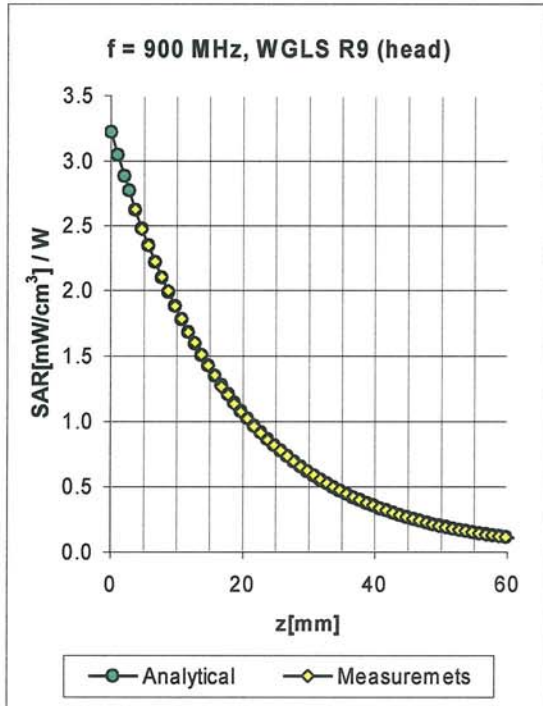
### Dynamic Range f(SAR<sub>head</sub>) ( Waveguide R22 )



**Probe Linearity Error  $\leq \pm 0.2$  dB**



## Conversion Factor Assessment



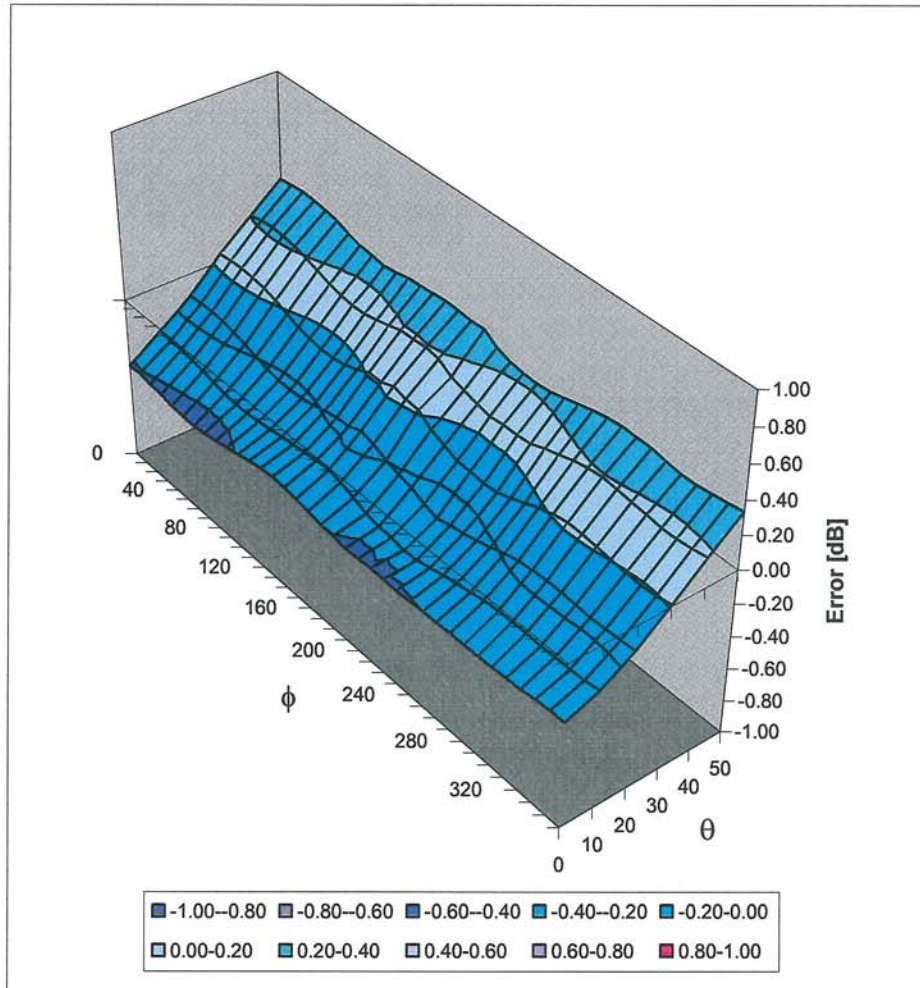
f [MHz]	Validity [MHz] <sup>B</sup>	Tissue	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
835	785-885	Head	41.5 ± 5%	0.90 ± 5%	0.45	2.29	6.31 ± 9.7%	(k=2)
900	850-950	Head	41.5 ± 5%	0.97 ± 5%	0.57	1.99	6.14 ± 9.7%	(k=2)
1750	1700-1800	Head	40.0 ± 5%	1.40 ± 5%	0.57	2.43	5.07 ± 9.7%	(k=2)
1900	1850-1950	Head	40.0 ± 5%	1.40 ± 5%	0.59	2.61	4.90 ± 9.7%	(k=2)
2450	2400-2500	Head	39.2 ± 5%	1.80 ± 5%	1.03	1.88	4.31 ± 9.7%	(k=2)
835	785-885	Body	55.2 ± 5%	0.97 ± 5%	0.65	1.91	6.09 ± 9.7%	(k=2)
900	850-950	Body	55.0 ± 5%	1.05 ± 5%	0.47	2.25	5.94 ± 9.7%	(k=2)
1750	1700-1800	Body	53.3 ± 5%	1.52 ± 5%	0.59	2.75	4.58 ± 9.7%	(k=2)
1900	1850-1950	Body	53.3 ± 5%	1.52 ± 5%	0.63	2.70	4.38 ± 9.7%	(k=2)
2450	2400-2500	Body	52.7 ± 5%	1.95 ± 5%	1.42	1.50	4.16 ± 9.7%	(k=2)

<sup>B</sup> The total standard uncertainty is calculated as root-sum-square of standard uncertainty of the Conversion Factor at calibration frequency and the standard uncertainty for the indicated frequency band.



## Deviation from Isotropy in HSL

Error ( $\theta, \phi$ ),  $f = 900$  MHz



**Spherical Isotropy Error  $< \pm 0.4$  dB**





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X800 Mobile Station with Personal Handsfree Accessory**  
To: **OET Bulletin 65 Supplement C: (2001-01)**

## **Appendix 5 Photographs of EUT**

This appendix contains the following photographs:

<b>Photo Reference Number</b>	<b>Title</b>
PHT70944JD05/001	1800 MHz Body Fluid Level
PHT70944JD05/002	1900 MHz Head Fluid Level
PHT70944JD05/003	Battery Removed from EUT
PHT70944JD05/004	Display of Open EUT Facing Phantom with PHF
PHT70944JD05/005	Front of Closed EUT with PHF
PHT70944JD05/006	Front of Closed EUT
PHT70944JD05/007	Front of Memory Card
PHT70944JD05/008	Front of Open EUT
PHT70944JD05/009	Identification Label 1
PHT70944JD05/010	Identification Label 2
PHT70944JD05/011	Identification Label 3
PHT70944JD05/012	Identification Label 4
PHT70944JD05/013	Identification Label 5
PHT70944JD05/014	PHF Set-up View 1
PHT70944JD05/015	PHF Set-up View 2
PHT70944JD05/016	PHF
PHT70944JD05/017	Rear Case Removed from EUT
PHT70944JD05/018	Rear of Closed EUT Facing Phantom with PHF
PHT70944JD05/019	Rear of Closed EUT
PHT70944JD05/020	Rear of Memory Card
PHT70944JD05/021	Rear of Open EUT Facing Phantom with PHF
PHT70944JD05/022	Rear of Open EUT
PHT70944JD05/023	Tilt Left
PHT70944JD05/024	Tilt Right
PHT70944JD05/025	Touch Left
PHT70944JD05/026	Touch Right

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PHT70944JD05/001 1800 MHz Body Fluid Level

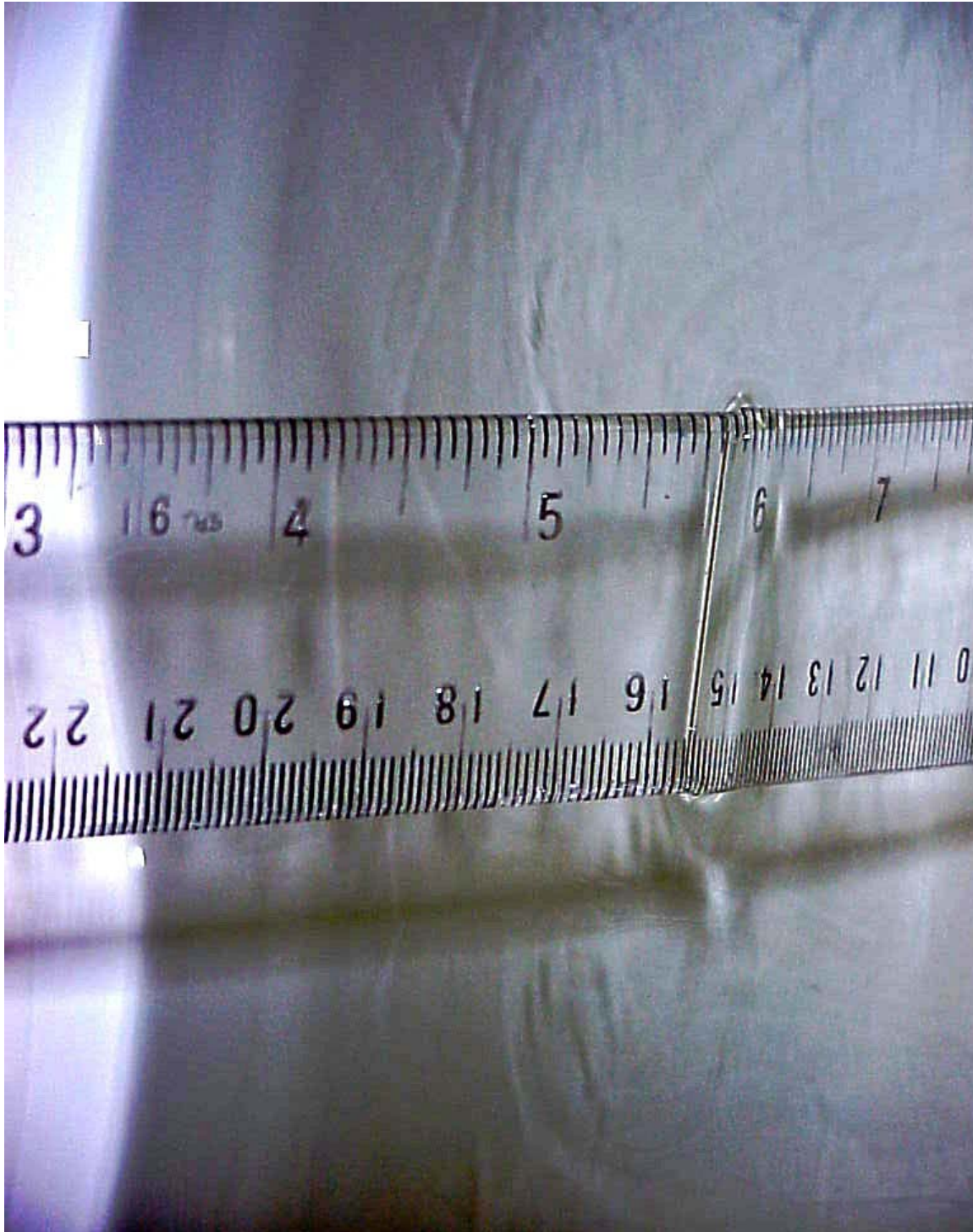




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PHT70944JD05/002 1900 MHz Head Fluid Level



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PHT70944JD05/003 Battery Removed from EUT

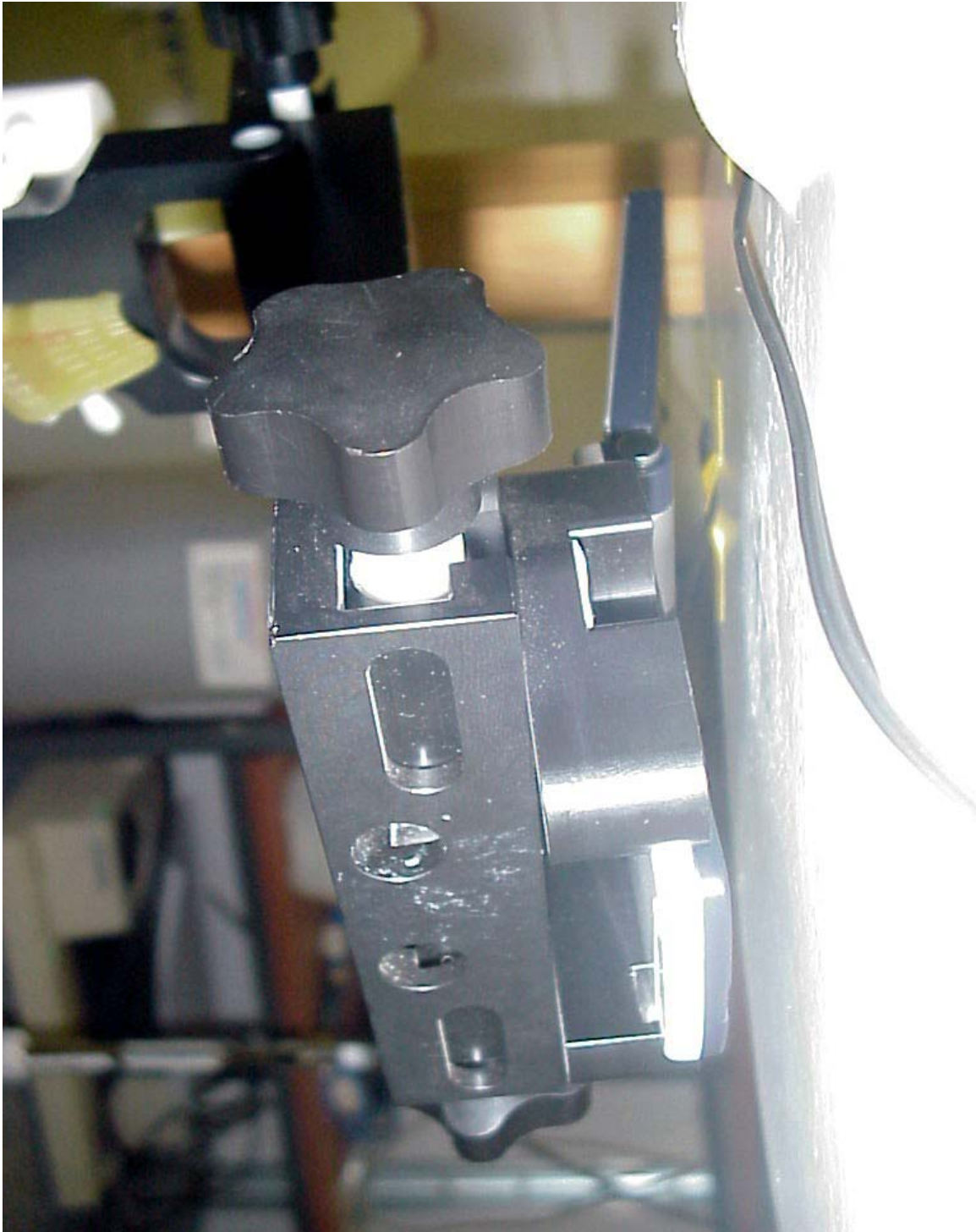




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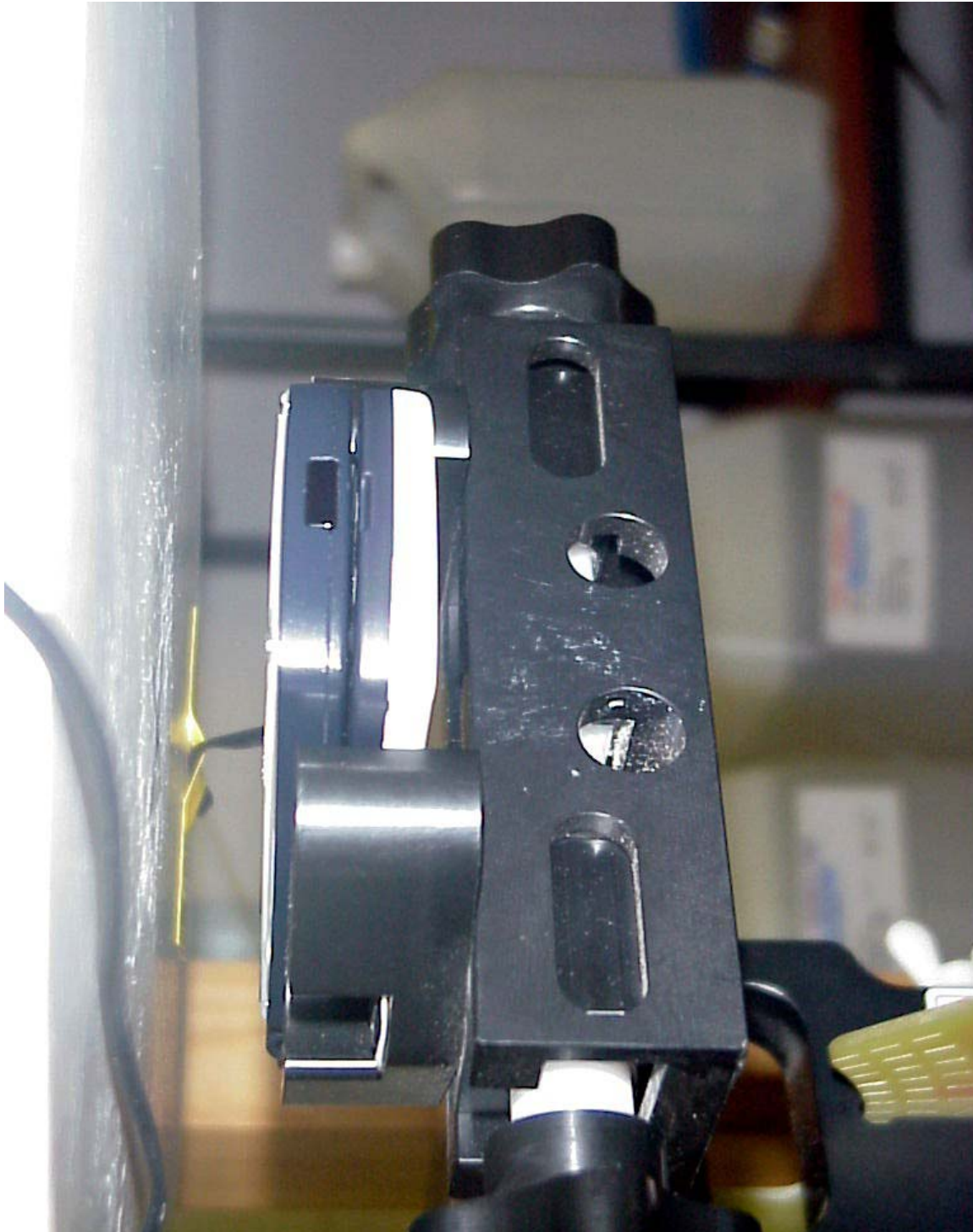
**PHT70944JD05/004 Display of Open EUT Facing Phantom with PHF**



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PHT70944JD05/005 Front of Closed EUT with PHF



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PHT70944JD05/006 Front of Closed EUT

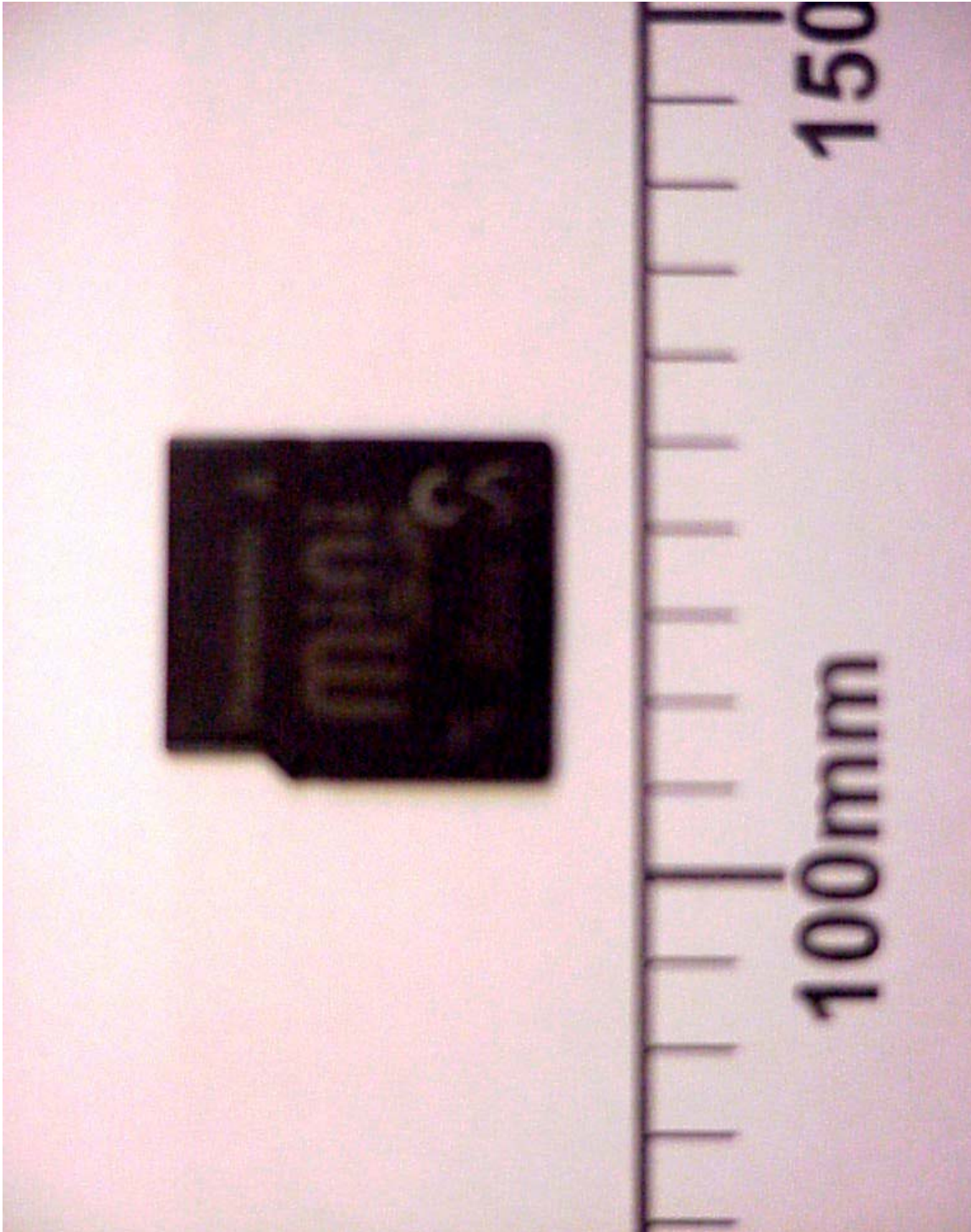




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PHT70944JD05/007 Front of Memory Card





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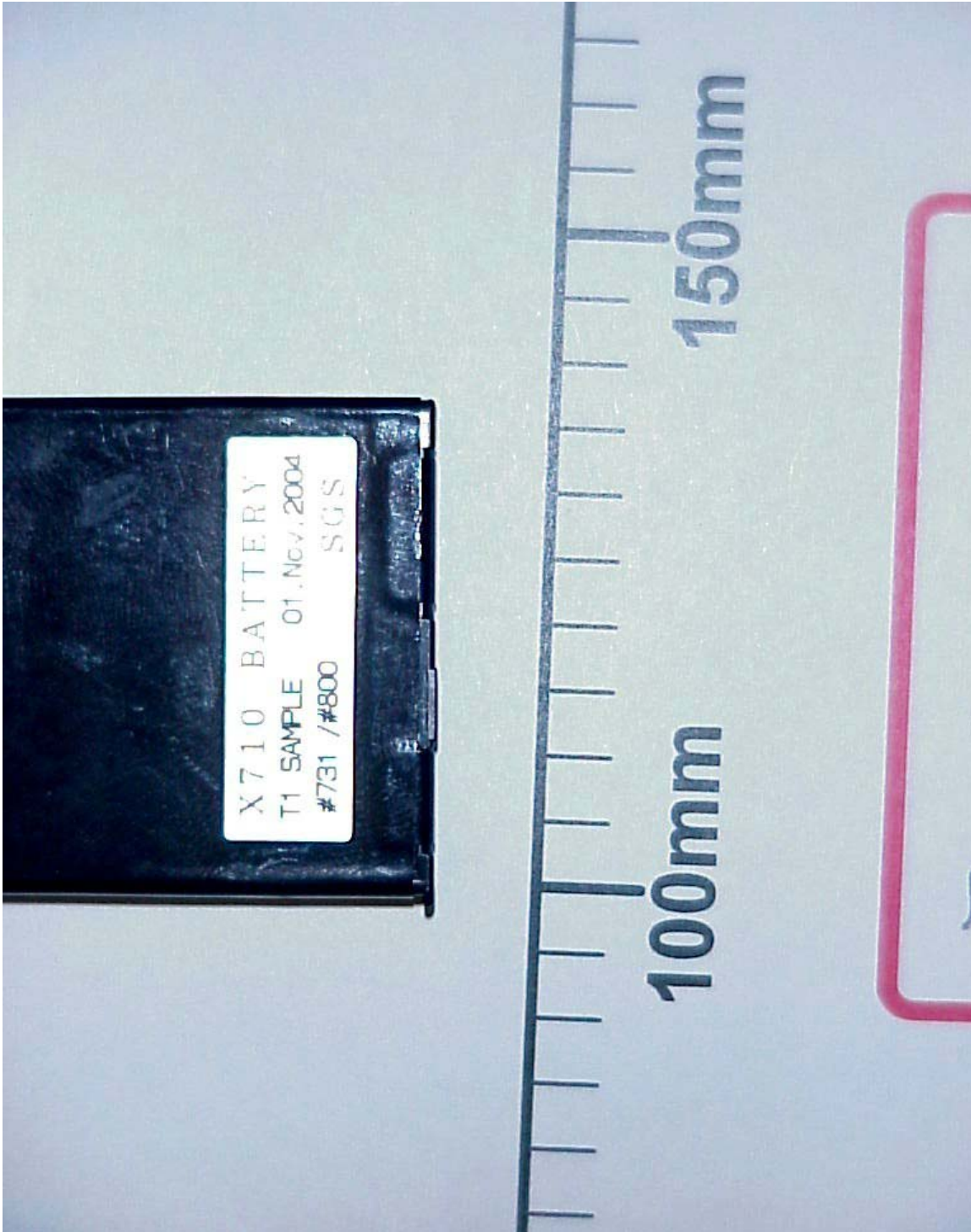
PHT70944JD05/008 Front of Open EUT



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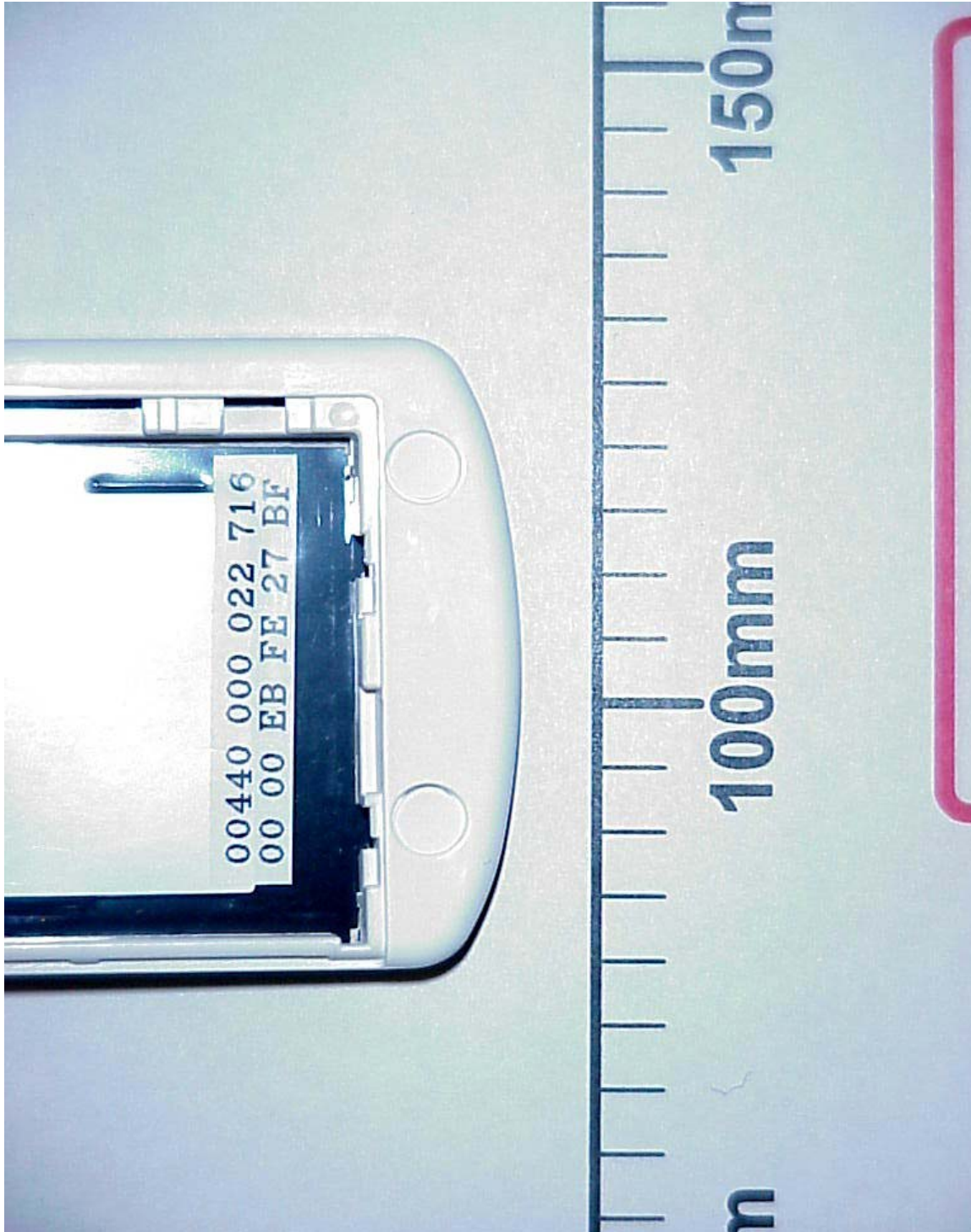
PHT70944JD05/009 Identification Label 1



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PHT70944JD05/010 Identification Label 2

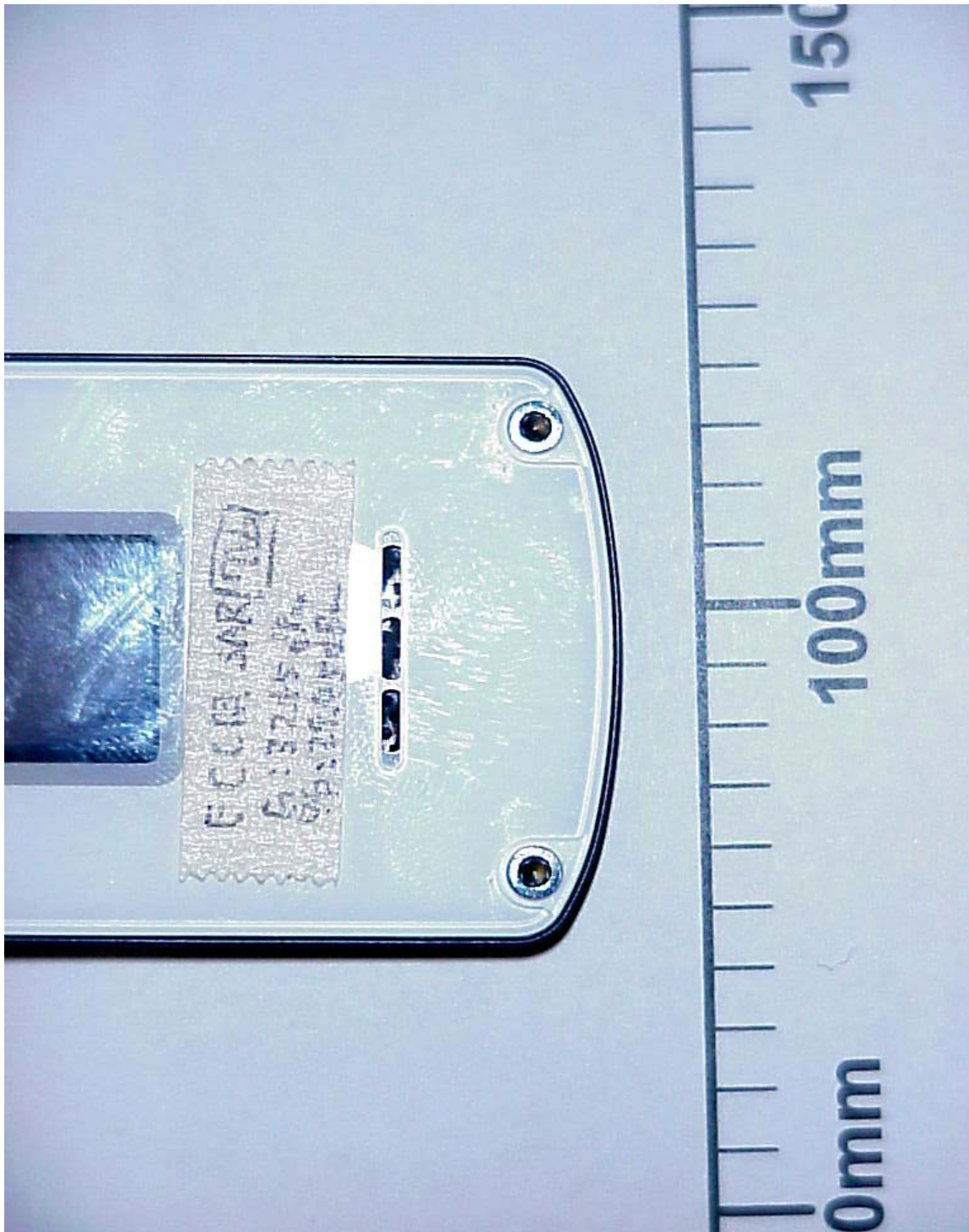




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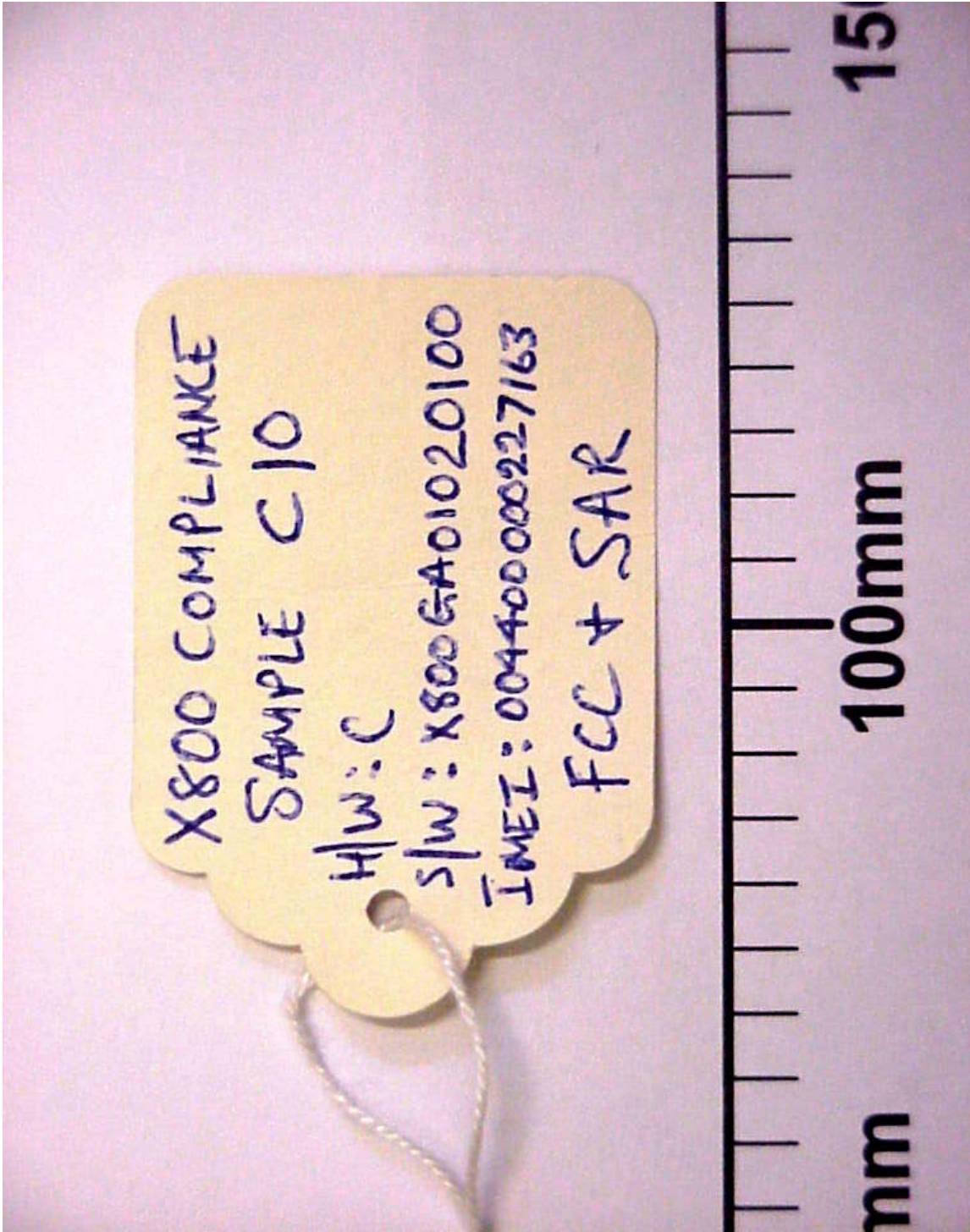
PHT70944JD05/011 Identification Label 3



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PHT70944JD05/012 Identification Label 4

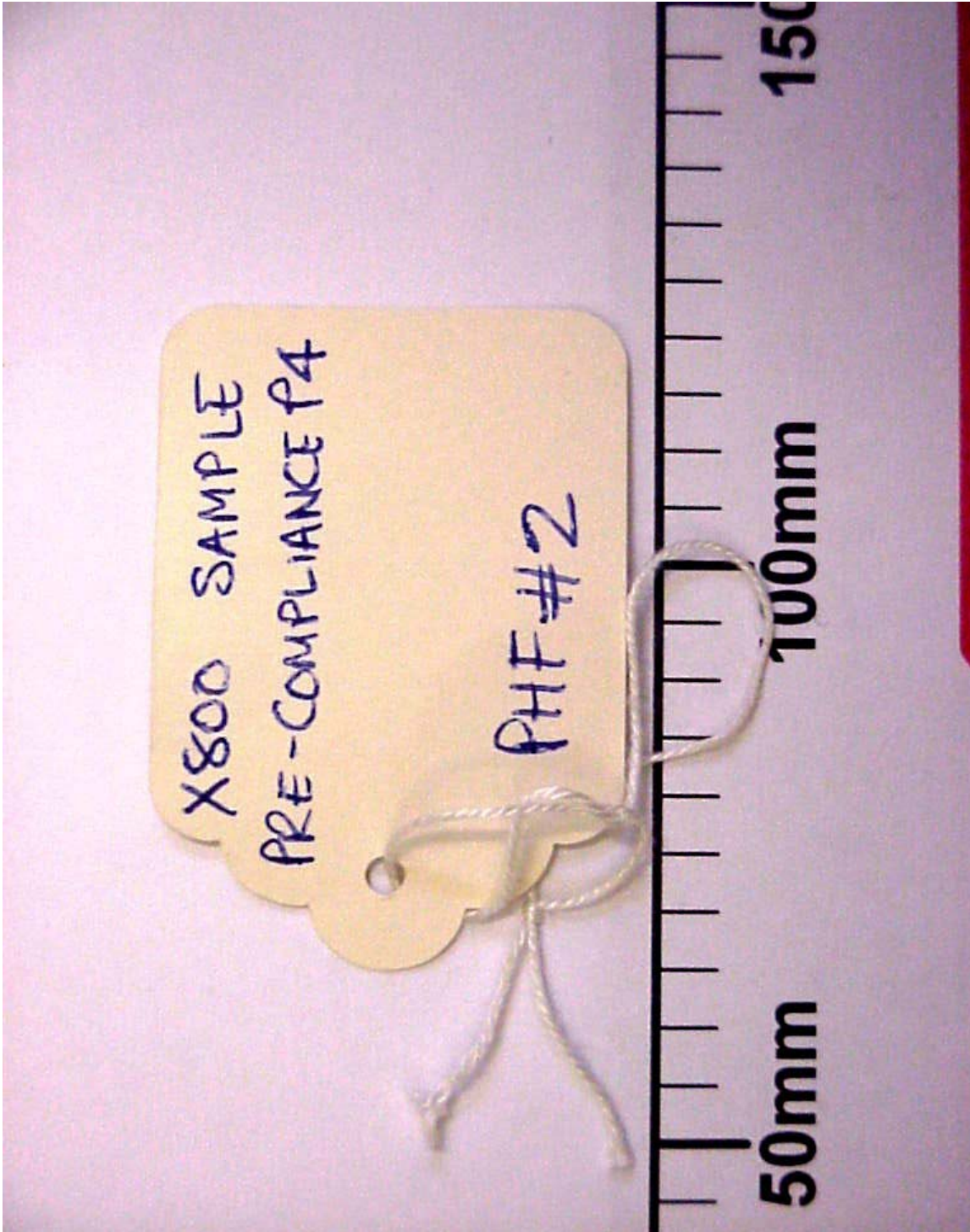




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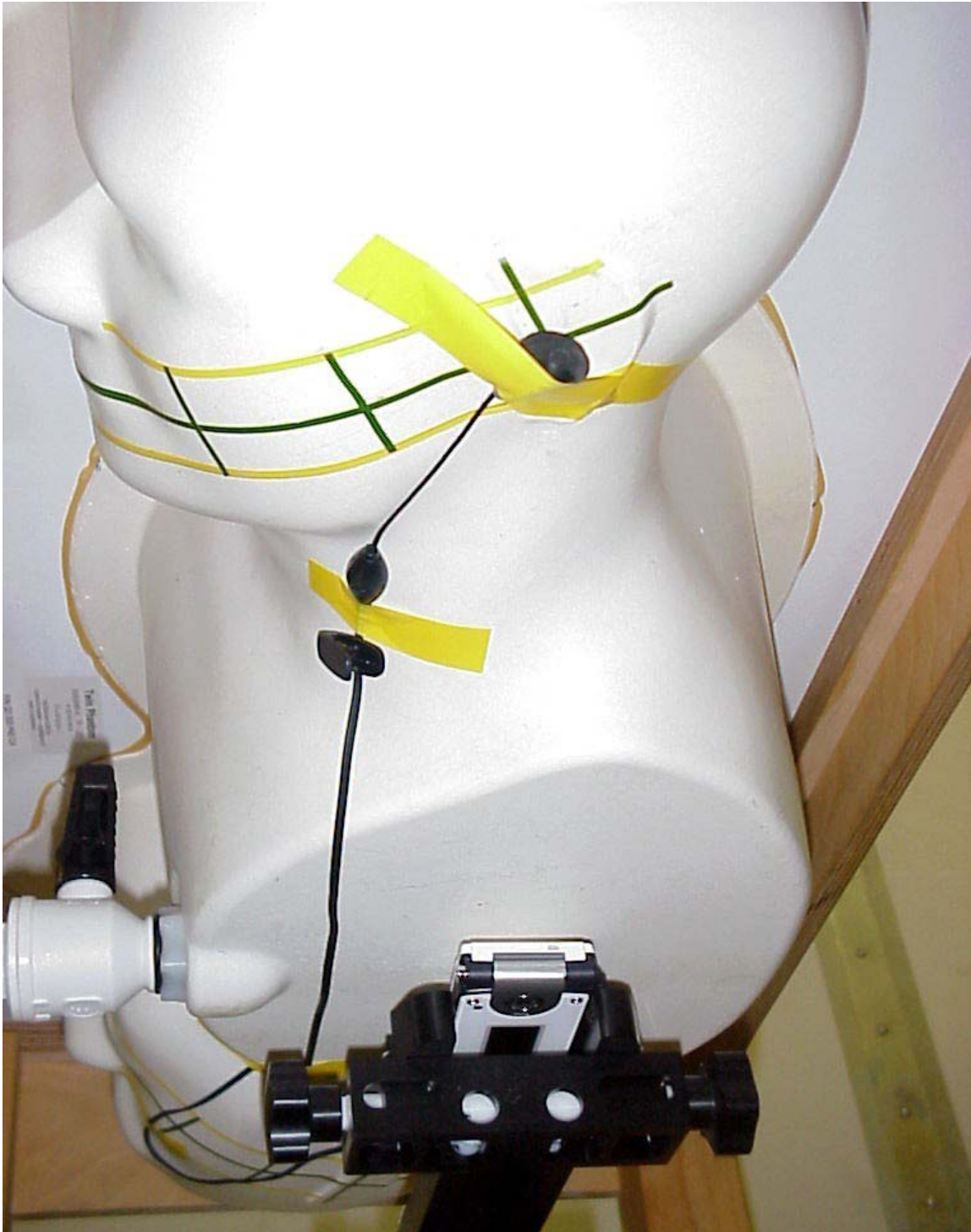
PHT70944JD05/013 Identification Label 5



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**PHT70944JD05/014 PHF Set-up View 1**

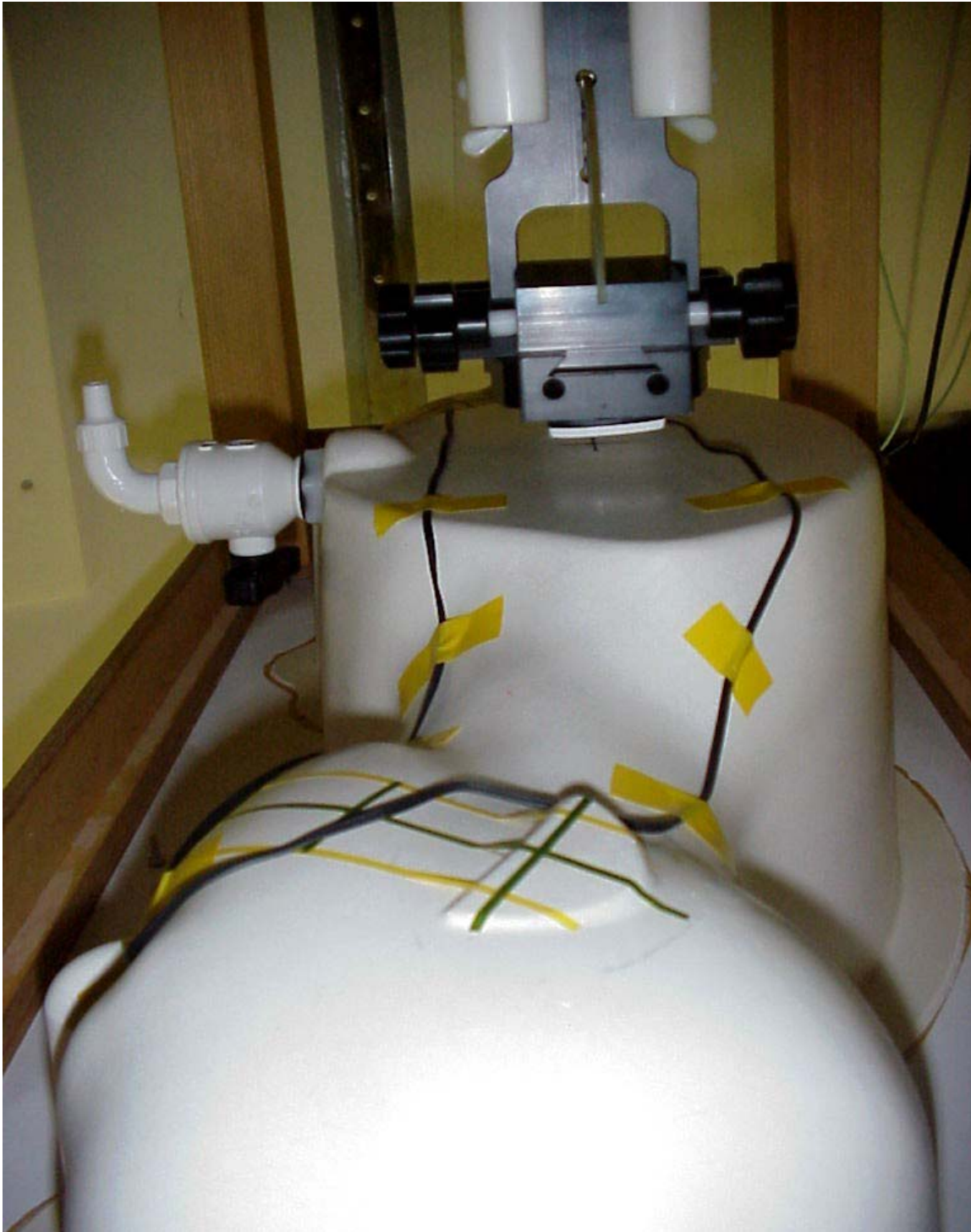




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PHT70944JD05/015 PHF Set-up View 2





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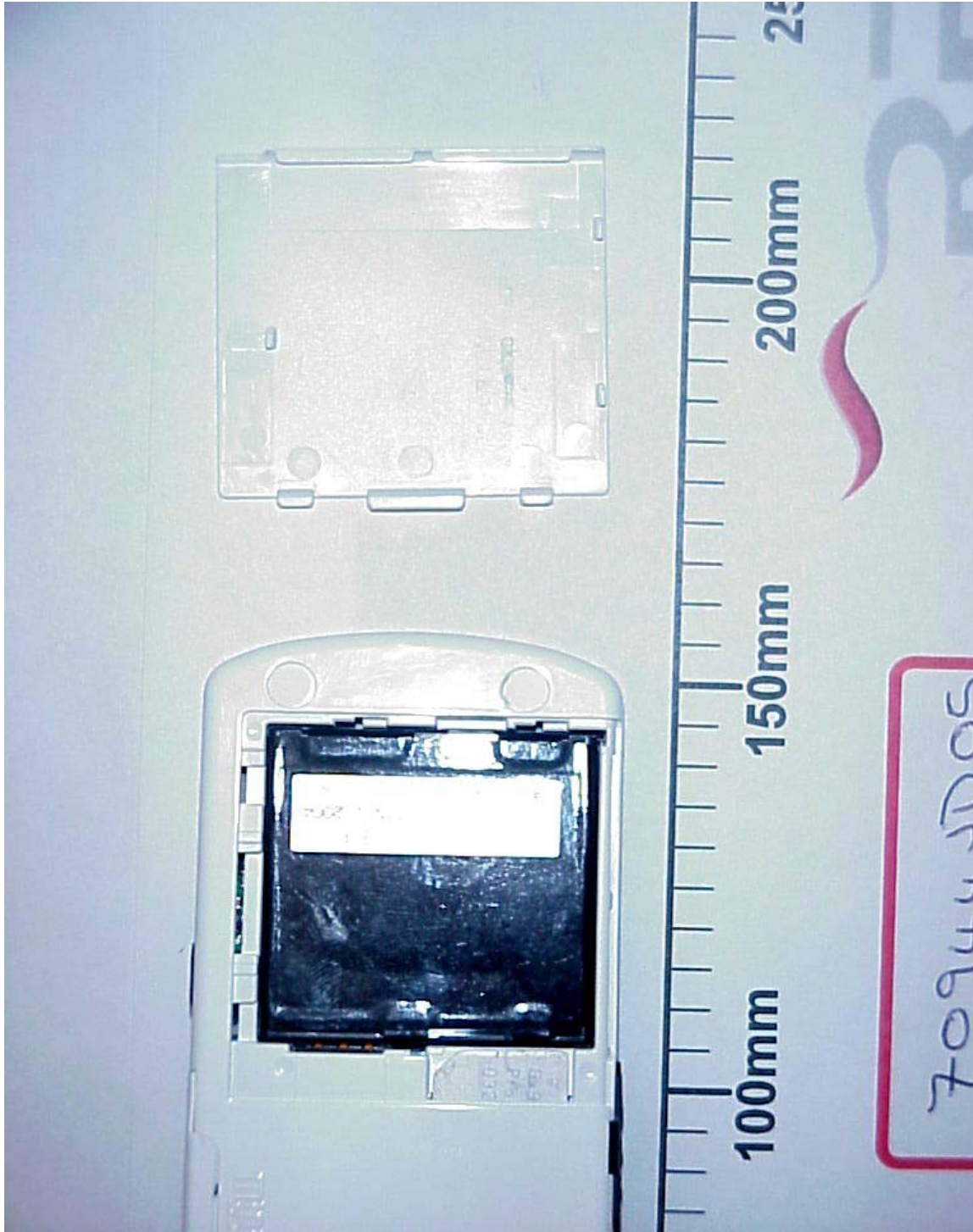
PHT70944JD05/016 PHF



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PHT70944JD05/017 Rear Case Removed from EUT





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**PHT70944JD05/018 Rear of Closed EUT Facing Phantom with PHF**



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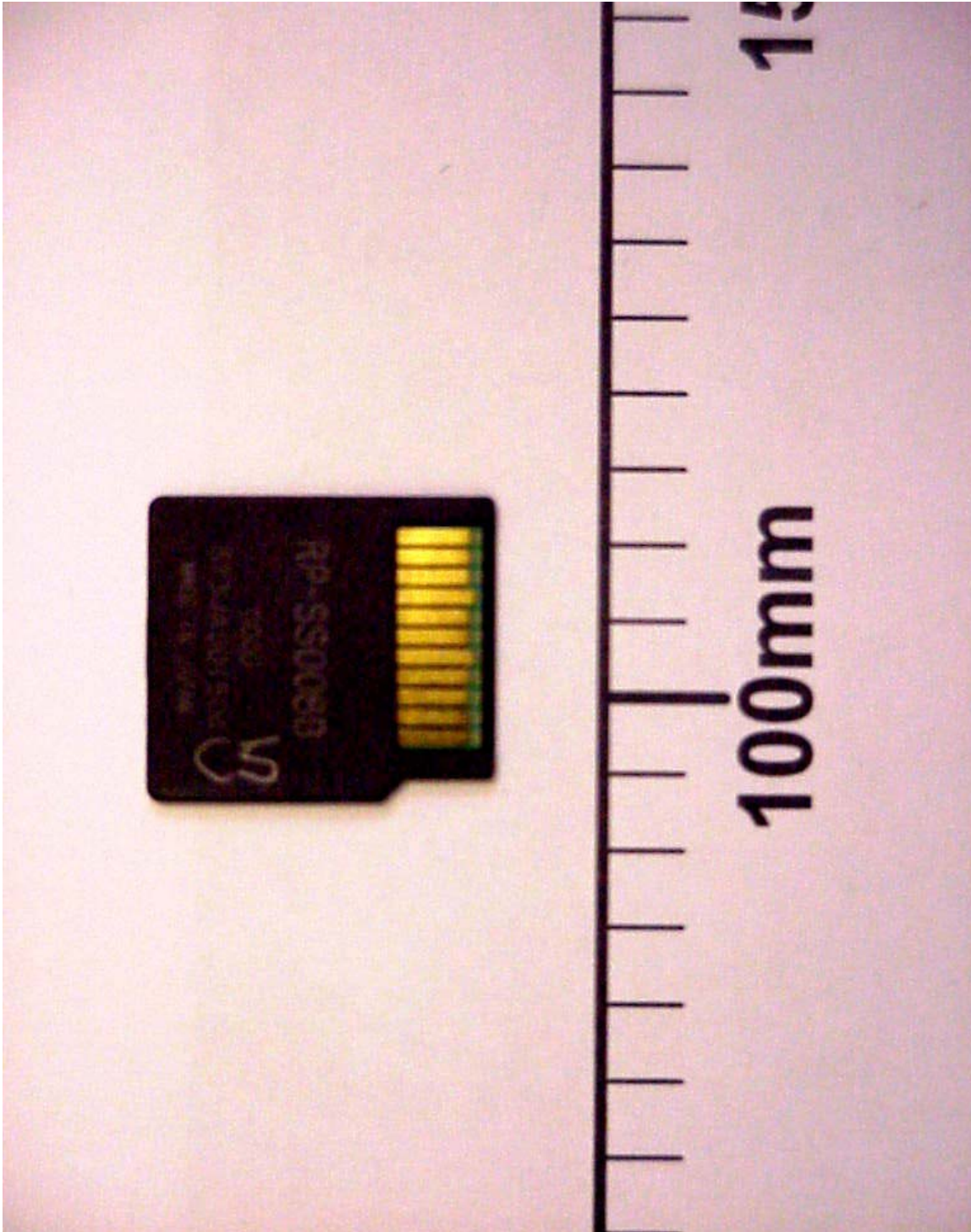
PHT70944JD05/019 Rear of Closed EUT



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PHT70944JD05/020 Rear of Memory Card

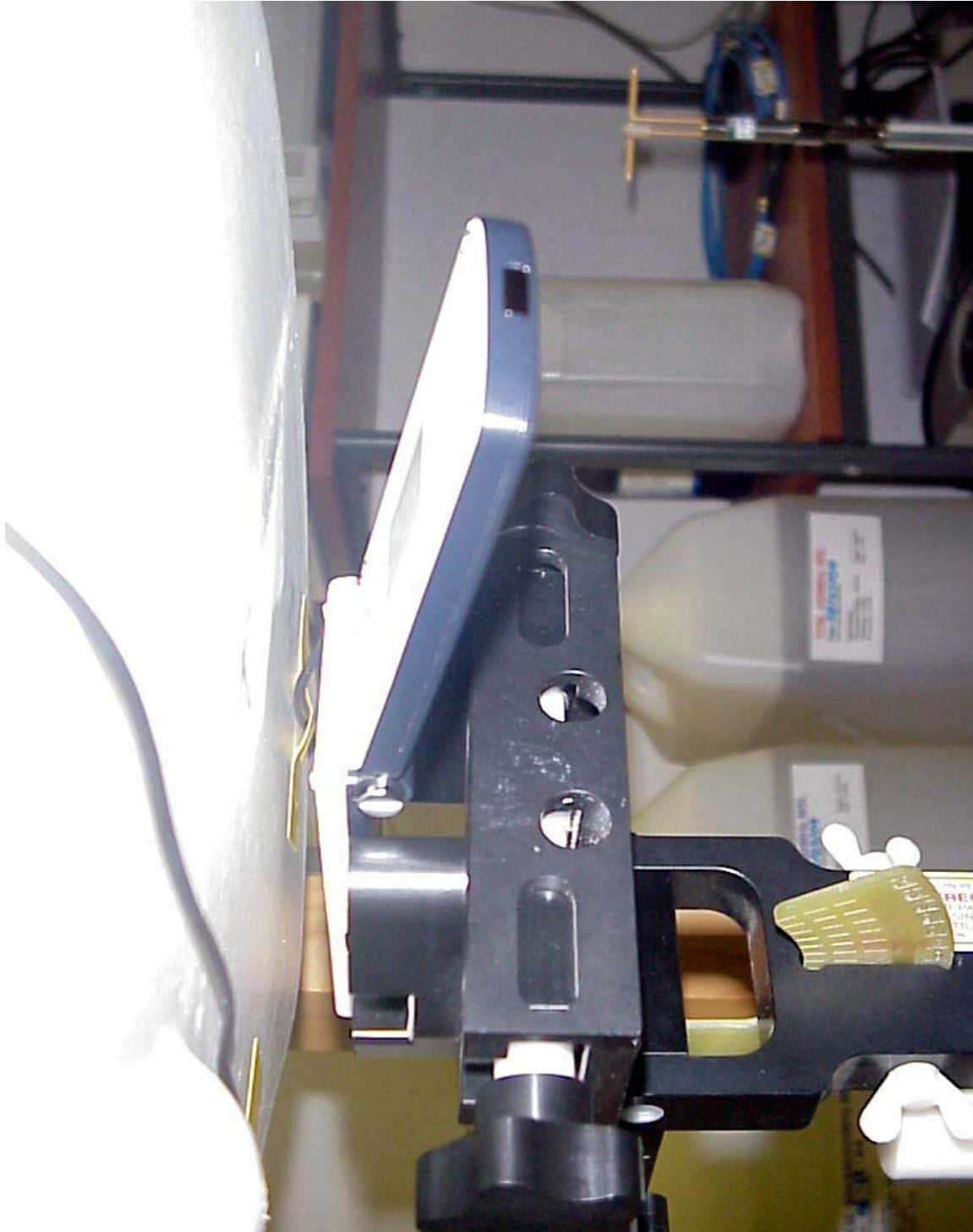




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**PHT70944JD05/021 Rear of Open EUT Facing Phantom with PHF**

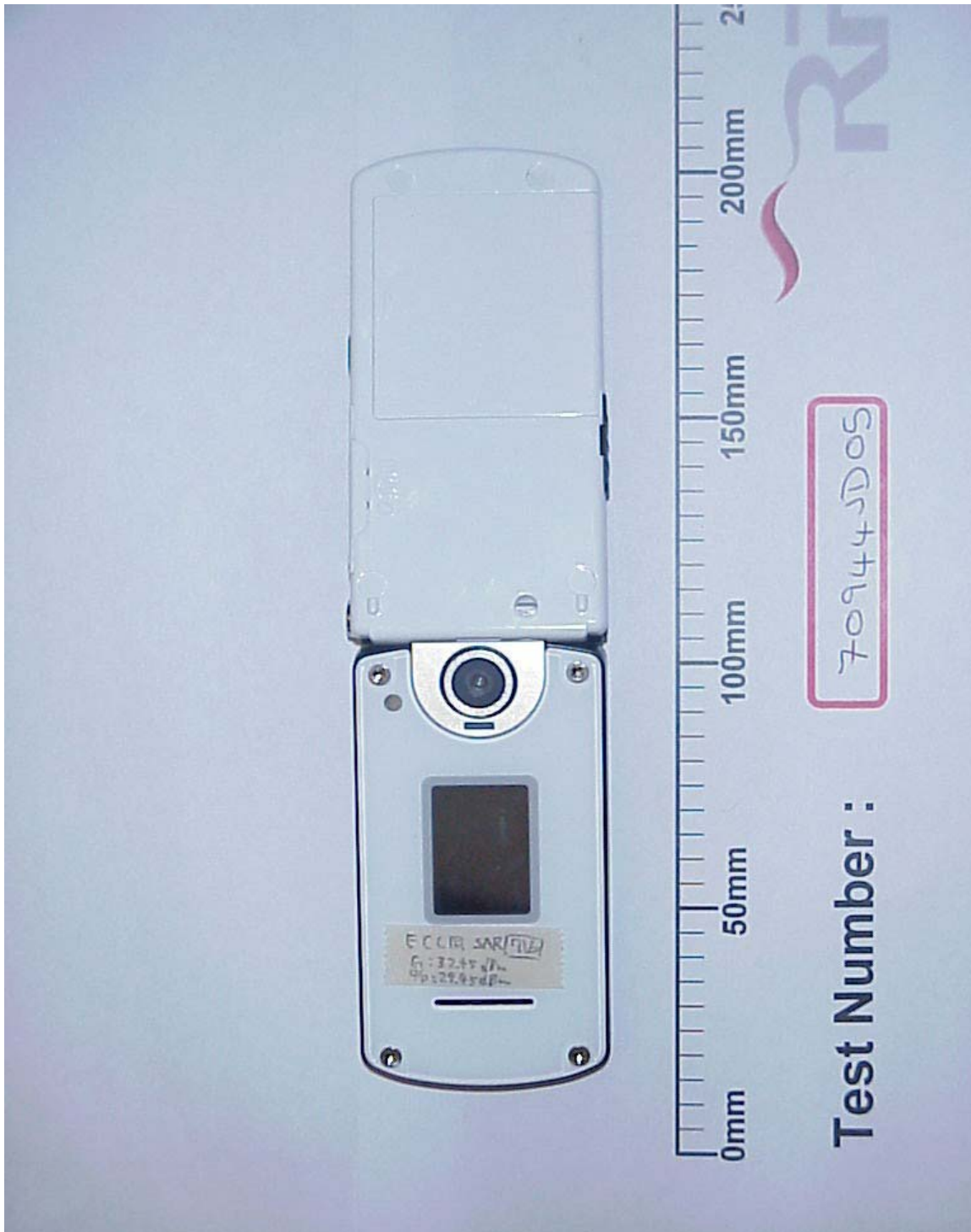


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PHT70944JD05/022 Rear of Open EUT



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PHT70944JD05/023 Tilt Left

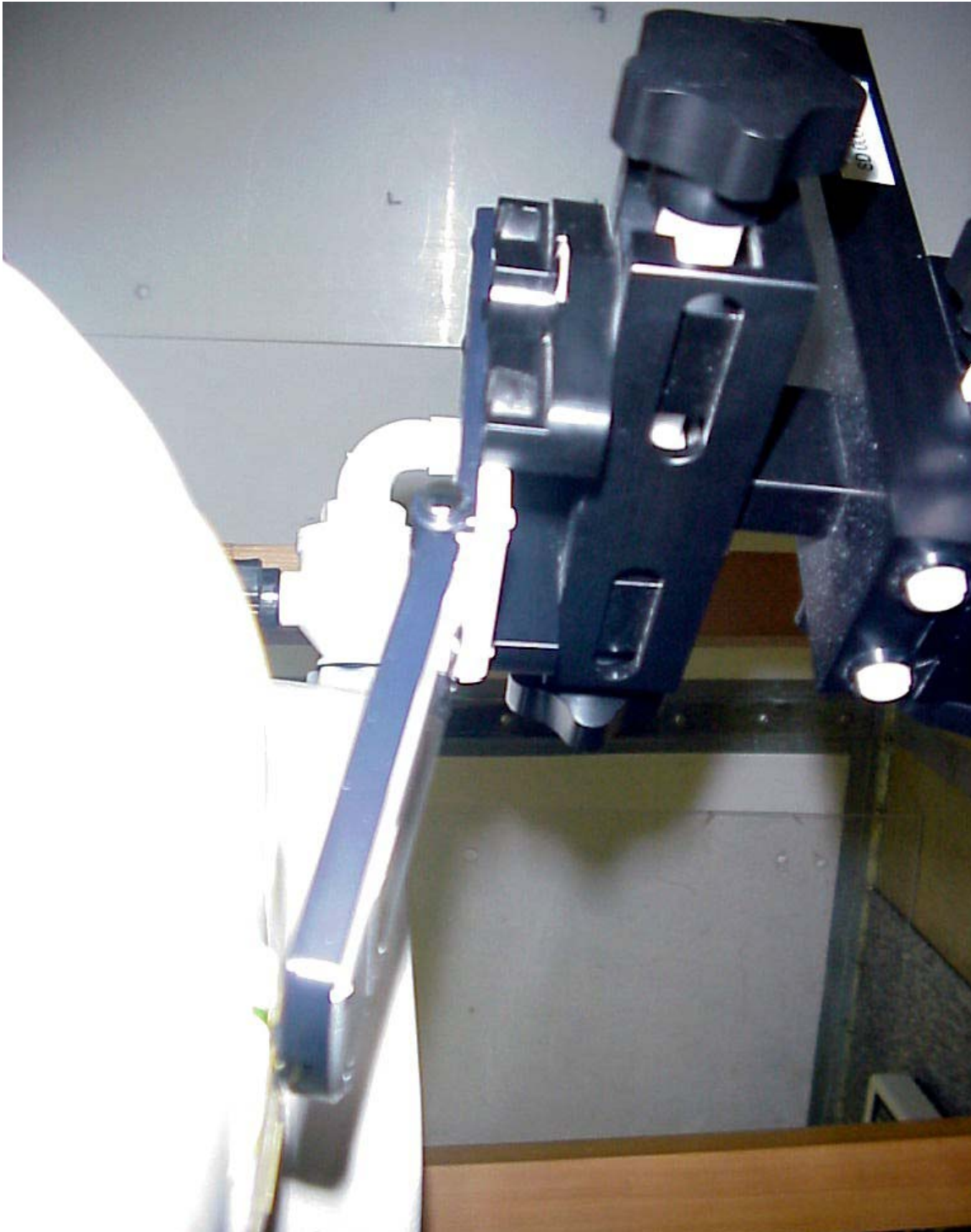




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PHT70944JD05/024 Tilt Right



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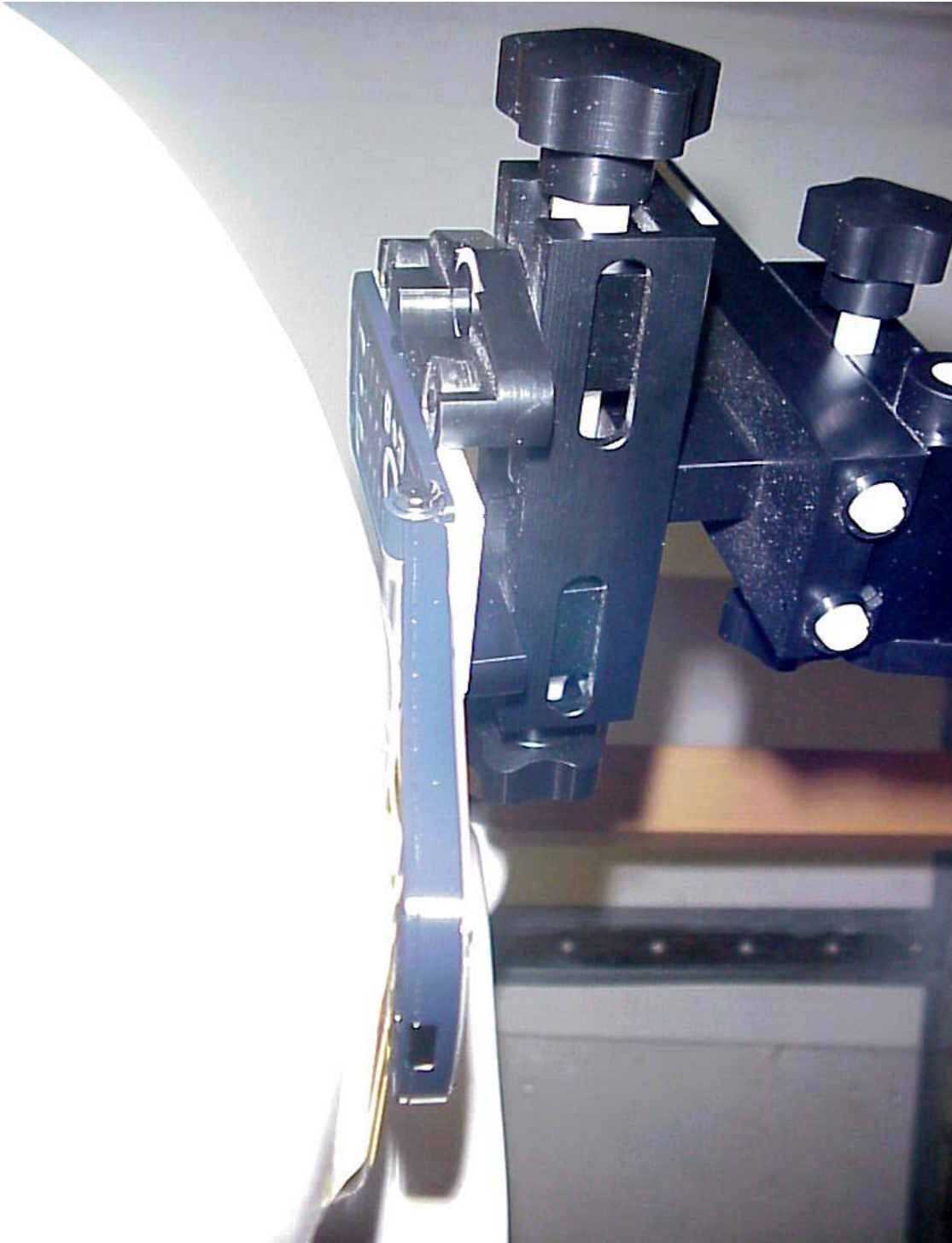
PHT70944JD05/025 Touch Left



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**PHT70944JD05/026 Touch Right**



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**TEST REPORT**

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