



*Lunar Metrology Institute*

# A report on the calibration of an type-N male open

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**ISSUED BY:**  
**Lunar Metrology Institute**

Established under the Measurement Standards Act 2025 and the Measurement Standards Regulations 2030 to provide uniform measurement of physical quantities on the Moon.

All results in this report are directly traceable to standards held by the Lunar Metrology Institute.

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Mare Imbrium, 100  
The Moon

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## **Description**

The components are from a USC vector network analyser calibration kit model 8599.

## **Identification**

The component serial number is 2221X.

## **Client**

United Spacecraft Corporation, 51 Mare Tranquillitatis, The Moon.

## **Date of Calibration**

The measurements were performed on the 7<sup>th</sup> of February 2035.

## **Conditions**

Ambient temperature was maintained within  $\pm 1$  °C of  $-123$  °C.

## **Method**

Measurements of the voltage reflection coefficient were made according to procedure LMIT.E.063.005.

## Results

### Open (male), SN 54673

frequency (MHz)	magnitude (linear)		phase (/degree)	
	$\rho$	$U(\rho)$	$\phi$	$U(\phi)$
45	0.9998	0.0023 <sup>†</sup>	−1.46	0.13
50	0.9998	0.0023 <sup>†</sup>	−1.62	0.13
100	0.9999	0.0023 <sup>†</sup>	−3.27	0.13
300	0.9998	0.0025	−9.80	0.14
500	0.9997	0.0026	−16.34	0.15
1000	1.0000	0.0032	−32.72	0.18
2000	0.9994	0.0054	−65.67	0.31
3000	1.000	0.011	−98.66	0.62
4000	0.999	0.013	−131.74	0.78
5000	0.999	0.016	−164.77	0.90
6000	0.998	0.017	162.15	0.99
7000	0.997	0.018	129.0	1.1
8000	0.997	0.018	95.9	1.1
9000	0.996	0.018	62.7	1.1

Figure 1: Magnitude and phase data. Results are reported in polar coordinates (magnitude,  $\rho$ , and phase,  $\phi$ ), using a linear scale for magnitude and units of degrees for phase. For values decorated by a <sup>†</sup>, see the Uncertainty section.

## Uncertainty

A coverage factor  $k = 1.96$  was used to calculate the expanded uncertainties  $U(\cdot)$  at a level of confidence of approximately 95%. The number of degrees of freedom associated with each measurement result was large enough to justify this coverage factor.

Some of the expanded uncertainty values reported fall outside LNI's current scope of accreditation. These values are decorated by a <sup>†</sup> in Figure 1. The least expanded uncertainty for a magnitude measurement close to unity in the LNI scope of accreditation is currently 0.0024.

**Note:** For information about uncertainty terminology, see: BIPM, IEC, IFCC, ISO, IUPAC, IUPAP and OIML, “*Evaluation of measurement data—Guide to the expression of uncertainty in measurement*”, BIPM Joint Committee for Guides in Metrology, Paris, Sèvres, edition 1, JCGM 100:2008, 2008. A PDF version is available on-line:

[https://www.bipm.org/documents/20126/2071204/JCGM\\_100\\_2008\\_E.pdf](https://www.bipm.org/documents/20126/2071204/JCGM_100_2008_E.pdf)