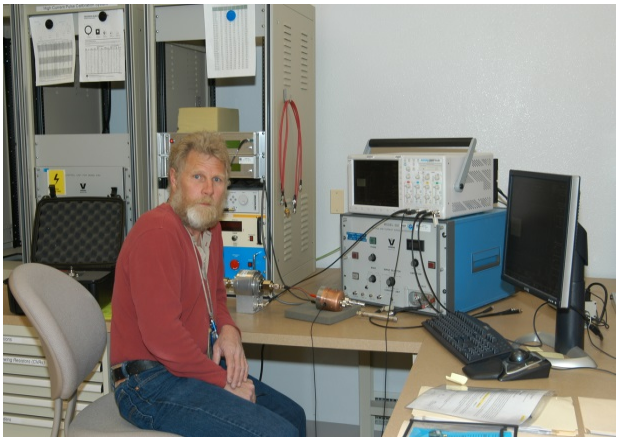
Primary Standards Laboratory
AC Electrical Project

Fact Sheet

The Alternating Current (AC) project of the Primary Standards Laboratory (PSL) maintains a wide variety of AC and pulsed electrical measurement capabilities to provide Systeme International-traceable measurements through the National Institute of Standards and Technology (NIST) for Sandia National Laboratories (SNL), the Nuclear Weapons Complex, and Strategic Partnership Project customers. Metrology resources include high accuracy AC current and voltage measurement systems to quantify component AC-DC difference, unique pulsed high-voltage generation and measurement capability to certify resistive and capacitive voltage dividers, and time and frequency measurements using a NIST-designed system. In addition, electrical impedance of inductors and capacitors over a wide frequency range can be measured and certified for the customer.



Calibration of pulsed current viewing resistors and transformers are performed by Mr. Forslund by direct comparison to NIST custom-built standards

The project staff also provides key support in the auditing and approval process of auxiliary DOE/NNSA contractor standards laboratories and commercial accredited laboratories by providing proficiency test items and assessing metrology competence.

The AC Project provides consultation for all its customers in the selection of appropriate new instruments and standards, developing solutions for problems that arise in the application of measurement equipment and systems, and the proper use of calibrated standards. Project staff provide key support in the auditing and approval process of both DOE/NNSA Contractor Standards Laboratories and commercial accredited laboratories by providing proficiency test items and assessing metrology competence.

Capabilities

A generic measurement capabilities and associated uncertainties is listed on the next page. The National Institute of Standards and Technology/National Voluntary Laboratory Accreditation Program (NIST/NVLAP) accredits the laboratory measurements under NVLAP Lab Code 105002-0.

For additional details, visit:
http://ts.nist.gov/standards/scopes/1050020.pdf

Major Resources

- The Time and Frequency System is equipped with GPS clocks and the NIST-FMAS.
- A unique Pulsed High Voltage Measurement System is available for certifying resistive and capacitive dividers.
- Fully automated computer-controlled impedance measurements are used for inductance and capacitance over a wide frequency range.
- CVTs, CVRs, and current measuring components can be certified using the Pulsed High Current Measurement System.
- Certification of waveform instruments from DC to > 2 GHz using automated calibration stations
- Certification of PXI modules for waveform measurements

NVLAP accredited impedance calibrations including inductance and capacitance standards up to 30 MHz are performed by Mr. Fajardo using various state-of-the-art standards and instruments, as well as standards with a 60+-year history.

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Description of Measurement	Measured Values under Accreditation	Frequency or Time Range	Uncertainty (k =2)
AC Current			
	220uA – 220mA	10Hz – 10kHz	0.032%
		20Hz – 10kHz	0.028% – 0.71%
	2.2A		
		40Hz – 10kHz	0.048% – 0.37%
	11A		
AC Voltage			
		10Hz – 1MHz	0.23% – 0.14%
	2.2mV – 70V		
		10Hz – 500kHz	0.023% – 0.094%
	220V		
		10Hz – 100kHz	0.021% – 0.052%
	700V – 1000V		
AC Capacitance			
Variable	0.01pF – 1000pF	1 kHz	0.0005%
Fixed	1pF – 1000pF	100Hz	0.01%
	0.01pF – 1000pF	1kHz	0.0001% – 0.2%
	1pF – 1000pF	10kHz	0.0025% – 0.006%
	0.01pF – 1000pF	100kHz	0.0025% – 1.3%
	1pF – 500pF	1MHz	0.003% – 0.60%
AC Inductance			
	50uH – 10H	100Hz – 1kHz	0.020% – 0.27%
	0.25uH – 100mH	10kHz	0.05% – 1.2%
	0.1uH – 25mH	100kHz	0.17% – 3.1%
	0.1uH – 500uH	1MHz	0.20% – 4.7%
	0.25uH – 10uH	10MHz	0.1% – 0.8%
Frequency Reference			
	10 MHz		5×10^{-13}
Stop Watch and Timers			
		1s – 24h	0.05 s/day

AC-DC Difference Measurement System in the AC Laboratory.

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