



Engineering Innovation

Newton's4th Ltd (abbreviated to N4L) was established in 1997 to design, manufacture and support innovative electronic test instrumentation to a world-wide market. Our product portfolio includes Power Analyzers, Frequency Response Analyzers (gain/phase analyzers), Impedance Analyzers, Vector Voltmeters, Phase Meters, true RMS voltmeters, Selective Level Meters, Laboratory Power Amplifiers and Programmable Power Sources.

Our Name, Newton's4th

The name Newton (Sir Isaac) is synonymous with a thorough understanding of physical principles from observation of the real world. His well known 3 laws of motion are so simple and clear that they are easily learned and applied, yet they give us the tools to analyse the motion of very complex systems. The number 4 represents engineering innovation, building on what is already established. Newton's4th – innovation based on established fundamental principles.

Accreditation

Newton's4th Ltd are ISO9001:2015 registered, the internationally recognized standard for the quality management of businesses. In recognition of the technical innovation and commercial success of the PPA series, N4L received the "Innovation 2010" Queen's award for enterprise.

Our Calibration Laboratory is accredited by UKAS to ISO17025 for Voltage, Current, Power, Phase, Harmonics and Flicker. In 2013, N4L became the first power analyzer manufacturer to provide ISO17025 accredited certification as standard with all power measurement instruments.

POWER



PPA Series
Precision Power measurement
from DC to 2MHz

FREQUENCY RESPONSE



PSM Series
Gain and Phase measurement
from 10uHz to 50MHz

IMPEDANCE



PSM Series + LCR/IAI/Batt470
Impedance measurement
from 10uHz to 50MHz

SIGNAL + POWER AMPLIFICATION



LPA and N4A Series
DC to 1MHz Power Amplifiers
DC to 1kHz Power Sources $\leq 67kW$

PPA Series - Applications

Research and Development:

Auto range, Auto frequency lock and measurement optimisation get accurate results fast.

Electric Vehicles, Motor Drives and Motors:

Electrical Power

Noise rejecting frequency synchronisation without limiting the measurement bandwidth.

Electrical to Mechanical Power

Measurement with wideband response and simultaneous measurement of fundamental components.

Renewable Energy conversion:

Independent inputs separately configurable with direct transfer of measurements to a dedicated PC program. Optimum accuracy at each stage of a power system.

Power Transformer Testing:

High speed sampling combined with an innovative real time Discrete Fourier Transform process, achieves exceptional noise immunity and phase accuracy that is ideally suited to power transformer testing.

Standards Compliance:

Voltage Change, Harmonic current emissions, Standby Power and Power transformer standards compliance.

IEC61000-3-2/3/11/12 Harmonics and Flicker

IEC62301 & EN50564 Standby Power

IEC60076-1 and ANSI/IEEE C57.110 Power Transformer Measurement

Lighting equipment:

Dedicated ballast mode and frequency synchronisation to ensure stable measurements with optimum accuracy.

White Goods development and test:

Power consumption, dynamic performance, and standards compliance. Direct voltage and current inputs optimised for best stability, speed and accuracy.

Avionics Testing:

Power and Harmonic measurement in accordance with Avionics Industry standards.

DO-160G, ABD0100.8.1C/E, AMD-24C, Boeing 787B30147 RevC

PPA Series - Features and benefits

Analogue design:

Inherently wide analogue bandwidth

Low capacitance voltage attenuator geometry

Low inductance current shunt geometry

High speed digital isolation

High CMRR

Raw samples transferred to motherboard

Solid state gain amplifier ranging

Optimum speed and reliability

Wide dynamic range

Peak ranging ensures no range clipping and no need to select crest factor

High rating and protection - 3000V DC direct inputs galvanically isolated

Digital design:

ADC window accuracy and repeatability

High speed sampling maintained at any measurement window size

Gapless sampling windows, synchronised to applied signal

Asynchronous channel windows for optimum efficiency measurements

Real time presentation of total and fundamental; Voltage, Current and Power.

PC software and integration:

Application specific software

IEC Harmonics and Flicker

Low Power standby

General measurements and datalogging

PPALog

Real time, graph of table of up to 64 measurement functions per channel

Connect to 4 six phase instruments to log 24 Channels in one program

Accessories and services:

Signal conditioning

Voltage attenuators, Current shunts, Current transformers, Rogowski coils, filters

System integration

Multi channel I/O interface with thermocouple inputs

Current Sensor interfaces and power supplies

Calibration

Wideband, UKAS accredited, H+F, System (end to end) calibration

<p>PPA500</p>		<p>General purpose power measurement Production test Standby power test</p>	<p>Half Rack wide 2U high - DC to 500kHz 0.1% nominal power accuracy High performance alternative to conventional compact power analyzers 1, 2 or 3 phase versions Customer configurable high contrast digital display with 6 digit zoom resolution or up to 24 measured values across three phases</p>
<p>PPA1500</p>		<p>Academics Development and test Lighting ballast Power supply testing</p>	<p>All features of the PPA500 plus: Wider frequency range - DC to 1MHz Graphical display - Scope Real time graph Vector</p>
<p>PPA3500</p>		<p>Motor / Inverters System integrators Electric vehicle test Renewable energy</p>	<p>Full Rack 2U high - DC to 1MHz 0.06 % nominal power accuracy 3, 4, 5 or 6 phase versions with virtual phase 7 for 3Ø-1Ø-3Ø systems Torque and speed input for real time mechanical power Dual Display - High contrast configurable digital / graphic Motor / Inverter application modes Compatible with ADI40 Analogue / Digital Interface</p>
<p>PPA4500</p>		<p>Bench R&D Motor / Inverters</p>	<p>Full Rack 3U high - DC to 2MHz 0.04 % nominal power accuracy 1, 2 or 3 phase versions Torque and speed input for real time mechanical power Customer configurable high contrast digital / graphic display, 6 digit zoom resolution or up to 30 measured values across three phases Motor / Inverter application modes Compatible with ADI40 Analogue / Digital Interface</p>
<p>PPA5500</p>		<p>Bench R&D Motor / Inverters Power transformer test IEC61000-3-2/3 Harmonics and Flicker</p>	<p>All features of the PPA4500 plus: 0.02 % nominal power accuracy Additional range to increase low level sensitivity Increased measurement speed Increased number of harmonic orders Transformer Edition (TE) available with dedicated certification IEC Harmonic and Flicker version with associated FW and HW</p>

PSM Series – Applications

Electronic circuit Design and Development:

Offering a wide frequency range signal generator plus measurement of absolute and relative magnitude and phase across two or three independent measurement channels, the PSM range provides an exceptionally versatile measurement instrument for design engineers.

Control loop analysis:

Closed loop control is the basis of many electronic and electrochemical systems. Quantifying for example the stability of a power supply control loop, requires a combination of frequency selectivity, dynamic range and phase accuracy that only a true frequency response analyzer can provide.

Transformer Testing:

Both low and high-power transformers rely upon electromagnetic coupling that is influenced by materials and manufacturing processes. Resultant transformer characteristics are not effectively tested by conventional measurement equipment. Validation of correct materials and assembly is achieved at the time of manufacture and during ongoing maintenance processes, by testing to a 'Sweep Frequency Response Analysis' standard called IEC60076-Part 18.

PSM Series – Features and benefits

Analogue design:

Input type

Single ended ground reference, isolated or fully differential inputs available to satisfy a wide range of measurement applications.

Wide analogue bandwidth

DC coupled plus 10uHz up to 50MHz, one of the widest frequency ranges of any commercial measurement instrument.

Wide dynamic range

Models focused toward different applications offer measurements from microvolts to hundreds of volts.

Digital design:

Synchronous digital measurement windows

Discrete Fourier Transform computation giving high selectivity and noise rejection

Amplifier design:

Wherever AC signals are amplified, the relative magnitude and phase angle at different points within the amplifier will be of interest.

Transistor performance analysis:

Many components including the ubiquitous transistor require the definition of frequency response for which PSM products are ideally suited.

Electronic Filter design / verification:

Most electronic products that involve AC signals or operate in the presence of noise will involve a hardware filter, where the frequency response will be tested.

Mechanical movement and resonance:

Analogies between electrical and mechanical systems are commonly made and can be realised with a frequency response analyzer.

Selective Level and power-line communication testing:

Where frequency selective measurement over a wide frequency range is required, a variant of the PSM products called the SLM, offers a solution.

Display:

Auto ranging and auto scaling

Fully functional real time numeric, table and graphics without the need for a PC

PC software and integration:

Full control, storage and data presentation with PSMComm2 PC software

Dedicated transformer analysis with SFRAComm PC software

Scripting software CommView2

Accessories and services:

Signal conditioning

Voltage Attenuators, Current Shunts, Current Transformers, and Filters

System integration

Injection Transformers, Amplifiers, Interfacing

Calibration

Full frequency and input range certification

<p>PSM1700</p>		<p>Control loop analysis Filter design LVDT testing Amplifier frequency response Power supply rejection ratio (PSRR) testing Component phase response</p>	<p>DC and 10uHz to 1MHz 100Vpk - Single Ended Floating Inputs 9 Ranges from 10mVpk to 100Vpk in 1-3-1 sequence Ground reference generator $\pm 10Vpk$</p>
<p>PSM1735</p>		<p>As PSM1700 with wider frequency range and greater sensitivity suited to: RFI line filter design and test Low level systems High voltage common mode with differential input configuration</p>	<p>DC and 10uHz to 35MHz 10Vpk - Single ended grounded and balanced differential inputs 9 Ranges from 1mVpk to 10Vpk in 1-3-1 sequence Ground reference generator $\pm 10Vpk$</p>
<p>PSM3750</p>		<p>As PSM1735 plus: Direct high voltage or isolated applications Multistage testing via additional measurement input Wideband control loop analysis via internal isolated generator</p>	<p>DC and 10uHz to 50MHz 500Vpk - Isolated differential inputs 12 Ranges from 3mVpk to 500Vpk Isolated generator $\pm 10Vdc$ or AC rms</p> <p>2 or 3 channel options</p>
<p>SFRA45/ SLM3505</p>		<p>SFRA45 Power transformer sweep FRA; Design, test, and maintenance of power transformers and inductors</p> <p>SLM3505 Power line communication testing and maintenance Line trap impedance testing</p>	<p>5Hz to 45MHz 10Vpk - Single ended grounded 9 Ranges from 1mVpk to 10Vpk in 1-3-1 sequence Ground reference generator $\pm 10Vpk$ Power - AC Adaptor or nominal 12V DC Power + Internal Batteries</p> <p>5Hz to 5MHz 300Vpk - Single Ended Floating high-level input 10Vpk - Single Ended Floating low-level input Ground reference generator $\pm 10Vpk$ Power - AC Adaptor or nominal 12V DC Power + Internal Batteries</p>

PSM Series + LCR/IAI/Batt470 – Applications

Impedance analysis:

Given exceptional frequency selectivity and phase angle accuracy, the PSM Phase Sensitive Multimeter becomes the ideal foundation for Impedance measurement, with the addition of current sensing accessories.

LCR Electronic component measurement:

Inductors, Capacitors and Resistors have nominal values that may require verification at a defined nominal frequency. However, components are of course not ideal, with parasitic influences that have a varying effect on the impedance over frequency. The ability of a PSM to make measurements over a swept frequency range allows engineers to quantify and conveniently present these effects.

Electroplating analysis:

In a similar manner to the material and thickness of a capacitor dielectric, the formulation and thickness of plating material exhibits a value of capacitance. Measurement of capacitance over frequency is therefore a highly effective way of testing the constancy and quality of a plating process.

Fuel Cell Analysis:

Impedance analysis over frequency allows fuel cell manufacturers to monitor and qualify the state of cells throughout a working cycle.

Biological and Electrochemical Analysis:

Sometimes referred to as ‘Impedance Spectroscopy’, impedance analysis over a frequency sweep with a defined circuit model, provides an understanding of material structure and behaviour.

Battery research and testing:

While an electrical battery primarily operates under DC conditions, the ability of the battery to withstand fast load changes and the condition of a battery can be quantified by analysing the impedance of an AC component superimposed upon a nominal DC level.

Piezo Electric component testing:

Many industries including those in medical and automotive fields increasingly use Piezo electric devices, where the identification of impedance and resonant frequency is suited to the PSM frequency sweep Impedance functions.

Quantify capacitor loss:

The demand for high efficiency electronic products forces greater attention to component losses, including highly reactive components like capacitors, where measurement of ESR (Equivalent Series Resistance) is necessary to establish losses.

PSM Series + LCR/IAI/Batt470 – Features and benefits

Analogue design:

Compatibility

LCR Active head, Impedance Analysis Interface, EIS Interface, TA107, Shunts and CT's compatible with most models in the PSM range.

Wide Impedance Range

A wide range of hardware accessories and the wide voltage measurement range of PSM instruments combine to satisfy many impedance measurement applications.

2 wire or 4 wire measurements

Separate power and sense BNC terminals permit either 4 wire (Kelvin) connection where the influence of supply cabling must be considered or 2 wire cabling when the simplicity of this system provides superior measurement results.

Support of third party fixturing:

Conventional BNC connectors and a 22mm pitch fixture adaptor make it easy to use established fixtures from other suppliers or to connect custom fixtures.

PC software and integration:

Full control, storage and data presentation with PSMComm2 PC software Scripting software CommView2

Accessories and services:

Signal conditioning

Voltage Attenuators, Current Shunts, Current Transformers and Filters

Adjustment/Calibration:

Measurement adjustment for IAI units is stored in the associated PSM while the LCR Active Head and other impedance accessories do not offer or require adjustment.

<p>PSM1700+LCR ACTIVE HEAD</p>		<p>General LCR measurements Component testing</p>	<p>DC and 10uHz to 1MHz Nominal Impedance range - 10mOhm to 100MOhm</p>
<p>PSM1735+IAI</p>		<p>Impedance analysis up to 35MHz Component testing</p>	<p>DC and 10uHz to 35MHz Nominal Impedance range - 1mOhm to 500MOhm</p>
<p>PSM3750+IAI2</p>		<p>Impedance analysis up to 50MHz Component testing EIS (Electrochemical Impedance Spectroscopy) Fuel cell analysis (Using current sensors)</p>	<p>DC and 10uHz to 50MHz Nominal Impedance range - 1mOhm to 500MOhm</p>
<p>TA107</p>		<p>10⁷ volts per amp transimpedance amplifier High Impedance testing</p>	<p>DC and 10uHz to 100KHz Nominal Impedance range - 1MOhm to 100GOhm (10MOhm to 1TOhm with LPA400)</p>
<p>BATT470m</p>		<p>EIS testing of lithium ion cells</p>	<p>100mHz to 1MHz Nominal Impedance range - 1mOhm to 100kOhm DC Voltage hold off - 200V</p>

LPA Series – Applications

Audio Electronics Design and Test:

There is a common assumption that audio amplifiers will be suitable for the design and test of audio microphones and speakers but that is often untrue, since these are usually AC coupled, with limited low frequency response. AC+DC coupling offered by LPA amplifiers provide an ideal solution since they maintain full output at low frequency.

Piezo device testing:

The nature of Piezo applications involve operation at resonant frequencies where impedance is low. In this test condition, an LPA enables users to maintain a higher drive current and therefore more measurable signal for instruments such as the PSM range.

Reactive component testing:

Since the impedance of reactive components will change considerably over frequency, the LPA series offer a solution at test points where signal generators do not have enough power to maintain a suitable signal level.

LPA Series – Features and benefits

Analogue design:

AC and DC coupled output
DC to 1MHz bandwidth
Fast slew rate
Selectable voltage / current versions
Compatible with PSM series

Hardware:

Isolated BNC or 4mm touchproof output sockets for user safety
Selectable AC coupling filter -3dB @ 16Hz to reduce DC components
Low B/W filter attenuation 40dB/decade linear phase for low frequency applications.

N4A Series – Applications

White goods domestic line testing:

Electronic products that will be used in locations other than the country in which they are made, will need to be tested at the voltage and frequency of their destination country.

Electrical product efficiency:

Where the efficiency of an electronic product must be established, reliable measurements will depend upon a stable input source to avoid uncertainty.

Design verification:

On load verification of a defined input operating range of mains powered electrical devices.

IEC61000 Harmonic and Flicker testing plus susceptibility:

Full compliance Harmonic and Flicker testing requires a full compliance source. Simulation of power abnormalities to check DUT resilience to abnormal power waveforms.

N4A Series – Features and benefits

Analogue design:

AC and DC coupled output.
Independent control of AC and DC components.
Low THD
Dual signal generator system allows custom waveform generation with low and high frequency components without suffering typical memory constraint.
2 x Full Power for 3 seconds on most models support high start up DUT power without the need to oversize the source.
Full power to 1kHz
Small signal e.g., harmonics to 10kHz

Digital design:

Front panel sequence programming
Front panel waveform generation
Non-volatile waveform storage and recall
Remote calibration in conjunction with PPA series power analyzers

<p>LPA01</p>		<p>1MHz bandwidth AC+DC coupled Laboratory-Power-Amplifier Electronic component testing Piezo testing</p>	<p>LPA01 14Vpk @ 1Apk (700mArms) from DC to 1MHz</p> <p>Coupling: AC, AC+DC and AC+(0.1 DC gain) Gain options: x1, x4 or x10 Filter option: -3dB @ 80kHz Linear phase 40dB/decade</p>
<p>LPA400</p>		<p>1MHz bandwidth AC+DC coupled high voltage Laboratory-Power-Amplifier Electronic component testing Piezo testing</p>	<p>LPA400A ±400Vpk @ 75mApk (50mArms) from DC to 100kHz Falling to ±40Vpk @ 75mApk (50mArms) at 1MHz LPA400B ±180Vpk @ 150mApk (100mArms) from DC to 200kHz Falling to ±40Vpk @ 150mApk (100mArms) at 1MHz</p> <p>Coupling: AC, AC+DC and AC+(0.1 DC gain) Gain options: x50, x200 or x500 Filter option: -3dB @ 80kHz Linear phase 40dB/decade</p>
<p>LPA05</p>		<p>1MHz bandwidth AC+DC coupled high current Laboratory-Power-Amplifier</p>	<p>LPA05A ±40Vpk @ 5Apk (3Arms) from DC to 250kHz Falling to ±20Vpk @ 5Apk (3Arms) at 1MHz LPA05B ±16Vpk @ 8Apk (5Arms) from DC to 1MHz</p> <p>Coupling: AC, AC+DC and AC+(0.1 DC gain) Fixed gain: x10 Filter option: -3dB @ 85kHz Linear phase 40dB/decade</p>
<p>N4A Power Sources</p>		<p>3kVA to 67kVA Programmable power sources DC ~ 1kHz fundamental power IEC61000 compliance testing Aerospace testing White goods appliance testing Mains simulation</p>	<p>Output AC 0-300VAC rms - from DC to 1kHz Full Signal (10kHz Small Signal) DC 0-425VDC</p> <p>N4A03 1Ø 3kVA (10Arms) 3 Second Inrush 20Arms N4A06 1Ø 6kVA (20Arms) 3 Second Inrush 40Arms N4A18 3Ø 18kVA (33Arms/ph) 3 Second Inrush 64Arms/ph N4A30 3Ø 30kVA (20Arms/ph) 3 Second Inrush 40Arms/ph N4A67 3Ø 67kVA (75Arms/ph) 3 Second Inrush 100Arms/ph</p> <p>Parallel Option: N4A18 120Arms N4A30 200Arms</p>



N4L Newtons4th Ltd

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