Phase Sensitive Multimeters
A new generation of versatile measurement instruments

PSM1700  \textit{PsimetriQ}  
10\text{uHz} to 1\text{MHz}

PSM1735  \textit{NumetriQ}  
10\text{uHz} to 35\text{MHz}
Versatility without compromise

In a world where engineers from many different application areas require ever increasing speed, flexibility and measurement accuracy, N4L introduce a new generation of versatile measurement instruments that offer leading performance in every mode without the compromise on accuracy or the additional cost that is commonly associated with such flexible instruments.

Utilising the latest DSP and FPGA technology to optimise the use of innovative analogue hardware, many measurements functions can be derived with great precision from the basic elements of true rms voltage on two measurement channels plus the phase angle between them. It is from this fundamental relationship between independent voltages and their relative phase angle that the phrase ‘Phase Sensitive Multimeter’ was derived and this is also the key to the unique combination of performance versatility and value provided by the PSM range.

Whether you will make use of just one or all six of the primary measurement modes included in the PSM1700 and PSM1735, you can be sure of the exceptional accuracy, speed and ease of use that only the latest design technology can provide.

Frequency Response Analyser

Incorporating a digital signal generator, two differential auto-ranging voltmeters, auto-scale frequency plots and intuitive setup stored into non-volatile memory; the PSM range brings accurate and simple to operate frequency response analysis within the grasp of many who could not previously consider an FRA.

Features

- Differential inputs
- Fast sweep with up to 20 frequency steps per second
- DFT analysis giving exceptional noise rejection
- Automatic Gain/Phase margin computation
- Storage of results into non-volatile memory

FRA Example applications

- Power supply gain and phase analysis
- Electronic filter design and test
- Speaker and amplifier test
- Mechanical vibration analysis
- Electro-Mechanical control loop analysis

PSM1700 with N4L injection transformer testing an SMPS

Selection of the most suitable display format is very easy, switching between real time, tabular or graphical presentation from any mode with a single key stroke.

Real time mode at cursor point

In real time mode, the display functions are user selectable and can be presented in any order and at any of three zoom levels. Cursor keys can then be used to adjust amplitude and frequency with selectable step size to provide complete control of test conditions.

Vector Voltmeter

Unique to the VVM mode is a null meter display that provides the feel of traditional analogue instruments while maintaining the precision of a 6 digit phase display and 1 milli-degree phase resolution.

A high stability signal generator with direct digital synthesis, true rms sensing voltmeters and discreet fourier analysis combine to provide phase measurement accuracy beyond any comparable product.

Features

- Simultaneous measurement of all functions
- Synchronised to internal or external frequency source

VVM Example applications

- Electrochemical materials analysis
- Current transformer testing
- Phase meter calibration
LCR Meter

Whether using an external shunt, an LCR Active Head or the Impedance Analyser Interface; LCR mode provides all impedance parameters quickly and accurately either at single frequencies or over a user defined frequency sweep.

LCR Head – 10uHz to 5MHz
IAI – 10uHz to 35MHz

PSM1700 with LCR Active Head
PSM1735 with Impedance Analyser Interface

6 digit resolution and exceptional phase stability permit testing of the most demanding components such as low ESR capacitors.

Any point in a sweep can be selected with a cursor and viewed in a detailed results table.

Features

- Wide frequency range
- Freq, Phase and Tan Delta to 6 digits
- Passive shunt or active head options
- Graph or table of any function
- Sweep results store to memory

LCR Example applications

- Component testing
- Electrochemistry
- Circuit impedance analysis
- Testing resonance

RMS Voltmeter

In addition to providing the raw data from which all other functions are derived, each channel can be used directly for applications requiring precision rms measurement. Unlike many voltmeters, AC and DC components are quantified separately and dBm, peak, CF and surge values are displayed.

Both units utilise independent differential circuits permitting simultaneous analysis of two points at a different potential. For example, the input and output on voltage converter or two windings on a transformer.

Harmonic Analyser

The Harmonic Analyser mode simultaneously measures individual harmonic components and total harmonic distortion values on both measurement channels.

Discrete Fourier Transform algorithms permit fundamental harmonic components to be quantified accurately even in the presence of noise and distortion.

Power Meter

The combination of true rms measurement channels, precision phase analysis, high speed computation and a versatile graphic display provide an ideal solution to many applications that involve rapid changes in power.

Features

- Real time true rms measurement with no missed data.
- Synchronisation with fundamental down to 10ms period.
- Datalog of up to 4 functions stored into non-volatile memory.
- Watch results during datalog capture with scroll display.
- Real time DFT harmonic analysis.

Power Meter applications

- Power profile testing
- SMPS standby analysis
- Distortion analysis
- PFC testing

PC control, data capture and file storage

PSMcomm software provides control of all primary PSM functions with graphical or tabular data presentation, dual cursor measurements, an automatic gain phase margin function plus print, copy, save to file and firmware download.

CommVIEW PC software supplied as standard, provides script file instrument control, result storage in .txt format and firmware download.
System specifications

**PSM17xx**

**Datatalog**
- Functions: Up to 4 measured functions user selectable
- Datalog Window: From 10ms with no gap between each log
- Memory: RAM or non-volatile up to 8000 records

**High Speed Data Streaming**
- Rate: 1500 readings/s max
- Window: 66us to 1s Synchronized to waveform
- Buffer: 8000 results

**General**
- Display: 320 x 240 dot LCD – white LED backlight
- Alarm: Any displayed function
- Program stores: 100, one loaded on power up
- Sweep stores: 30, all parameters in any sweep function
- Remote operation: Full capability, control and data
- Size: 170H x 350W x 250D mm approx
- Temperature: 5 to 35°C
- Weight: 4kg approx
- Power supply: 90-240V rms 47-63Hz 30VA max

**PSM1700**

**Frequency Response Analyser**
- Measurement: Magnitude, gain (CH1/CH2 or CH2/CH1), gain (dB), offset gain (dB), phase (°)
- Frequency range: 10kHz to 1MHz
- Gain accuracy in dB: 0.02% < 1kHz
- Phase accuracy: 0.02° < 1kHz
- Frequency source: Measurement generator or CVH input
- Resolution: Real-time DFT, no missing data

**Vector Voltmeter**
- Measurement: In-phase, quadrature, tan Ø, magnitude, phase, in-phase ratio, rms, rms ratio, LDV differential, LDV ratiometric
- Frequency range: 10kHz to 1MHz
- Basic accuracy (ac): 0.05% range + 0.05% reading + 0.05% frequency

**LCR Meter**
- Functions: L, C, R (ac), Q, tan delta, impedance, phase – Series or parallel circuit
- Frequency range: 10kHz to 1MHz
- Current shunt: External or N4L active head of Impedance Analysis Interface
- Ranges: LCR Head or IAI
- Inductance – 100Hz to 10kHz
- Capacitance – 10pF to 100uf
- Resistance – 10MΩ to 1000MΩ
- Basic accuracy: 0.1% + tolerance of selected current shunt
- Sweep capability: All ac functions

**True RMS Voltmeter**
- Channels: 2
- Frequency range: DC to 1MHz
- DC to 1MHz: 1kHz to 50kHz fundamentally only
- Measurement: rms, ac, dc, peak, cl, surge, dbm
- Basic accuracy (ac): As VVM + 0.2mV
- Accuracy (dc): 0.1% range + 0.1% reading + 0.5mV

**Power Meter**
- Measurements: W, VA, PF, V, A, – total, fundamental and integrated, power harmonics
- Frequency range: 20mHz to 1MHz
- Current shunt: External or use N4L power adaptor
- Current accuracy: As voltage + external shunt tolerance
- Watts accuracy: 0.1% VA range + 0.1% reading + external shunt tolerance

**Harmonic Analyser**
- Scan: Single or series
- Frequency range: 10kHz to 1MHz
- Measurement: Harmonic, series THD or difference THD
- Max harmonic: 50

**Signal Generator**
- Type: Direct digital synthesis
- Frequency: 10kHz to 1MHz
- Waveforms: Sine, triangle, square, sawtooth
- Accuracy (with no trim): Frequency ±0.05% Amplitude ±5% < 100kHz Amplitude ±10% < 1MHz
- Impedance: 50Ω ±2%
- Output voltage: 0V to ±10Vpk
- Output resolution: 5mV to 5mV level dependent
- Offset: 0V to ±10Vpk
- Offset resolution: ±10mV
- Clock rate: 11.52MHz
- Connector: Grounded BNC

**PSM1735**

**Measurement**
- Magnitude, gain (CH1/CH2 or CH2/CH1), gain (dB), offset gain (dB), phase (°)
- Frequency range: 10kHz to 35MHz
- Gain accuracy in dB: 0.02% < 1kHz
- Phase accuracy: 0.02° < 1kHz
- Frequency source: Measurement generator or CVH input
- Resolution: Real-time DFT, no missing data

**Vector Voltmeter**
- Measurement: In-phase, quadrature, tan Ø, magnitude, phase, in-phase ratio, rms, rms ratio, LDV differential, LDV ratiometric
- Frequency range: 10kHz to 1MHz
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