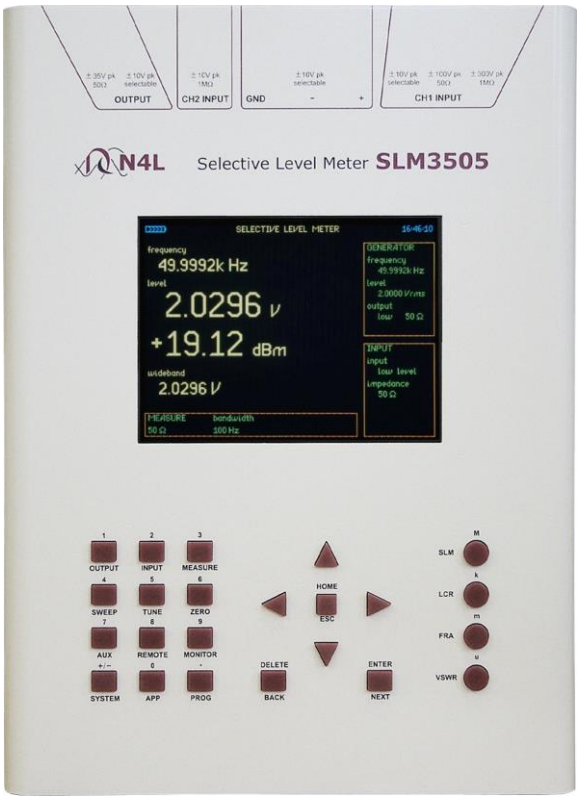
Field Portable Power Line Communications Analysis

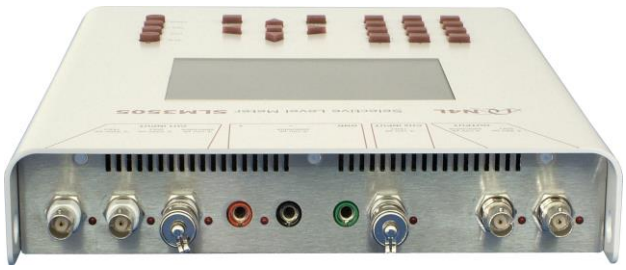


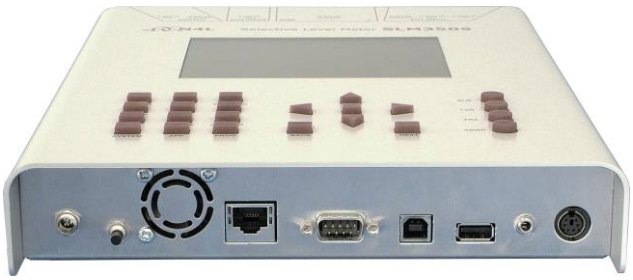
Instrument Functions

- Single and Dual Frequency Selective Level Meter
- Impedance Analyzer (LCR Measurements)
- Frequency Response Analyzer
- VSWR Meter
- Signal Generator
- Oscilloscope

Applications

- Power Line Carrier Alignment & Maintenance
- Line Trap Alignment & Test
- Line Tuner Alignment & Test
- PLC Transmitter & Receiver Test & Set-up
- Audio Tone Protective Relay Channel Test & Set-up
- FSK Telemetry Testing





Summary

The SLM3505 was designed to provide a single instrument solution for the Electric Utility System Protection Engineer and Relay/Communications Technician responsible for the alignment and maintenance of Power Line Carrier, Audio Tone and FSK Communications Systems. This multifunction instrument replaces all 4 existing Power Line Carrier Instruments in one for a fraction of the cost, all in a compact lightweight package.

Featured Application Highlights

LINE TRAP TESTING

The SLM3505's Impedance Analyzer provides an impedance versus frequency plot directly on the display. A technician can therefore view a curve representing the resonant frequency and adjust a trap and tuning pack while viewing the changes in a real time environment, without having to adjust the meter. Since the SLM3505 is a true LCR Meter with the ability to zero out cable impedance, test lead length and separation is no longer a concern. Now the technician can attach long leads to a mounted trap and perform testing while still on the ground, by simply zeroing the capacitance in the leads.

LINE TUNER TESTING

The SLM3505 provides a single instrument solution for adjusting a Tuner's Series inductor and Impedance Matching transformer for minimum reflected power. The 3505 achieves this either with a conventional directional coupler technique or by an innovative impedance comparison technique that achieves the same measurement results without the need for any additional hardware. Using either technique in VSWR mode, a single screen displays the frequency under test, the forward power level, the reflected power level and the % reflected power.

TRANSMITTER/RECEIVER TESTING

The SLM3505's wide frequency range (5Hz to 5MHz) is ideal for setting transmitters and receivers on Power Line Carrier, Audio Tone or Analogue Baseband Microwave systems.
Unlike many conventional selective level meters, the SLM3505 scans the required frequency range then centres automatically on the largest peak or two largest peaks. The high level output provides up to 2 watts into 50 Ohms for Power Line Carrier applications, while the low level output is ideal for work on audio tone and microwave systems. For the Power Line Carrier user, a high level, high impedance input capable of up to 300V peak can handle any standard transmitter output in the field today without the need for an external attenuator.

DATA & EVENT RECORDING

Many of the SLM3505's test functions will provide the technician invaluable information that can be used for future reference in verifying the state in which the equipment was tested and aligned. An internal 1 Gigabyte of storage, external USB memory stick compatibility and an RJ45 input connection for laptop connectivity provides the user a versatile solution for storing and retrieving field data.
Internal time and date stamping used in conjunction with simple comma separated data storage will help your company document the characteristics of your individual Power Line Carrier elements system wide.

FIELD INSTRUMENT

Designed for the substation environment, the SLM3505 is manufactured in a rugged aluminium housing with an adjustable carrying handle plus a separate nylon shoulder strap for convenient field use. The SLM3505 uses a state of the art 5.7" Colour Display to maximize visibility in all conditions, including full sunlight. A welcome alternative to the present multi-unit bulky solutions, the SLM3505's tablet size (305x230x45mm) and relatively light weight (2.3Kg) provides a compact solution that can become the technician's primary diagnostic tool. In addition to operating off internal rechargeable batteries and an AC adapter, the SLM3505
is also designed to operate off from an external supply or 12V vehicle battery standard.

Technical Specification

SELECTIVE LEVEL METER	
Frequency range	5Hz to 5MHz
Frequency accuracy	±5ppm over all temperature range
High Accuracy Option F	<±2ppm over all temperature range
Magnitude accuracy	<1KHz: 0.05% rng + 0.05% rdg + 50uV. <10KHz: 0.05%rng+0.05% rdg +0.01%/KHz + 50uV. <5MHz: 0.05%rng+0.25% rdg +0.001%/KHz + 50uV.
Inputs (Unbalanced) Type & Connection	differentially isolated & isolated BNC
Bandwidth settings	3, 25, 100, 1.95k, 3.1kHz & wideband
Measurement Units	V, dBm, dBu, dB0 (Traditionally referred to as dB in PLCC applications)
Accuracy of Level Measurement at 0dB(m)	± 0.3 dB(m)
High voltage input	
Max input	±300V peak
Input impedance	1MΩ ±5% // 30pF
50Ω input	
Max input	10W (22V rms)
Input impedance	50Ω ±1% // 30pF
75Ω input	
Max input	10W (28V rms)
Input impedance	75Ω ±1% // 30pF
Low level input	
Max input	±10V peak
Input impedance	75Ω ±1% // 30pF 120Ω ±1% // 30pF 150Ω ±1% // 30pF 600Ω ±1% // 30pF 1MΩ ±5% // 30pF
Input (Balanced)	
Max input	±10V peak
Input impedance	As Low level input
Input type	differential
Input connection	3 x 4mm connectors - positive, negative, and ground

SIGNAL GENERATOR	
Generator type	Direct Digital Synthesis (DDS), single frequency or sweep
Generator waveforms	sinewave, square, triangle, white noise
Frequency accuracy	±5ppm over all temperature range
High Accuracy Option F	<±2ppm over all temperature range
Magnitude accuracy	± 1% ± 1%/MHz
Frequency Setting	5Hz or better up to 999.999Hz in 1mHz steps 1kHz to 999.999kHz in 100mHz steps 1MHz to 5MHz in 1Hz steps
Resolution	6 Digits
Output Level Range for 0dB(m)	Selectable in 0.001dB(m) steps between: Low Output -40dB(m) to +24dB(m) High Output -7dB(m) to +35dB(m)
Hi level output	
Frequency range	10kHz to 5MHz
output level	2W into 75Ω (10V rms)
output impedance	75Ω ±2% (Option)
Low Level Output	
Frequency range	5Hz to 5MHz
output level	5V rms into high impedance
output impedance	75Ω +/-2% +22dBm 120Ω +/-2% +20dBm 150Ω +/-2% +19dBm 600Ω +/-2% +15dBm
Frequency Shift Delay Timer	0 to 1s (1ms steps)
IMPEDANCE ANALYZER	
Impedance range	100 milli Ohm to 100 kilo Ohm
Accuracy	<10KHz: 1% rdg. <1MHz: 1% rdg + 0.005%/KHz + 50uV. <5MHz: 5% rdg + 0.002%/KHz + 50uV.
Features	LCR Measurements (Inductance, Capacitance, Resistance, tan delta, QF) Lead compensation (zero lead function) Impedance versus Frequency Curve

OSCILLOSCOPE	
Sample rate:	5 Msamples/s
Timebase:	5us/div to 5s/div
Trigger:	auto, normal or single shot
Pretrigger:	none, 25%, 50%, 75%
Inputs ranges:	as Selective Level Meter
Second Input	±10V peak 1MΩ ±5% // 30pF
VSWR METER	
Accuracy	1% of reading up to 1MHz 5% of reading above 1MHz to 5MHz for power measurements (forward and reflected) at VSWR = 3.
Features	Forward Power, Reflected Power, % Reflected Power, & Frequency under test visible on one screen.

FREQUENCY RESPONSE ANALYZER	
Frequency range	5Hz to 5MHz
Gain Accuracy dB	0.02dB < 1kHz 0.05dB < 10kHz 0.1dB + 0.001dB/kHz
Phase Accuracy °	0.02° < 10kHz 0.02° + 0.003°/kHz
GENERAL SPECIFICATIONS	
Sweep Steps	Up to 2000 steps in all sweep functions
Set-up and Data Storage	Up to 1000 analyzer setups, readings and sweep results can be stored
Interface	USB, RS232, LAN
Real time clock	Time and Date Stamp for data stores
Data Storage	Internal 1Gb flash, external USB pen port
Display Type	5.7" ¼VGA colour high brightness backlight
Display Resolution	6 digit freq, 5 digit voltage, 4 digit dBm
Size	approx 305 x 230 x 45mm "tablet" style
Weight	2.3Kg
Power source	9 – 18V @ 3A AC adapter or 12V dc from car or external batteries
Battery type and Battery life	Re-Chargeable Lithium-Ion Up to 5 Hours
Temperature range	-5 to +50°C

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