

- Power Instrumentation, LCR analysis
- Gain-Phase / waveform analysis
- DC and AC transducers

Typical applications for the Powertek GP102 Gain Phase / Complex Waveform Analyser

Electrical Test of Electro Luminescent Lighting / EL films

To check on the quality of the EL film construction, power consumption and impedance parameters are measured. These are watts, voltage, current, power factor, capacitance C_p & C_s , ac resistance R_s & R_p , Tan delta, dissipation/loss factor, impedance and frequency. Most importantly, the EL film cannot be measured using a conventional watt meter and LCR bridge, this is why:-

LCR bridges will output a maximum of typically 10Vrms. At this low level the EL film exhibits very different impedance characteristics than at the rated power level of 100-200V. The current consumption is also very small, this means that most power meters are unable to make reliable measurements.

How is the GP102 used for electrical measurement of EL films?

The GP102 is capable of measuring LCR and power parameters required for characterisation of EL lamps. These measurements include C_p & C_s (parallel and series capacitance), ac resistance R_s & R_p , dissipation/loss factor, impedance, angle, reactance, watts, VA, voltage, current, power factor, and frequency, all measured at the same time. CH1 measures voltage and connects across the film, CH2 measures current and connects across a shunt, of value typically 1-5ohms. Using the option 06C-EL software, all the above measurements can be read into a PC, using single shot or timed acquisition. All results are easily imported to Excel. The user can use their own ac power supply, or use the Powertek LPA400 (outputs up to 400Vpk, 50mArms up to 200kHz). When used with the GP102/LPA400, the option 06C-EL software can control both the GP102 and the LPA400 using only one RS232 port. The LPA400 provides power for the EL by amplifying the GP102 generator output.

Electrical Testing of Ultrasonic Piezo Actuators

To check on the performance of Ultrasonic Piezo actuators, measurement of power and impedance is required. These are watts, voltage, current, power factor, capacitance C_p & C_s , ac resistance R_s & R_p , Tan delta, dissipation/loss factor, impedance and frequency. Most importantly, the Ultrasonic Piezo actuators cannot be measured using only a conventional watt meter and LCR bridge. LCR bridges will output a maximum of typically 10Vrms. At this low level the Ultrasonic Piezo actuators exhibit different impedance characteristics compared to drive levels of 100-200V. The current consumption is also very small, this means that most power meters are unable to make reliable measurements.

How is the GP102 used for electrical measurement of Ultrasonic Piezo actuators

The GP102 is capable of measuring LCR and power parameters required for characterisation of Ultrasonic Piezo actuators. These measurements include C_p & C_s (parallel and series capacitance), ac resistance R_s & R_p , dissipation/loss factor, impedance, angle, reactance, watts, VA, voltage, current, power factor, and frequency, all measured at the same time. CH1 measures voltage and connects across the Ultrasonic Piezo actuator, CH2

measures current and connects across a shunt, in series with the actuator. Using the Powertek PC software utilities, all the above measurements can be read into a PC, using single shot or timed acquisition. All results are easily imported to Excel. The user can use their own ac power supply or use the Powertek LPA01 / LPA400 (outputs up to 400Vpk, 50mA rms up to 200kHz). Labview drivers allow control of both the GP102 and the LPA400 amplifier using only one RS232 port. The LPA400 provides power for the Ultrasonic Piezo actuators by amplifying the GP102 generator output.

Switch Mode Power Supply (smps) Manufacturers

The GP102 is very suited to design and test applications involving switch mode power supplies (SMPS).

There are 5 key areas of interest in this smps application:-

- Response testing of power supply control loops (control loop gain and phase margins)
- Turns ratio of transformers (even those with high leakage inductance/distributed air gaps)
- Measurement of inductor quality factor (Q) and detection of shorted turns
- LCR measurement of components, Resr plots of with electrolytic capacitors (any size) including tan delta
- Measurement of ac and dc power, VA, power factor, amps peak and harmonic measurement

Detailed application notes are available.

Impedance analysis of wound components

The impedance analysis / LCR meter function of the GP102 allows measurement and testing of inductors, transformers, capacitors and electrolytic capacitors.

Available complex impedance / LCR measurements:

L	Inductance
Li	Leakage inductance
Q	Quality factor (Q is a good method to detect shorted turns)
C	Capacitance
Resr	Equivalent series resistance
Rdc	Dc resistance
D	Dissipation factor or Tan delta

Useful transformer measurement

Turns ratio N1:N2
Winding polarity and phasing
Turns counting (number of turns using TAF02)
No load core loss in iron cores
Power loss testing of ferrites up to 2MHz
Interwinding capacitance
Magnetizing current

All the above parameters can be swept with respect to frequency.

Wide Band ac / dc power meter from mW to MW!

The GP102 can be used with most current probes and current shunts to measure power. Connect the current probe or shunt to channel 2, enter a scaling factor. Comprehensive power measurement can then be made.

Available measurements are

- Watts (true power)
- VA (apparent power)
- PF (power factor)
- Fundamental Frequency
- True rms ac voltage and current
- Crest factors (ratio of peak to rms)
- Dc voltage and current
- Fundamental power
- Fundamental power factor and phase angle ($\cos \theta$)
- Harmonics
- THD

The GP102 has mutually isolated inputs which means it can be connected anywhere in the circuit under test. In particular the GP102 can measure power from dc to 2MHz and is compatible with most high frequency current probe transducers.

A popular application is using the GP102 to measure power loss in ferrite components. Typically ferrite core manufacturers will test the core quality by measuring power loss over the frequency range 100kHz to 2MHz depending on core type.

Testing ISDN, HDSL, ADSL (modem) transformers

The GP102 can make the following tests associated with Telecom Modem transformers:

- Inductance and quality factor Q
- Turns ratio and phasing of windings
- Insertion loss (power loss) *
- Return loss (power reflected) *
- THD ** measurement to -75dB
- Longitudinal balance. (Longitudinal balance is way of stating the common mode rejection) *
- Crosstalk
- Coil turns counting ***

* indicates that the use of a TAF01 + test fixture is advisable

** indicates that an external low distortion source is required

*** indicates that the use of a TAF02 is required

All the above parameters can be plotted against frequency, pass / fail limits can be applied