LT51 LINE TESTER

H HEUER INSTRUMENTS

- Level Meter
- Level Oscillator
- Spectrum Analyser
- Return Loss
- LCL / Balance
- Recorder Function
- NE and FE X-Talk
- Insertion Loss
- Selective Level Meter
- DCV / ACV / Loop Current
- Impedance (1 kHz)
- Distortion Meter

LINE TESTER LT51-PCM

The LT51 Line Tester is a portable handheld battery powered instrument for telecommunication testing. Measurement of common system parameters, such as cross-talk, gain, distortion and Psophometric noise, are achieved by combining the features of several pieces of test equipment such as a Selective Level Meter / Spectrum Analyser, Distortion Analyser, Generator and Handheld DMM, in the one small lightweight package.

It is the ideal instrument for testing the analog FXS & FXO interfaces of digital exchanges and PCM multiplexers. The LT51 is also very well suited to testing the carrier and information signals used in Power Line Communication (PLC) equipment.

The LT51 can be deployed as a stand-alone instrument in single-ending testing configurations to qualify cable pairs, or together with a second remote LT51, can perform more accurate terminated end-to-end testing. In stand-alone configurations (without PC control) testing can be automated with selected test sequences stored in the LT51. Alternatively the LT51 can be remotely controlled by a PC over the isolated USB link.

Great care has been taken to achieve easy operation of this instrument. Most functions are accessed by a single button press, or one further soft-key selection. Measurement results can be displayed graphically or numerically (in DMM mode) and can be simply saved into non-volatile memory for later recall or up-load to a PC for further evaluation and printing.

Firmware upgrades with new features are freely available and can be easily downloaded to the LT51 in the field.

Features and Benefits

- **Selectable Impedances from 50, 75, 600, TN12 Ω and bridging (~50 kΩ).**
- **Transmitter BW of 2 kHz to 2.2 MHz at 50, 75 Ω, 200 Hz to 20 kHz at 600 Ω, 200 Hz to 4 kHz at TN12.**
- **Level Spectrum, Return Loss, Noise (Psophometric), Cross-talk and Balance Measurements to 2.2 MHz.**
- **Spectrum Analyser with Zoom function over fixed spans from 4.5 kHz min.**
- **Selective Level Meter to 2.2 MHz with Selectivity BW's including 25 Hz and 1.75 kHz.**
- **Distortion Analyser from 200 Hz to 2.2 MHz (SNR, THD, SINAD, SFDR).**
- **Fully configurable Generator, -60 to +16 dBm at 50, 75 Ω, +6 dBm at 600, TN12 Ω**
- **Tx Mute, Single Tone, ITU-T G.227 Telephone Noise Cross-Talk signal, or Swept measurements.**
- **DMM functions DC/AC Voltage, DC Current (600 Ω shunt), AC Impedance Magnitude.**
- **Audio monitor (speaker) and Hands-free telephone for voice communication.**
- **Strong compact PC case designed to withstand rough treatment yet lightweight (< 1 kg).**
- **High contrast, sunlight-readable graphics display with a back-light.**
- **Large soft-touch keys with good feedback.**
- **Easy operation – one key press to set measurement then context sensitive soft-keys for configuration.**
- **>8 hours operation with easily replaceable AA NiMH batteries.**
- **Accepts commonly used 4mm banana plug test leads.**
- **Choice of Graphical or Numerical measurement display.**
- **Remote control of LT51 by PC via serial port over Opto-isolated USB link.**
- **Easy Test result storage and recall, up-load to PC for further evaluation.**
- **End-to-End testing utilising pair under test to second remote LT51.**

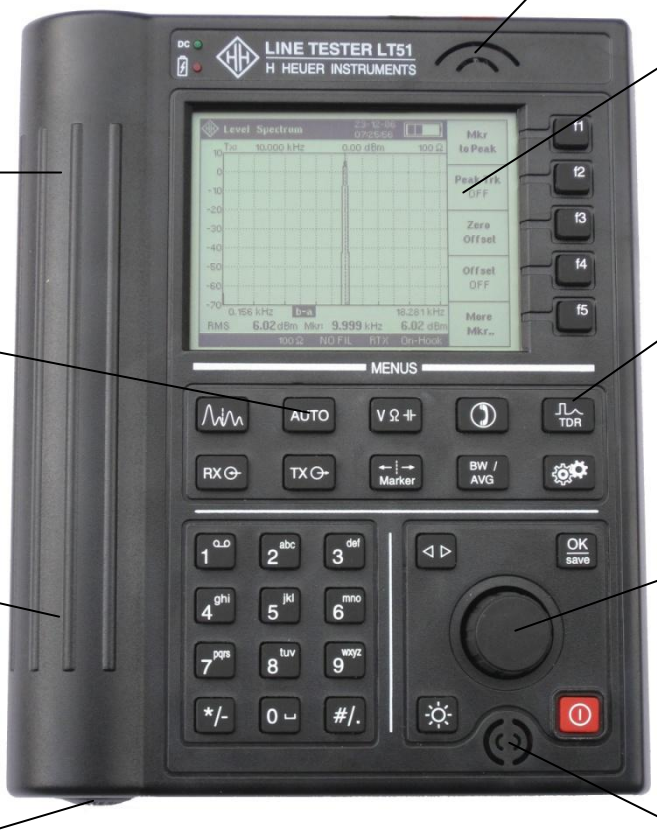
The LT51-PCM at a glance

Common 4mm Safety Connectors for Test lead connections.

USB Connection for Firmware Download, Result Upload

Power or charge from AC/DC Adaptor or Auto Lighter Adaptor

Integrated Speaker for line monitoring and voice communication



Large bright LCD is easy to read and displays all relevant information

Rugged but lightweight (700g) case withstands 1m drop onto concrete

Automated testing and reporting make testing efficient

Large soft touch keys for easy identification and selection of functions

Ergonomic grip for handheld applications

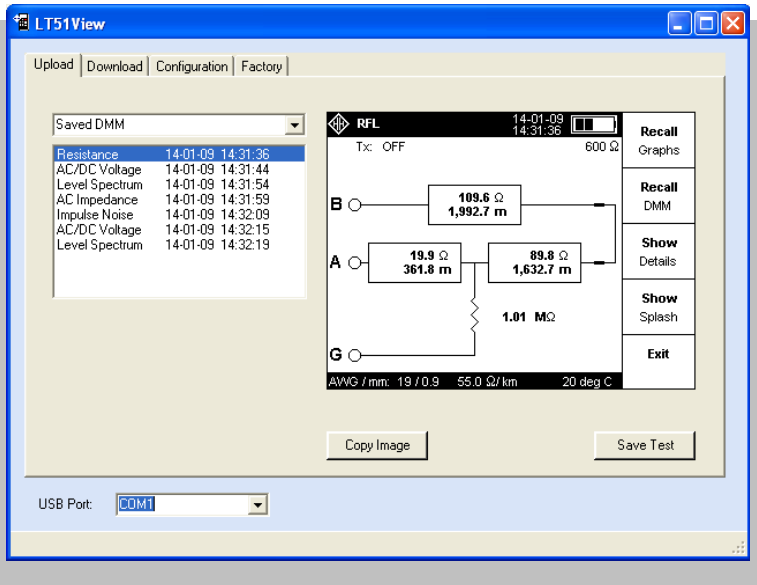
Knob for natural cursor movement, to increase / decrease values

Easy access to widely available AA cells providing > 10 hrs use

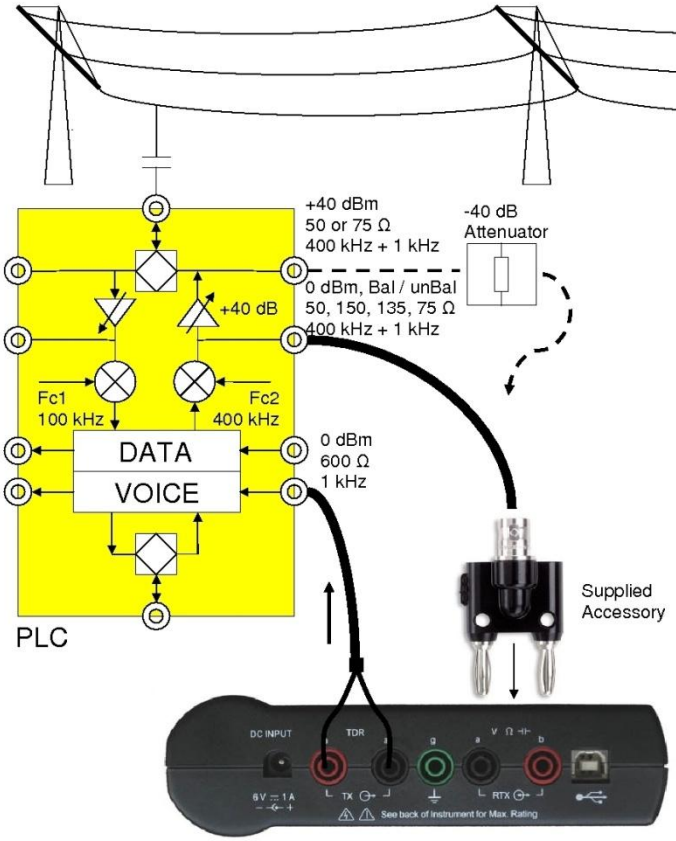
Integrated Microphone for Hands-free voice communciation

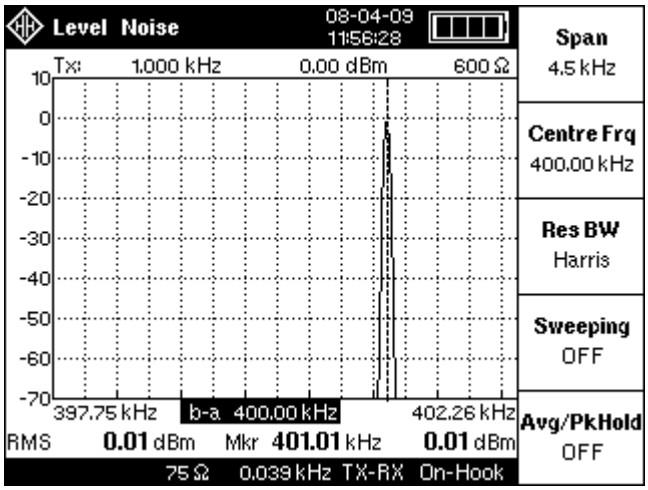
LT51View PC Software

- **Upload stored results**
- **Screen capture feature**
- **Save bitmaps and full results to files**
- **Download Firmware updates to LT51**
- **Remote control of LT51 over USB link for Automated testing using scripts**
- **Free download from the Heuer website**

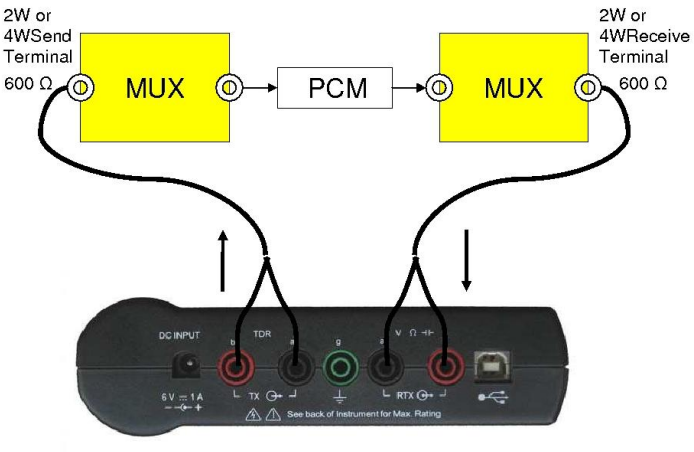


Testing PLC Systems with the LT51-PCM



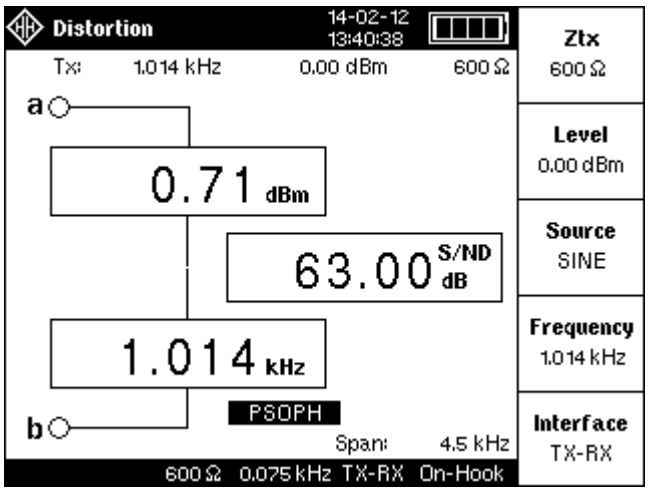


Testing PCM Multiplexers with the LT51-PCM



The following measurements are possible with the LT51:

- **Audio Level Setting**
- **Idle Channel Noise**
- **Frequency Response**
- **Gain Variation with Level**
- **Signal to Quantisation Noise (SINAD Distortion)**
- **Crosstalk w/wo G.227 TEL Noise signal**
- **DC/AC/Ring Voltage**



Standard Accessories

Optional Accessories

OPT51-01

OPT51-02

OPT51-03

OPT51-04

Standard Accessories

The following accessories are included with the purchase of the LT51:

LEADUSBAB	**1.8m USB Cable**
ADPT5V1ADC	**AC/DC adapter 100-250 VAC (specify AC Plug) input, 5 VDC 1 A output**
HBKLT51	**User Manual**
BAGLT51	**Soft Bag for storage of all accessories, transport and operation**
ADPTBNC	**Double Plug to BNC Adaptor**

Optional Accessories

OPT51-01	**Test lead with Double Banana Plug to 2 Alligator Clips**
OPT51-02	**Test lead with 2-Pole Krone to 2 Banana Plugs**
OPT51-03	**Test lead with 4-Pole Krone to 4 Banana Plugs**
OPT51-04	**Red & Black Test leads with Safety Banana Plugs to 5-way Clips**
OPT51-06	**Test lead with Double Banana Plug to 2 MiniGrabber Clips**
OPT51-07	**Test lead with Double Banana Plug to 2 MicroGrabber Clips**
OPT51-08	**Test lead with Double Banana Plug to 2 Stackable Banana Plugs**
OPT51-10	**Test lead with Double Banana Plug to BNC(m).**
AT51-UNBAL40DB	**40 dB Unbalanced Attenuator with BNC(m) and BNC(f) connectors.**

Specifications LT51-PCM (50/75/600/TN12)

Rev 1.3,Jun 2021

Physical

Case	PolyCarbonate (FV-0 rating)
Display	320 x 240 Graphic LCD w LED backlight
Keypad	Silicone Rubber with 31 keys
Rotary Control	21mm knob with integrated push switch
LEDs	Charging, External DC Power
Operating Temperature	+5 °C to 40 °C, 20% to 80% RH
Storage Temperature	-20 °C to 60 °C
Battery Charging Temp	10 °C to 40 °C
Environmental	Use at altitudes <2000m, Pollution Deg2
Dimensions	190 mm x 155 mm x 40 mm (L x W x H)
Weight	700g

Power Supply

Battery Type	3 AA (NiMH, NiCd or Alkaline)
Battery Life	8 hours typical (2100mAh NiMH)
Battery Recharge Time	5 hours in LT51
AC Operation (charging)	Ext. Adaptor: 240Vac to 5 to 6 Vdc (1A)
Auto Power-Off	12 mins after last button press

Interfaces

RTX a-b-g	3 balanced, 4mm sockets (ab 19mm pitch)
Rated Voltage	*RTXa-b:* 60 V, *RTXa* or *RTXb* to *g* : 30 V
TX a-b	2 balanced, 4mm sockets (ab 19mm pitch)
Rated Voltage	*TXa-b:* 60 V, *TXa* or *TXb* to *g:* 30 V
External DC	2.1 mm DC socket
Communication Port	USB Type B Receptacle

Regulatory Compliance

Safety	IEC 61010-1:2010
EMC	IEC 61326-2-1:2005 ClassA

Sine Signal Generator (transmitter)

Frequency	1 Hz to 2.2 MHz (1 Hz resolution)
Accuracy	5 ppm ± 1 Hz
Impedance (balanced)	50, 75, 600, TN12 Ω
Level	0.01 dB resolution

	200 Hz to 20 kHz	up to 2.2 MHz
600 Ω, TN12	-50 dBm to +6 dBm	
50 Ω, 75 Ω	-50 dBm to +16 dBm	-50 dBm to +10 dBm

Attenuator accuracy	As for Level Meter below
Frequency Response	600Ω: 200 Hz to 20 kHz: ± 0.25 dB
(ref: 0dBm/1kHz)	TN12: 200 Hz to 4 kHz: ± 0.25 dB
(ref: 0dBm/10kHz)	50, 75 Ω: 2 kHz to 200 kHz:± 0.25 dB
	50, 75 Ω: 2.2 MHz: ± 0.5 dB
SFDR (0dBm, 75 Ω, typ.)	> 50 dBc

Noise signal (transmitter)

Cross-Talk telephone signal	ITU-T G.227
Frequency Spacing	2.44 Hz
Level / Crest Factor	0 dBm (600 Ω) / 10.5 dB

Level Meter (receiver)

Frequency Range	200 Hz to 2.2 MHz
Accuracy	5 ppm ± 1 Hz
Level Range	<-120 to +30dBm
	(50/75/600/TN12 Ω, Term)
	auto-ranging or manual range setting
BWs (see Selectivity below)	25Hz, 1.74kHz, 3.1kHz, Psoph(ITU 0.41)
Impedance (balanced)	Terminated: 50, 75, 600, TN12 Ω
	Bridged: > 47 kΩ
Attenuator accuracy	+30 dBm to -30 dBm: ± 0.2 dB
(ref: 0dBm/10kHz/600Ω)	-30 dBm to -60 dBm: ± 0.3 dB
	less than -60 dBm: ± 0.5 dB
Frequency Response	600, TN12 Ω: 200 Hz to 20 kHz: ± 0.25 dB
(ref: 0dBm/1kHz)	600, TN12 Ω: 200kHz: ± 0.5 dB
(ref: 0dBm/10kHz)	50, 75 Ω: 2 kHz to 200 kHz: ± 0.25dB
	50, 75 Ω: 2.2 MHz: ± 0.5 dB
Level Display	absolute (dBm), relative(rdB)
Resolution	0.01 dB
Input Return Loss	> 25 dB, 75 Ω, 200 Hz to 2.2 MHz
Noise Floor	< -130 dBm/Hz

Selectivity

BW	Passband	Transition	Stopband
25 Hz	± 5 Hz, <0.5 dB	± 12 Hz, < 3 dB ± 50 Hz, > 30 dB	± 100 Hz, >50 dB ± 500 Hz, >90 dB
1.74 kHz	-	1.85 kHz, < 3 dB	± 2 kHz, >50 dB
3.1 kHz	-	2.7 kHz, < 3 dB	± 2.5 kHz, >80 dB

Spectrum Analyser

Frequency Range	200 Hz – 2.2 MHz
Frequency Spans	4.5, 9, 18 ..,600 kHz, 1.2 MHz, 2.4 MHz
Dynamic Range	> 60 dB (typically better than 70dB)
Max Displayed range	110 dB (80 dB + 30dB offset)
Frequency Resolution	< 0.5% of span

Distortion Analyser (THD, SINAD, SNR, SFDR)

Fundamental Freq range	200 Hz to 2.2 MHz
Harmonic Measm'nt range	2.2 MHz
Distortion Factor	Max: 10dB, Min: 60dB, typically >70dB

Loss, NEXT & FEXT (Cross-Talk) Measurements

Impedance	50, 75, 600, TN12 Ω
Frequency Range	200 Hz to 2.2 MHz
Level range	-90 to +10 dB
Accuracy	± 1 dB
Intrinsic NEXT (75 Ω)	<1 MHz: <-80dB, <2.2 MHz: <-75dB

Return Loss Measurement

Reference Impedance	50, 75, 600, TN12 Ω
Frequency Range	600, TN12 Ω: 200 Hz to 200 kHz
	50, 75 Ω: 200 Hz to 2.2 MHz
Tx level	-10 dBm
Range	0 to 40 dB
Accuracy	± 0.5 dB ± 5 % of reading for ref. Z
Intrinsic Return Loss (75 Ω)	< 200 kHz: > 50 dB, < 2.2 MHz: > 40 dB

TDR

Impedance (balanced)	50, 75 Ω
Pulse Velocity Factor (PVF)	0.01 to 0.99
Range (PVF = 0.70)	5,800 m ± 1 % + PVF uncertainty
Resolution (PVF=0.70)	0.8m (lowest range)
Pulse Amplitude	4 Vpp into 75 Ω
Pulse Width	50 ns, 200 ns, 500 ns, 1 μs, 2.5 μs, 5 μs

Voltage*

DC	160 V ± 1 % + 0.5V
AC	100 Vrms ± 2% (<100 Hz), True RMS

Impedance Magnitude

200 Hz to 20 kHz (600 Ω ref)	200 Ω to 1.6 kΩ ± 5% ± 5Ω
20 kHz to 500 kHz (75 Ω ref)	10 Ω to 400 Ω ± 5% ± 5Ω
20 kHz to 500 kHz (75 Ω ref)	< 1000 Ω ± 10% ± 5Ω

Signalling / Voice Communication

Dial Method	DTMF
Redial	Up to last 16 digits
Talk/Listen	built-in Microphone / Speaker
Loop Current (600Ω Shunt)	0 to 50 mA ± 1 % + 0.5 mA
*Ring Detector Range/Meas**	40 to 100 Vrms, 15 –70 Hz

*Maximum values capped by protection to Rated Voltage at inputs.

Data subject to alterations without notice

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