aTen

SISTEMI ELETTRONICI

Research, Development and Production

of

Telecommunications Measuring Instruments

Presents

ACT6000
Advanced Communication Tester

é .what is it?

- ŏ Level Generator
- ŏ Selective Level Meter
- ŏ Spectrum & Network Analyzer
- ŏ TDR Faults Locator
- ŏ Digital Multimeter
- ŏ White Noise Generator

é .what is it useful for ?

Tests and Analysis on lines or any other communication way

- ŏ Attenuation & Frequency response
- ŏ Noise, Level, Distortion & Cross-talk
- ŏ Return-loss & Longitudinal Balance
- ŏ Faults location & Micro-Interruptions
- ŏ Noise immunity & Data-rate estimation

General Applications

Air Traffic - Voice and data comms.

Highway data communications

Railway data communications

Electric Energy ï Data & Speech Transport (PLC)

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Advanced Communication Tester

Base Circuits & Measurements

- Insertion-Loss
- Filter Frequency Response
- Microinterruptions

Level Generator

- Noise
- Power Spectrum Density
- Impulsive Noise

Active Bridge

- Return-Loss
- Long. Balance-Loss
- TDR Fault Location

Selective Level Meter

Spectrum Analyzer

Digital Multimeter

- AC/DC Voltage
- AC/DC Capacitance
- Loop Resistance
- Res. Insulation

Resistive Bridge

Resistive Faults Location

Application notes for PLC Carriers Qualification

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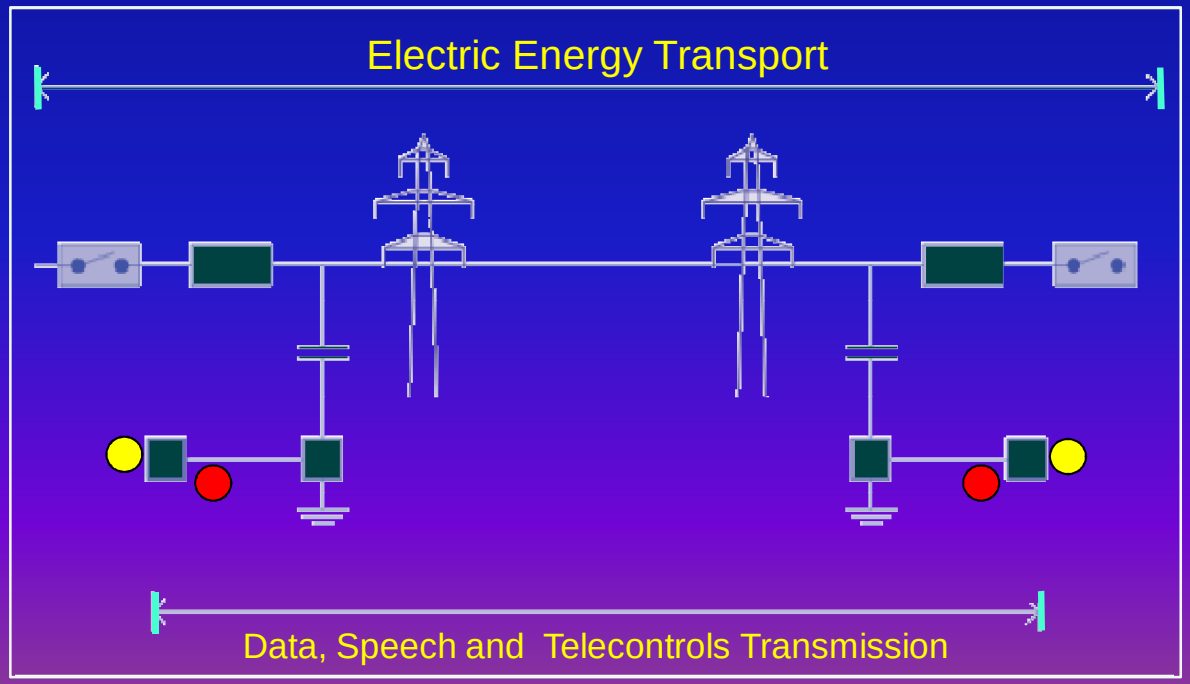
ACT6000 - PLC

PLC Applications:

- Carrier and RF channels qualification / setting
- RF Filters Analysis and Setting
- Spectral Analysis AF: 200 ï 3400 Hz / RF: 20 - 6000 kHz
- AF Channels qualification / troubleshooting



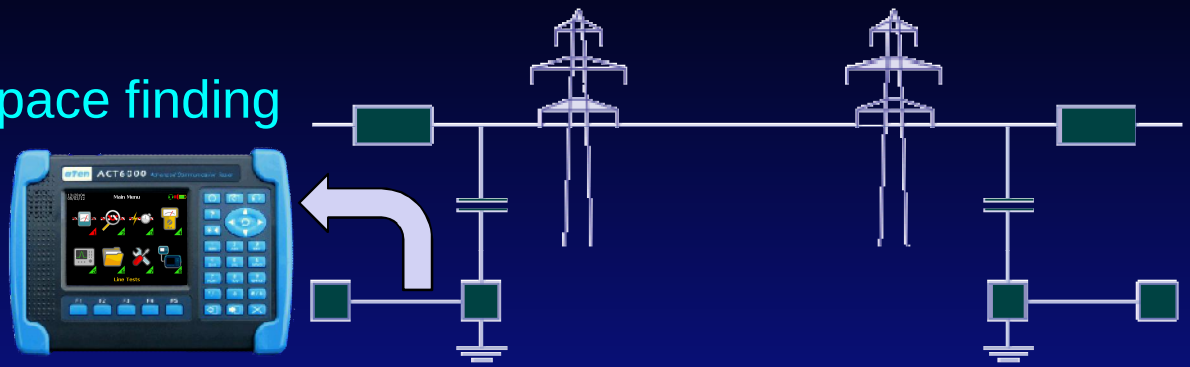
Measurements

-RF Band viewing / space finding
-RF Channel Noise level
-RF Channel Insertion-Loss
-RF Channel Filtering

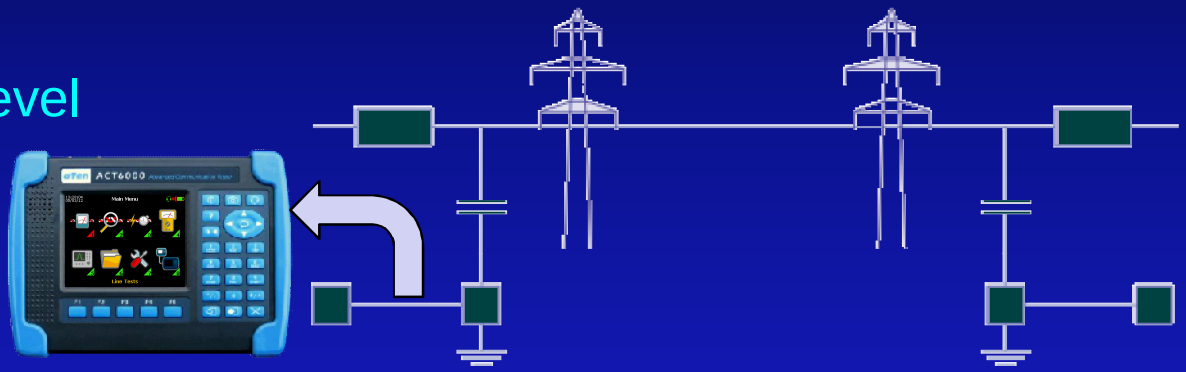
-AF Channel Analisys: Noise, Balancement, Return-Loss, Insertion-Loss
-AF Channel Microinterruptions
-AF Channel Impulsive Noise

Instrument Use and Modality for RF Tests

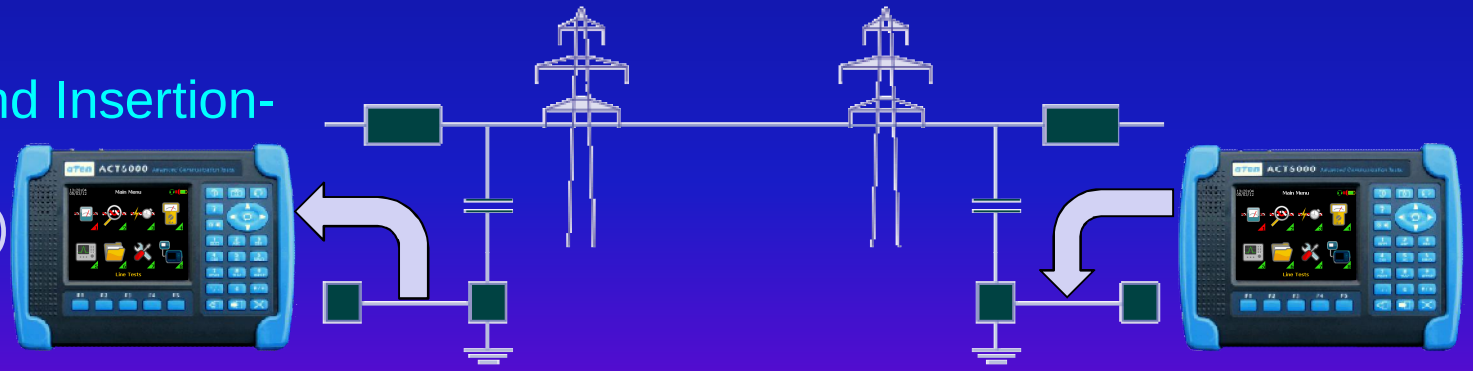
RF Band viewing / space finding
(single instrument)



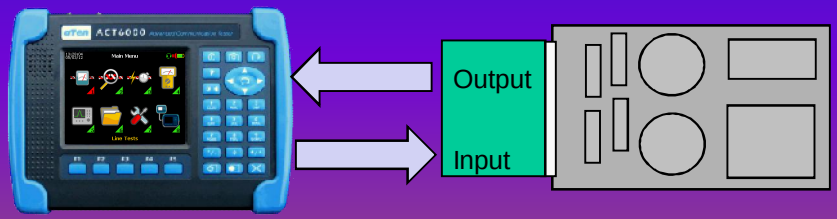
RF Channel Noise level
(single instrument)



RF Channel / W Band Insertion-Loss
(double instruments)



-RF Channel Filtering
(single instrument)



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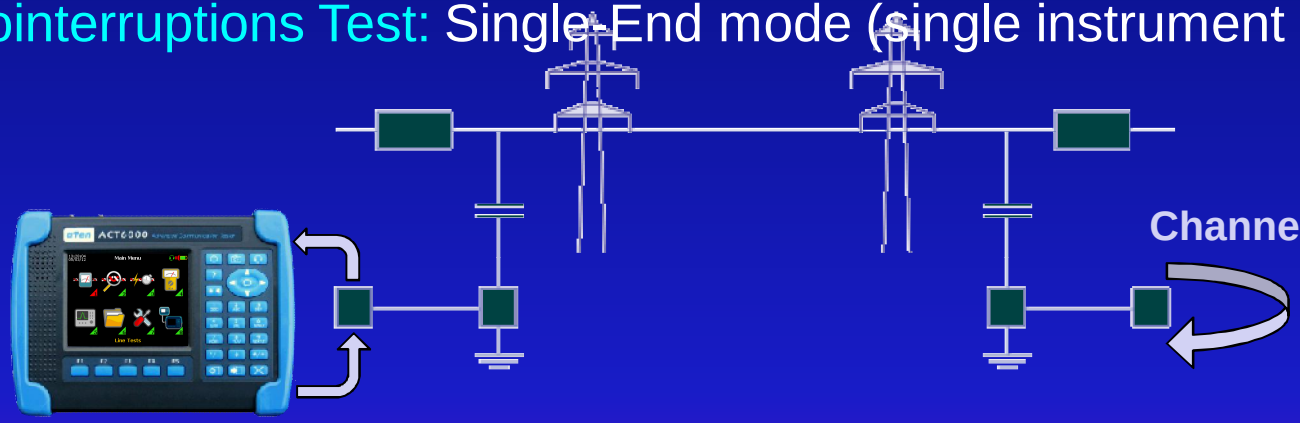
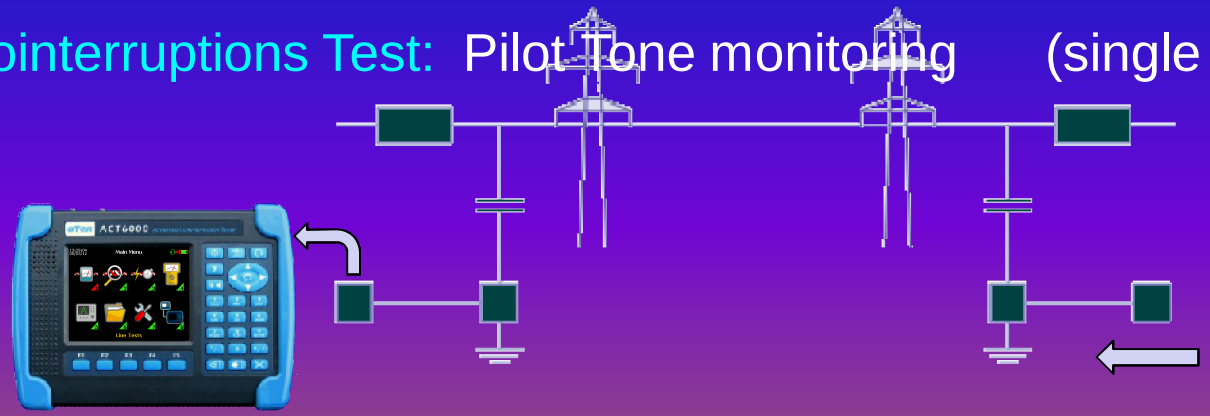
Instrument Use and Modality for AF Tests

- AF Channel Analisys in End-to-End (Automatic Master / Slave) mode:
  Noise, Balancement, Return-Loss, Insertion-Loss on Audio Band
- AF Microinterruptions Test: End-to-End mode (couple of instruments)

- AF Microinterruptions Test: Single-End mode (single instrument + loopback)



- AF Microinterruptions Test: Pilot Tone monitoring (single instrument)



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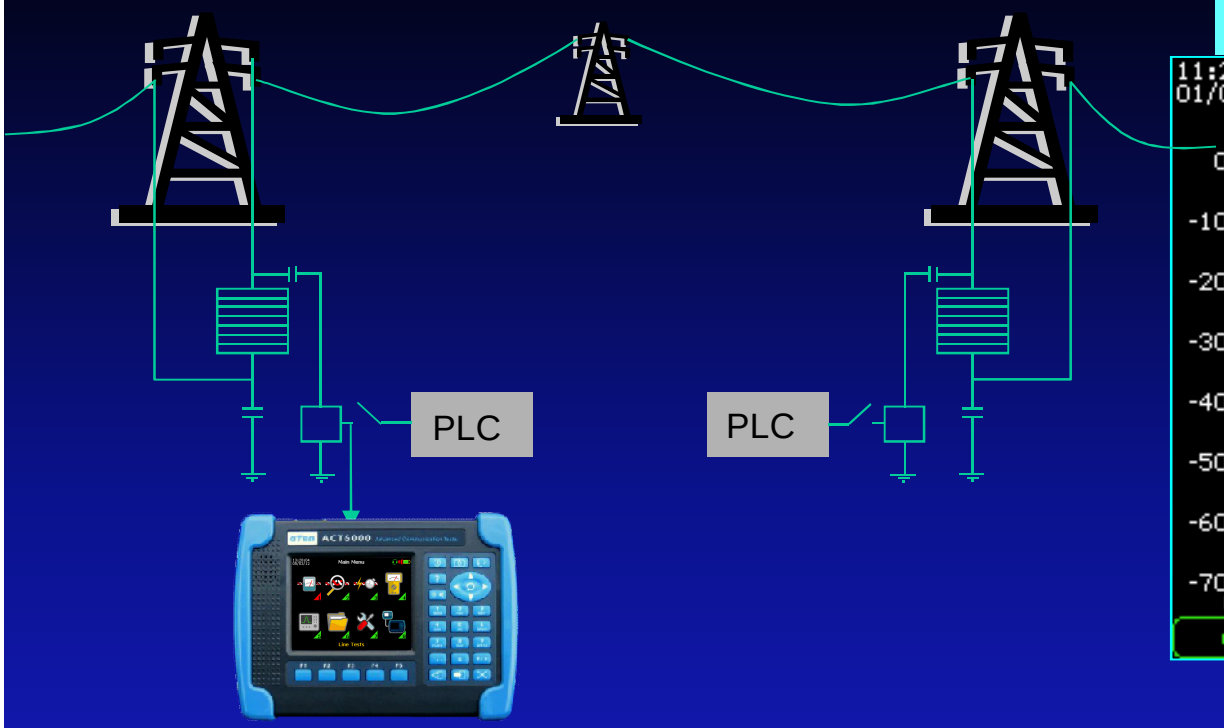
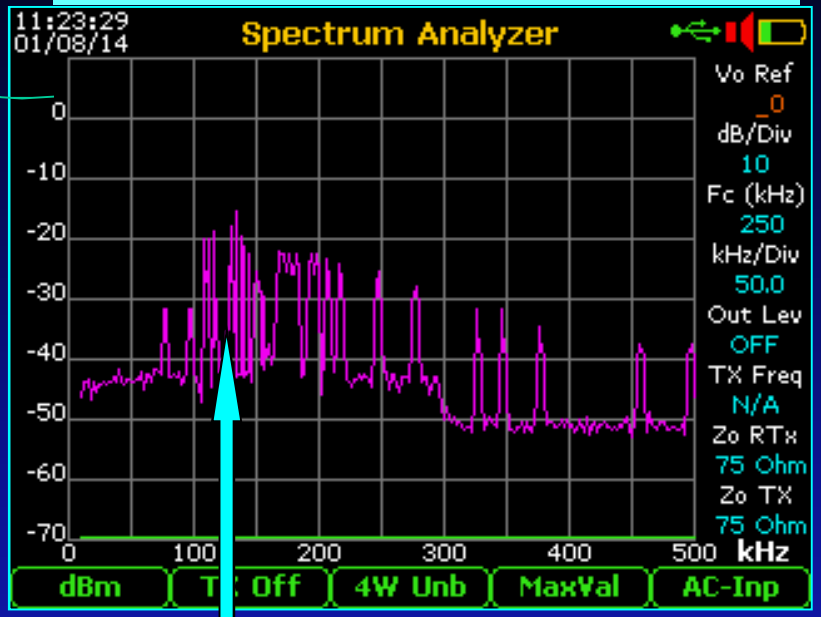
RF Band ï Spectral Viewing / Channel space finding

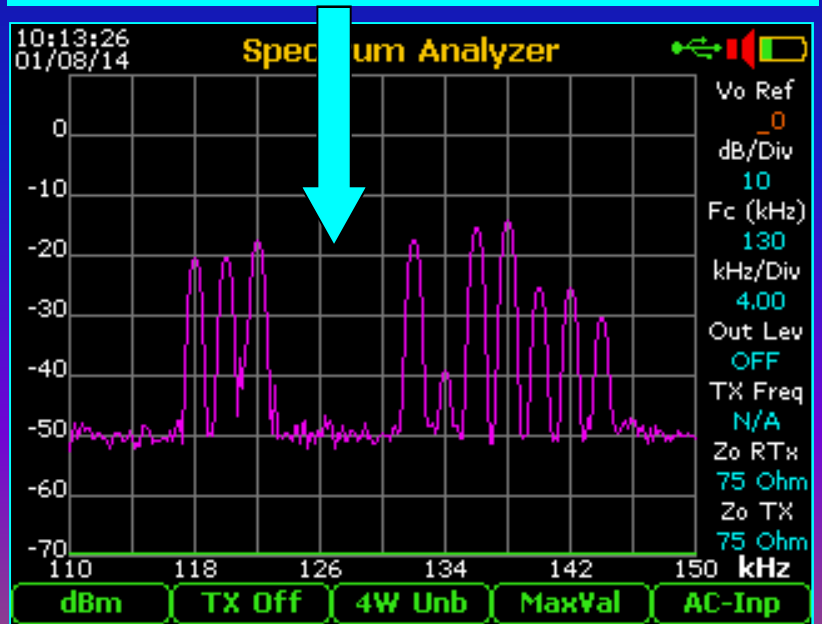


ACT6000
Spectrum Analyzer

Wide band analysis 0 ï 500 kHz



Narrow band analysis 110-150 kHz



Spectrum Analyzer Specifications

Frequency range	: from 200 Hz to 6 MHz (two band)
Input impedances balanced	: base band: 150, 200, 600 Ω and >10 k Ω; middle band: 100, 110, 120, 135, 150 Ω and >10 kΩ;
Input impedances unbalanced	: 50 and 75 Ω by Banana/BNC optional adapter.
- **Base band**	: 200 25000 Hz, by FFT analyzer (Kaiser window).
Span	: 6250 (+ zoom), 12500 and 25000 Hz.
Resolution horizontal.	: 250 pixel / 10 div. : 625, 1.250, 2.500 Hz / div.
Resolution vertical	: 192 pixel / 8 div.: 1, 2, 3 ÷ 20 dB / divi.
Resolution (BW)	: 50, 100, 200 .. Hz (other resolutions interpolated).
- **Middle band**	: 1 kHz to 6 MHz, by Digital SSB quad. conversion.
Span	: 30 ranges: from 10 to 8000 kHz, 10 per decade.
Resolution horizontal	: 250 pixel / 10 div: 1, 2, 4, 8, 16.. ÷ 800 kHz / divi.
Resolution vertical	: 92 pixel / 8 div.: 1 ÷ 20 dB / division.
Resolution (BW)	: 0.2, 0.5, 1, 2, 5, 8 kHz (other resolutions interpol.)
Noise floor	: Ò140 dBm/Hz.
Input range	: from noise floor ÷ +12 dBm @ 100 Ý .

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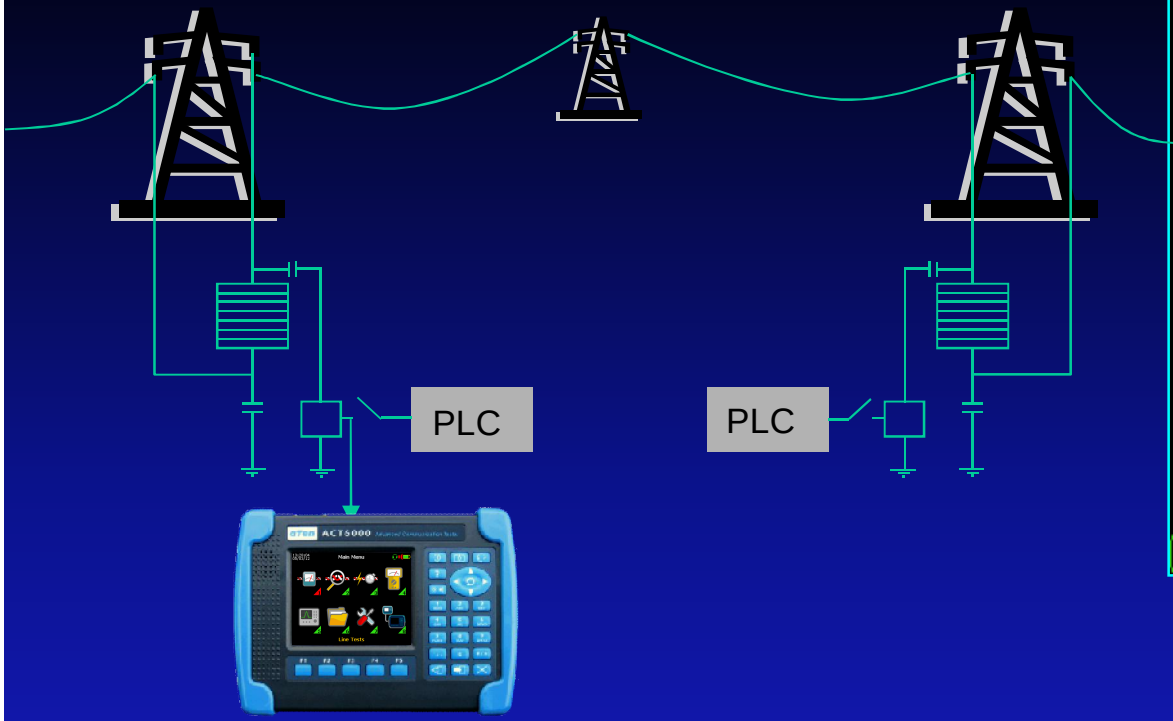
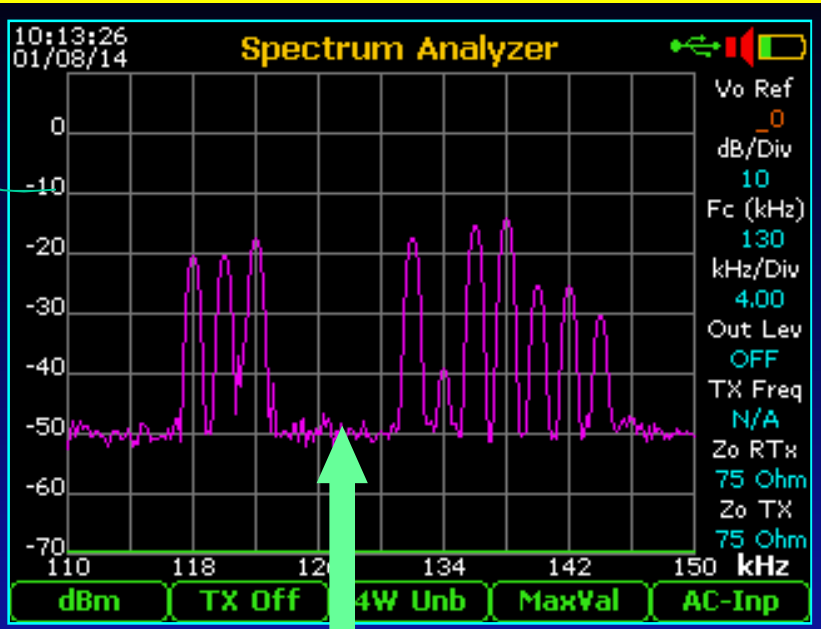
RF Band ï Spectral Noise measurement & S/N Ratio

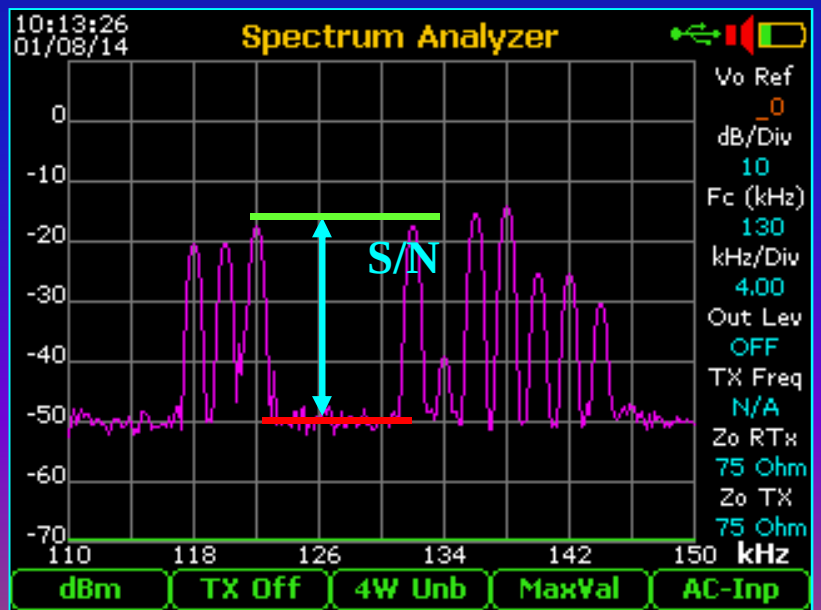


ACT6000
Spectrum Analyzer



Noise Level ≅ -50 dBm

S/N Ratio ≅ 33 dB



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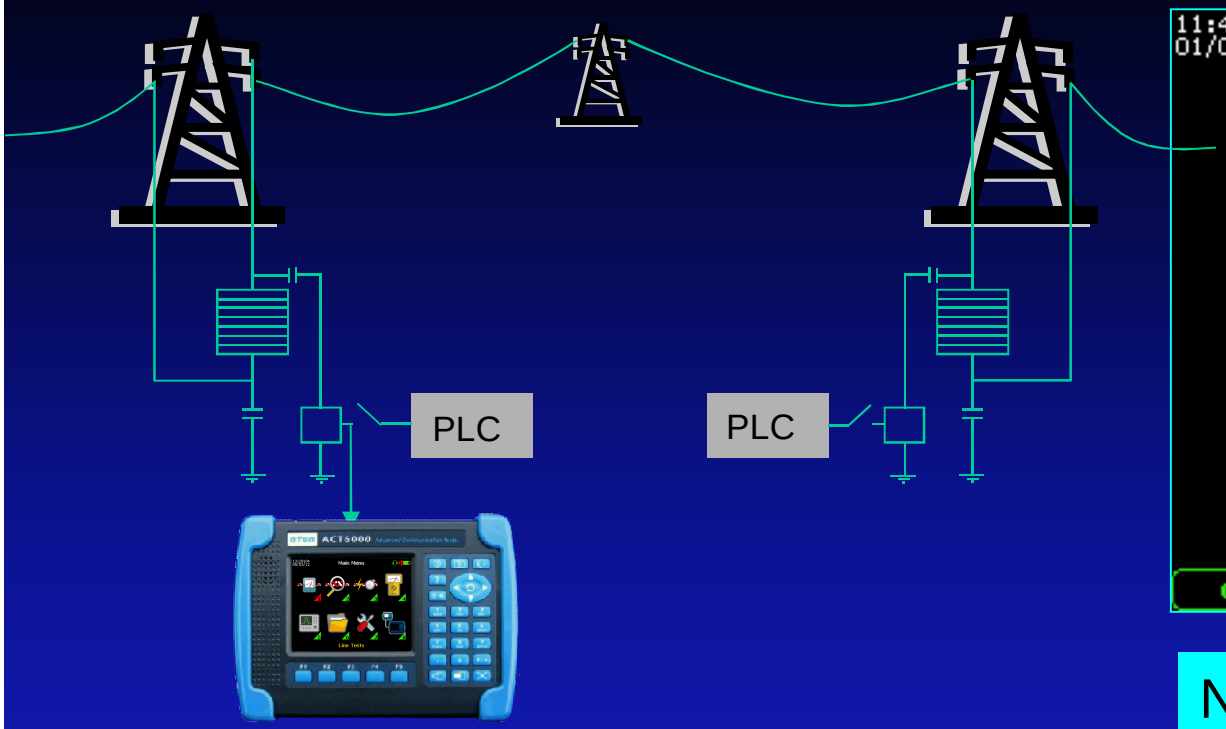
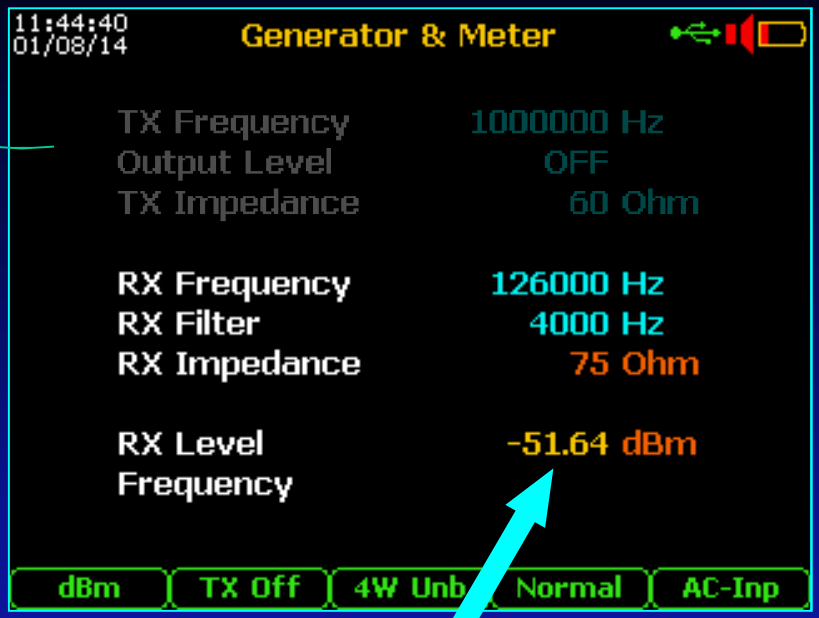
RF Band ï Channel Noise measurement





Noise @ 126 kHz / 4kHz band

ACT6000
Selective Level Meter

Selective Level Meter Specifications

Frequency rangeé é é é é é ...: from 20 Hz to 6 MHz (two bands);
Manual tuningé é é é é é .é .. : 1 Hz up to 5.999999 MHz;
Resolutioné é é é é é é é é .. 1 Hz.
Level measurement modeé é : dBm, dBV, dBu,Volt and relative (dBr).
Input rangeé é é é é é é ...é . : -120 +12 dBm @ 100 /
Resolutioné é é é é é é é é ..: 0.1 dB.
Level meter accuracyé é é .é . : ±0.2 dB from 400 Hz to 20 kHz @ 600 Ω;
±0.2 dB up to 2 MHz, ±0.3 dB up to 6 MHz;
Noise floor (TX OFF)é é é é ... : -140 dBm/Hz.
Input impedances balancedé é : base band: 150, 200, 600 Ω and >10 kΩ;
middle band: 100, 110, 120, 135, 150 Ω
and >10 kΩ;
Input impedances unbalancedé : 50 and 75 by Banana/BNC adapter.

Noise filters

Base band: Psophometric; C-Message;
0.3 ÷ 3.4 kHz, 0.02 ÷ 3.4 kHz, 0.3 ÷ 6.0 kHz,
0.02 ÷ 6.0 kHz, 0.3÷15.0 kHz, 0.02÷15.0 kHz,
0.3÷20.0 kHz, 20 ÷ 20.0 kHz, 20.0 kHz flat.

Selective filters / notch

Base band: (200 Hz ÷ 20 kHz) pass band and notch
for S/N+D (dB and %) test;
Selectivity: - 10 Hz @ fo <200 Hz;
- 5% fo @ >200Hz fo <4 kHz;
- 200 Hz @ fo >4 kHz.
- Telegraphic channel: 120, 240, 360, 480 Hz.

Middle band (20 kHz ÷ 6 MHz)
Selectivity : 25, 100, 200, 400 Hz and 1.74, 3.1, 4.0, 8.0, 16.0 kHz.

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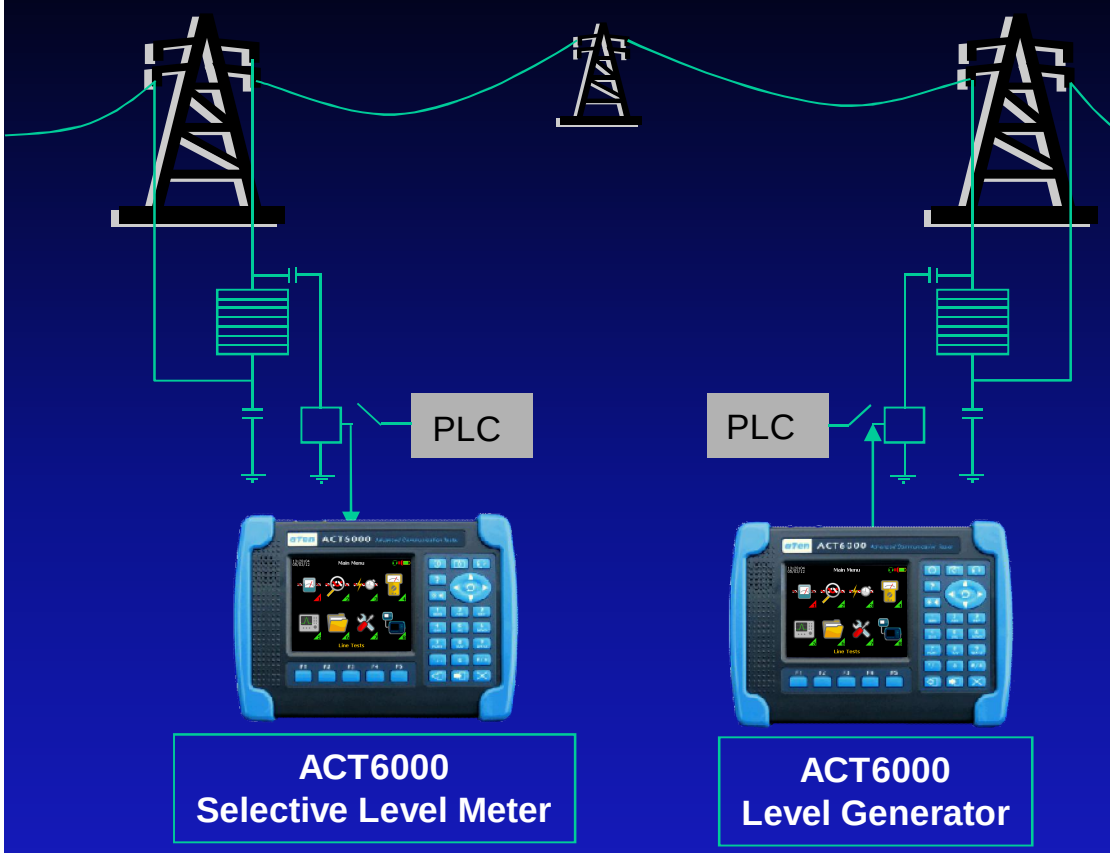
RF Band ï Channel Insertion-Loss



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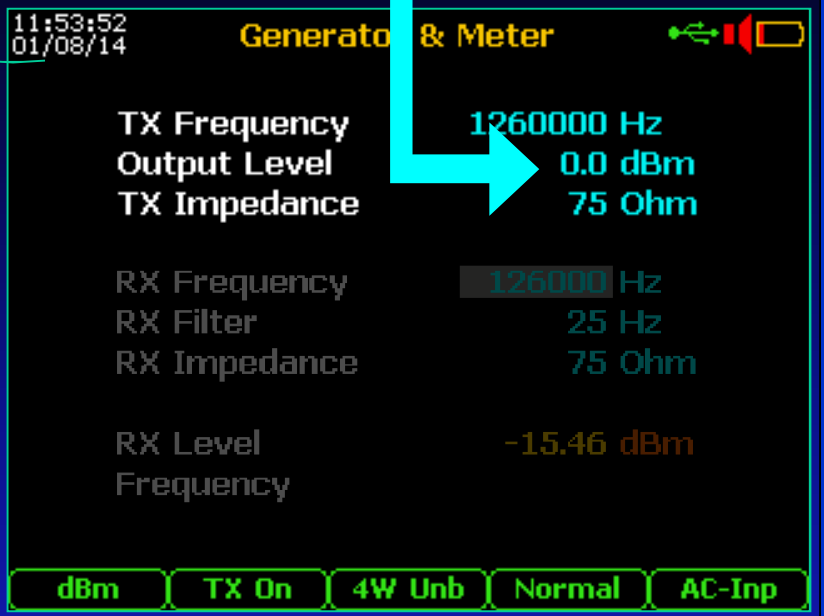
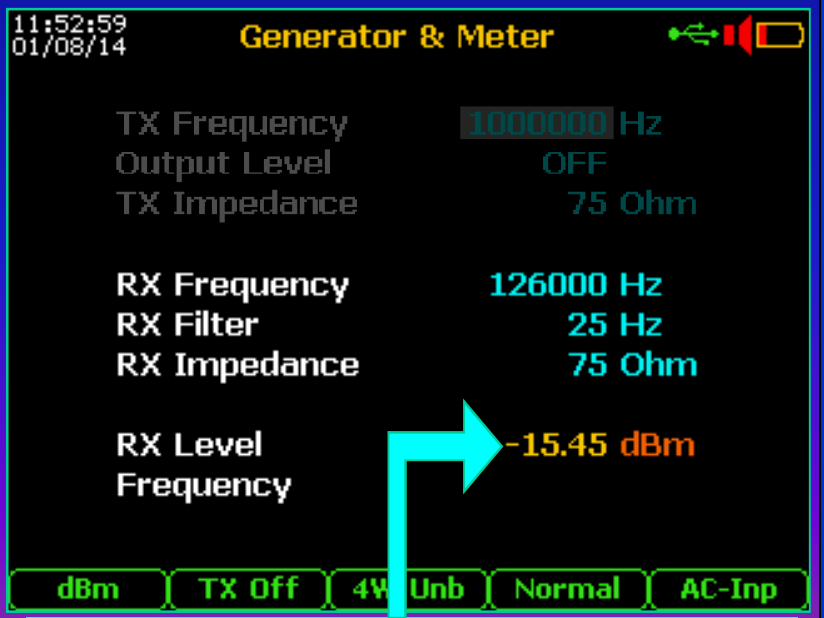
Selective Level Meter

ACT6000
Level Generator

Level sent @ 126 kHz





Level received / 25 Hz band

Level Generator Specifications

Sine output frequency range : base band: from 20 Hz to 20 kHz;
middle band: from 20 kHz to 6 MHz;
Frequency Resolution : 1 Hz up to 5.999999 MHz;
Frequency setup modeé é é ... : manual on single frequency and
step mode on programmable band / steps.
Output levelé é é é é é é é é : -60 ÷ +20 dBm @ 150 Ω / 0.1 dB steps.
Output level accuracyé é é é .. : ±0.2 dB from 400 Hz to 20 kHz @ 600 Ω;
±0.2 dB up to 2 MHz, ±0.3 dB up to 6 MHz; @ 100 Ω
Balanced output impedancesé ..: base band: 150, 200 and 600 Ω
middle band: 100, 110, 120, 135, 150 and 1350 Ω.
Unbalanced output impedances : 50 and 75 Ω by Banana/BNC optional adapter.

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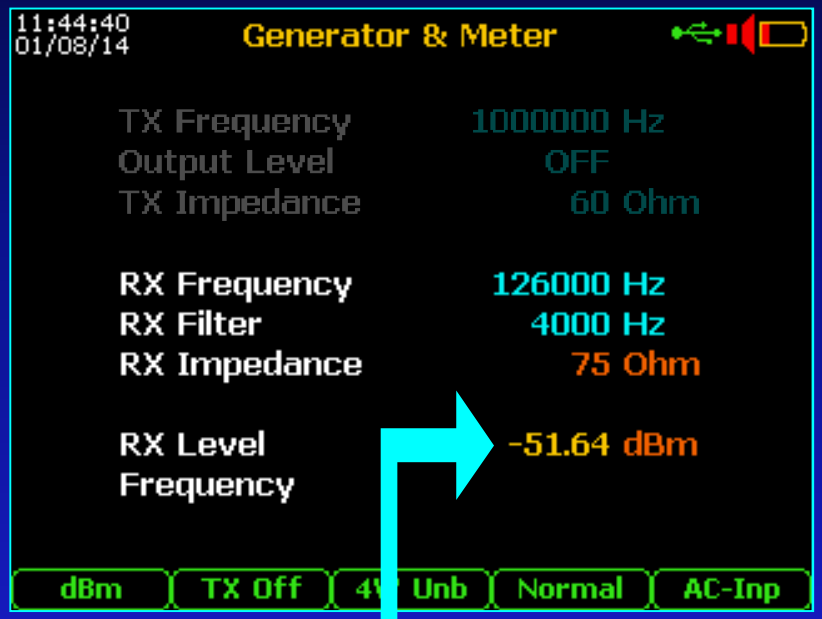
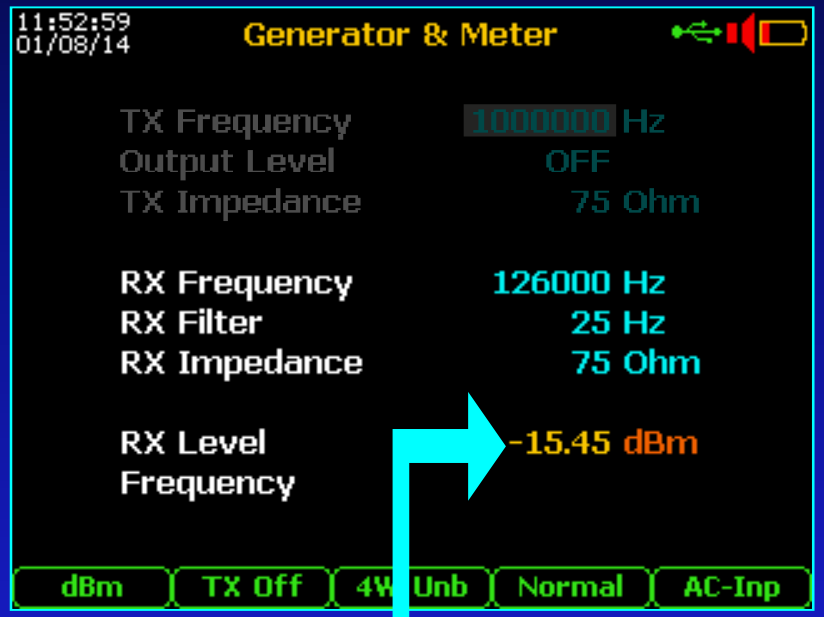
RF Band ï Channel Signal to Noise Ratio



Noise @ 126 kHz / 4kHz band



Signal level / 25 Hz band

S/N Ratio: (51.6 dBm ï 15.4 dB) ≅ 36.2 dB

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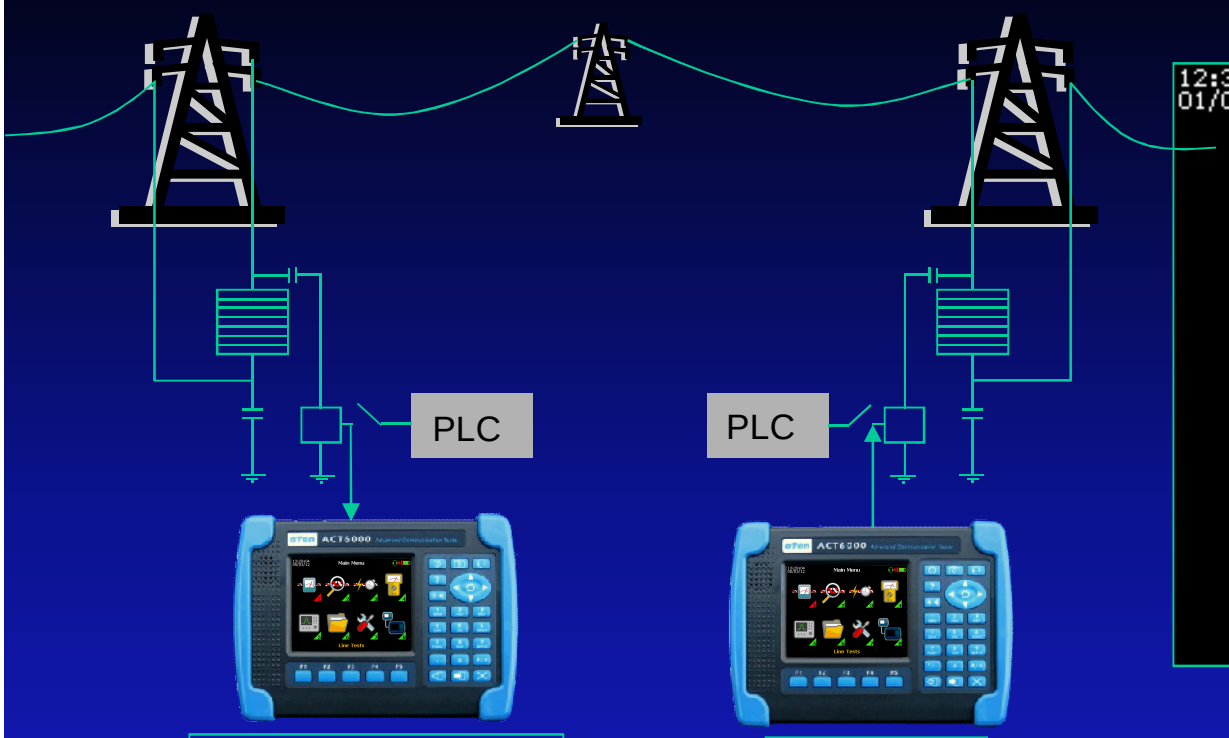
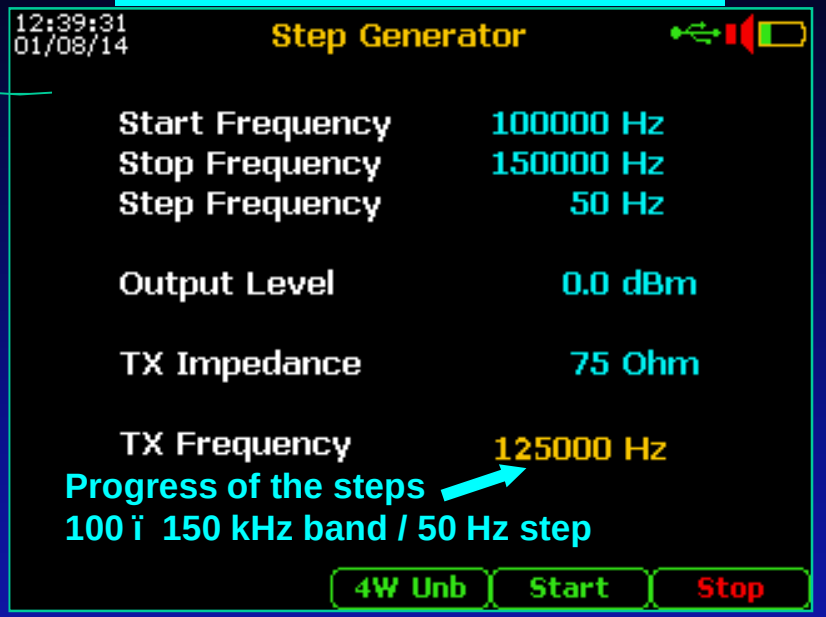
RF Band ï Wide Band Insertion-Loss



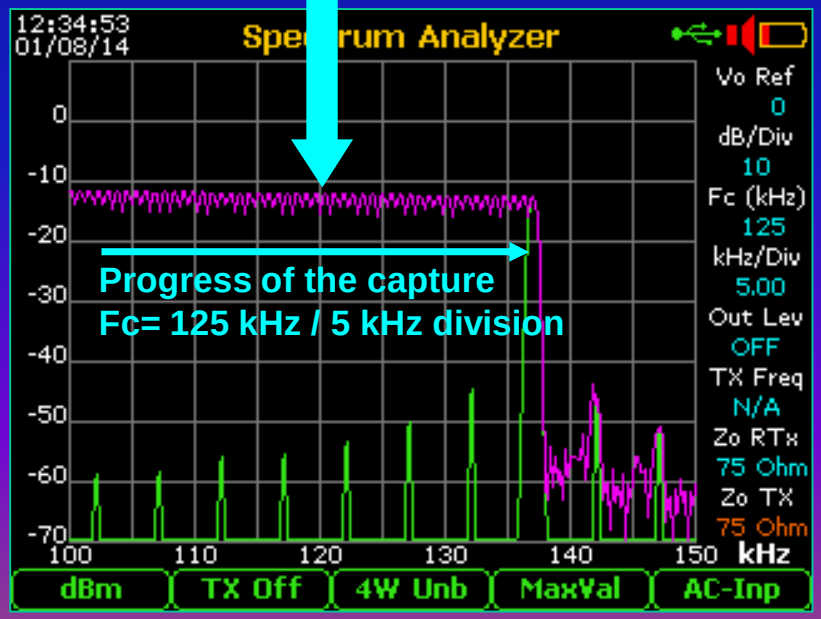
ACT6000 Spectrum Analyzer (Max value capture)

ACT6000 Step Level Generator

Step Level Generator



Step Level capturing



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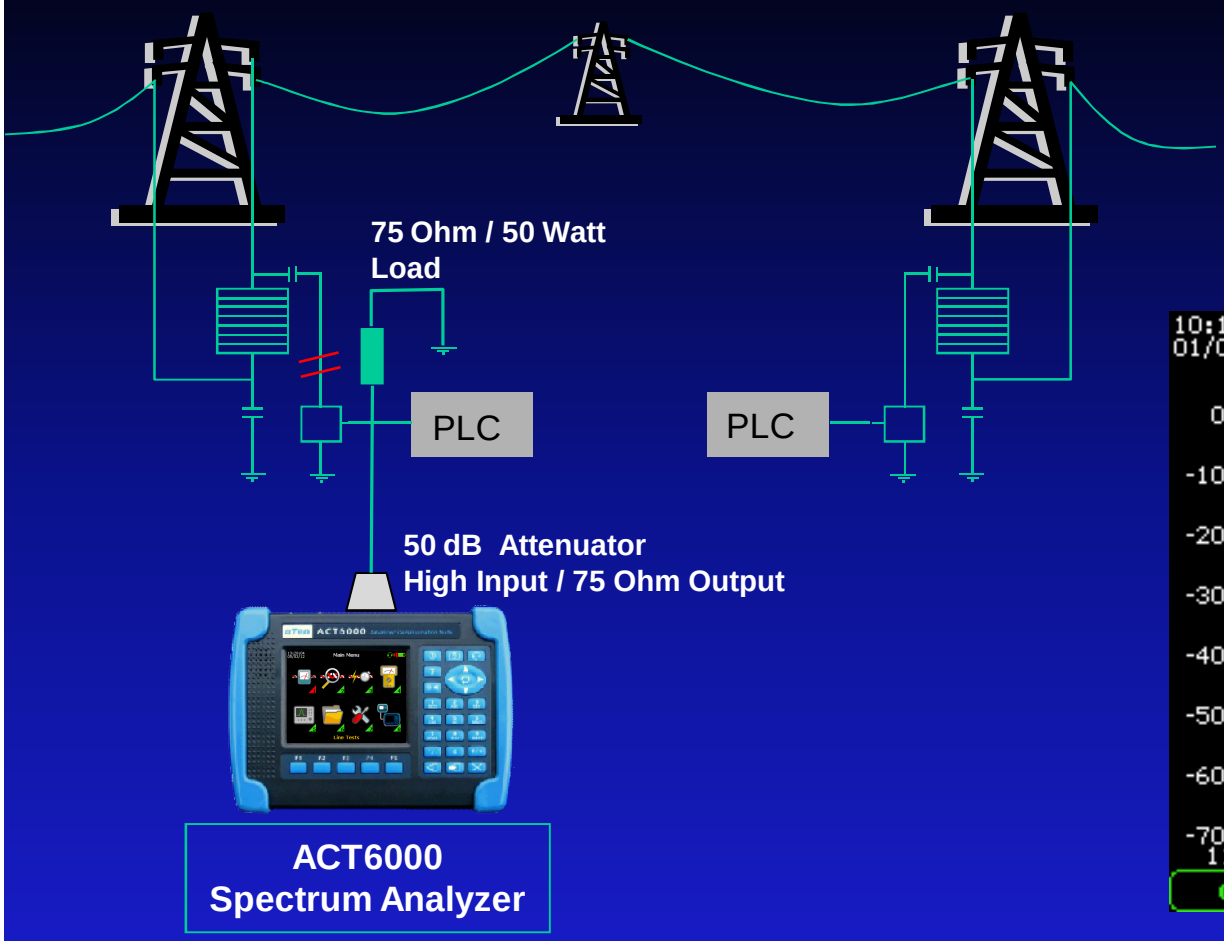
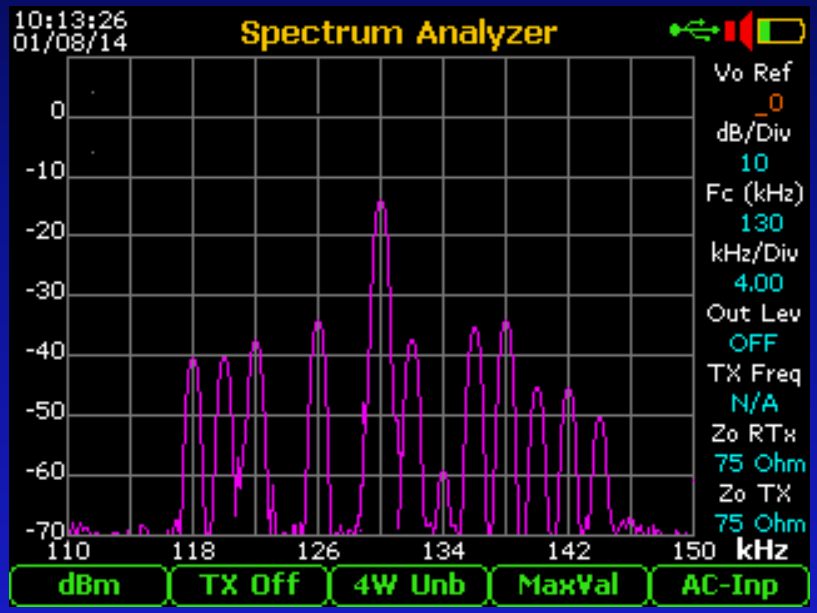
RF Band ï Power Spectral Analysis





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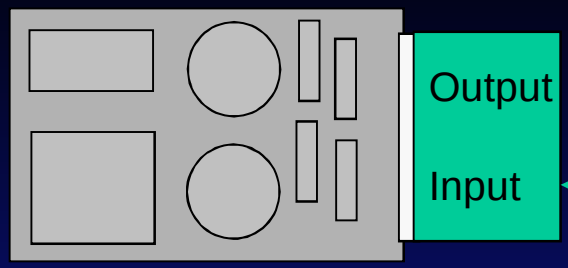
RF Band ï Channeling Filter Tuning



Channelling Selective Filter

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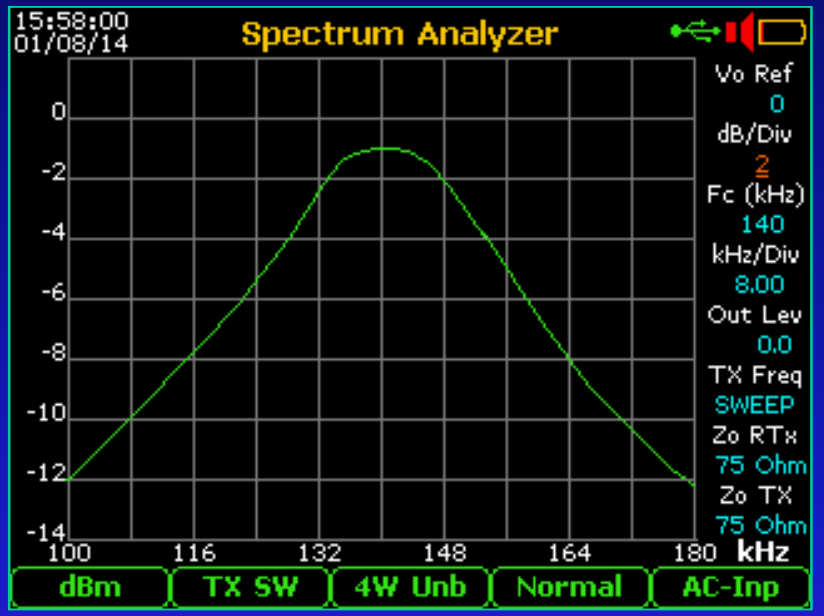
Network Analyzer



Network Analyzer Specifications

Frequency range	: from 200 Hz to 6 MHz (two band)
Input impedances balanced	: base band: 150, 200, 600 Ω and >10 k Ω; middle band: 100, 110, 120, 135, 150 Ω and >10 kΩ;
Input impedances unbalanced	: 50 and 75 Ω by Banana/BNC optional adapter.
- **Base band**	: 200 - 25000 Hz, by FFT analyzer (Kaiser window).
Span	: 6250 (+ zoom), 12500 and 25000 Hz.
Resolution horizontal.	: 250 pixel / 10 div. : 625, 1.250, 2.500 Hz / div.
Resolution vertical	: 192 pixel / 8 div.: 1, 2, 3 ÷ 20 dB / divi.
Resolution (BW)	: 50, 100, 200 .. Hz (other resolutions interpolated).
- **Middle band**	: 1 kHz to 6 MHz, by Digital SSB quad. conversion.
Span	: 30 ranges: from 10 to 8000 kHz, 10 per decade.
Resolution horizontal	: 250 pixel / 10 div: 1, 2, 4, 8, 16.. ÷ 800 kHz / divi.
Resolution vertical	: 92 pixel / 8 div.: 1 ÷ 20 dB / division.
Resolution (BW)	: 0.2, 0.5, 1, 2, 5, 8 kHz (other resolutions interpol.)
Noise floor	: Ò140 dBm/Hz.
Input range	: from noise floor ÷ +12 dBm @ 100 Ý.
Network Analyzer	: by tracking generator sweep or single frequency in 2/4 wires mode

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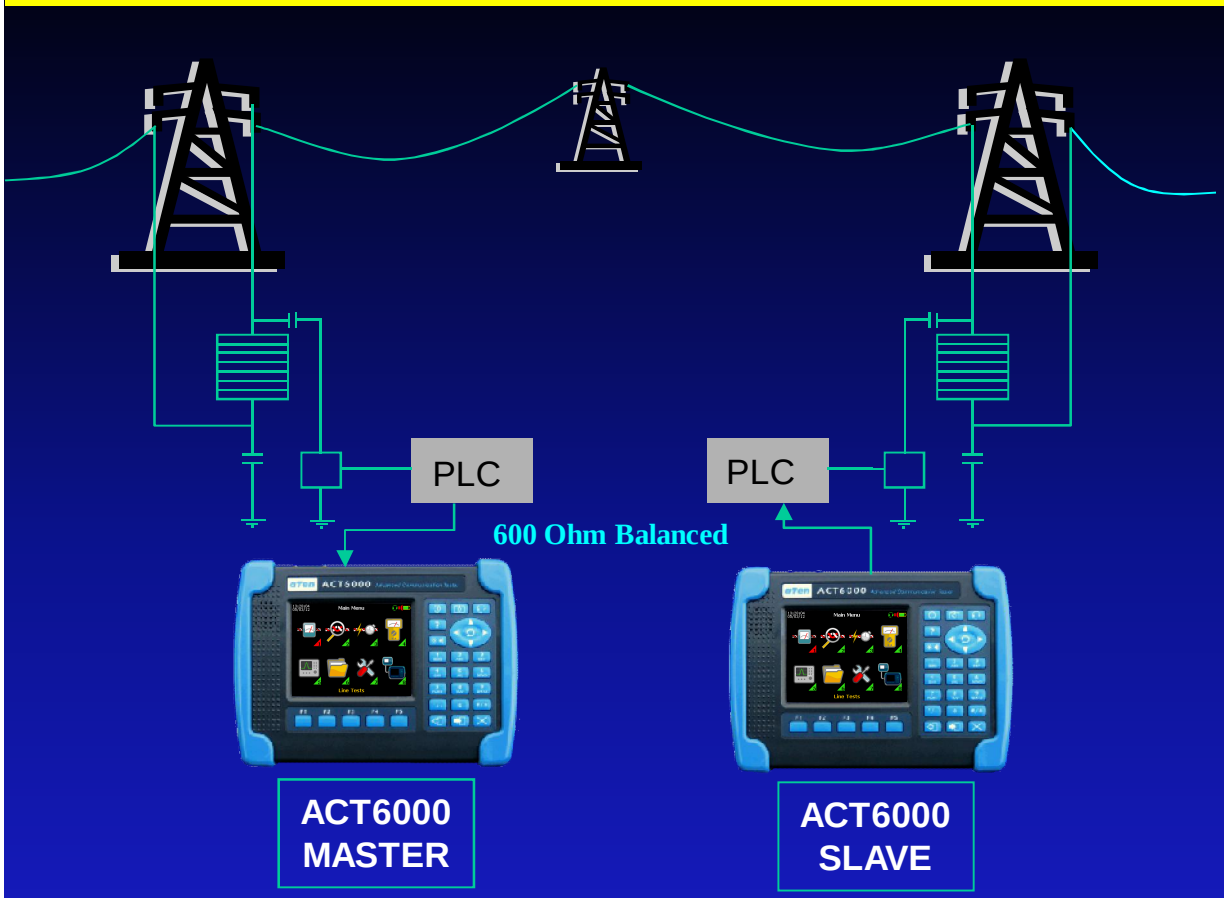
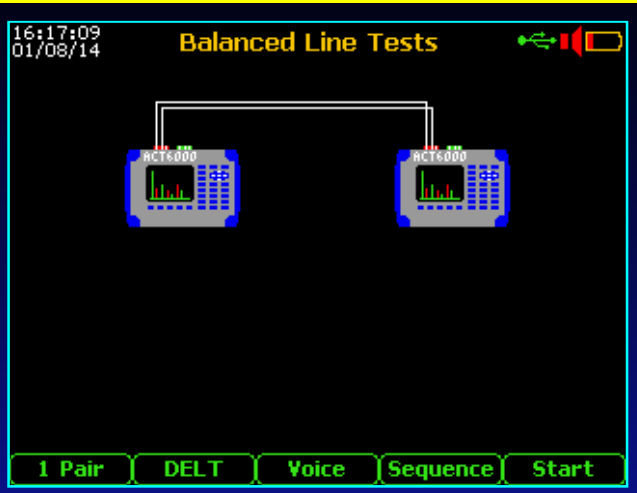
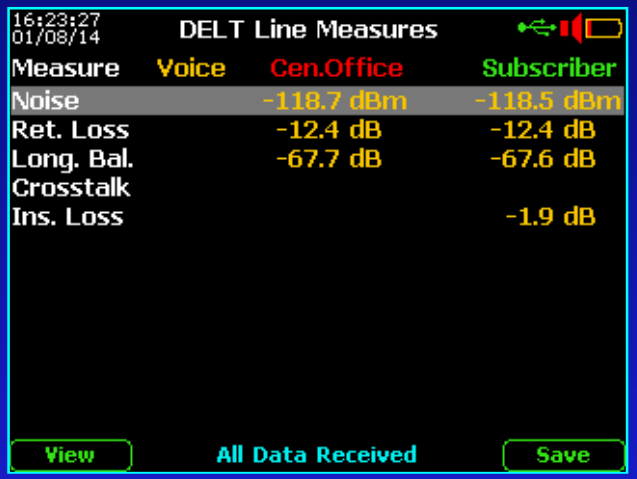
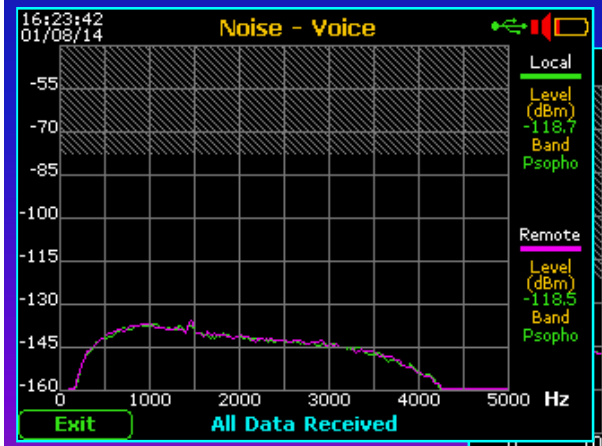
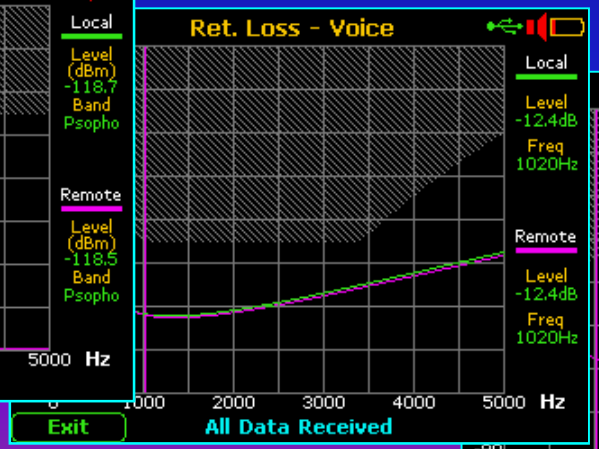
AF Channel - Analisys in End-to-End Automatic Master / Slave mode

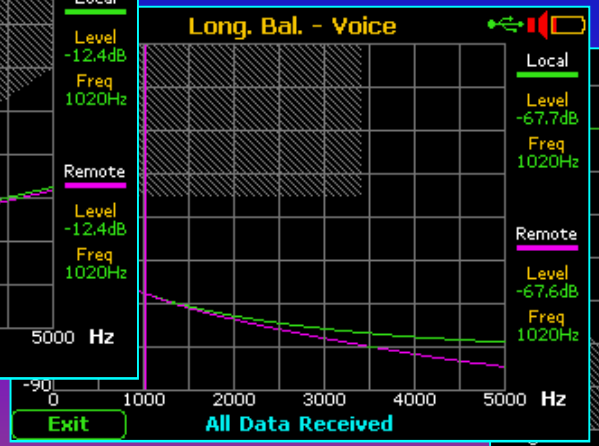


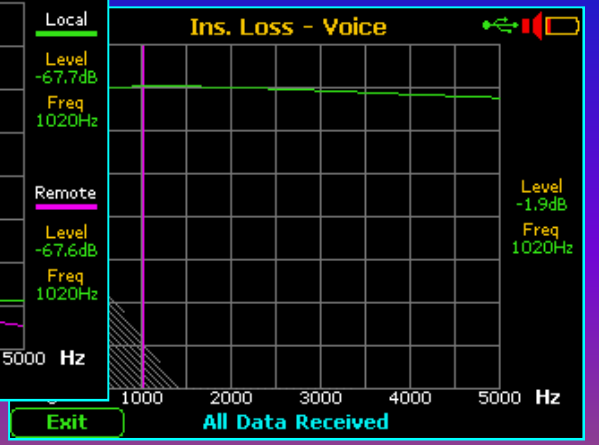












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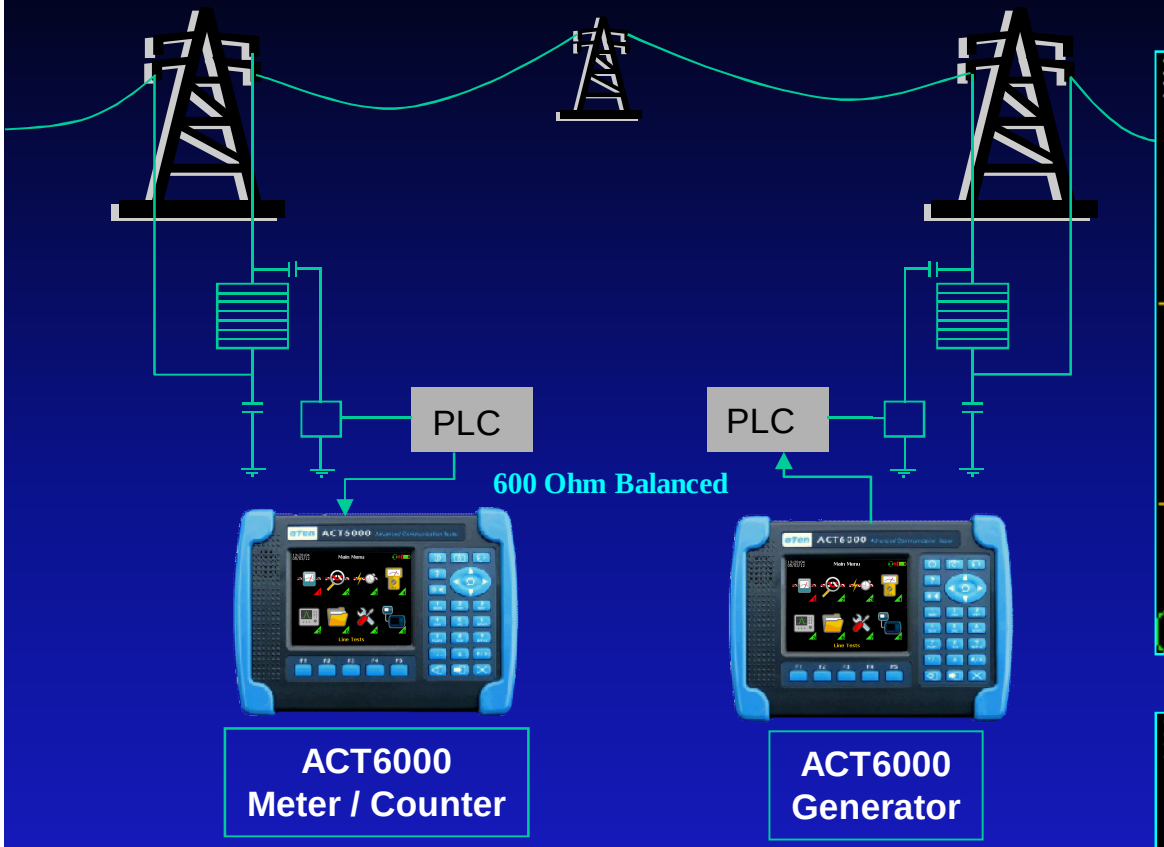
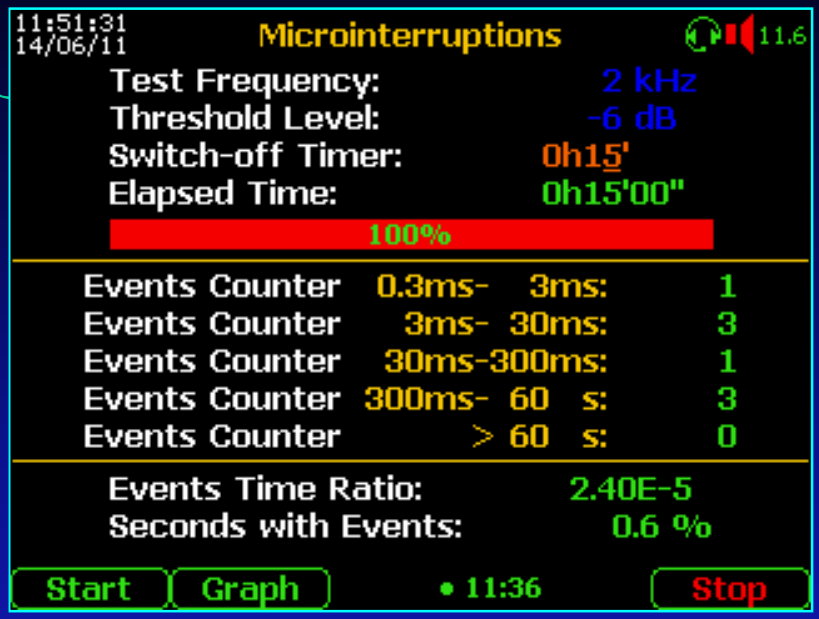
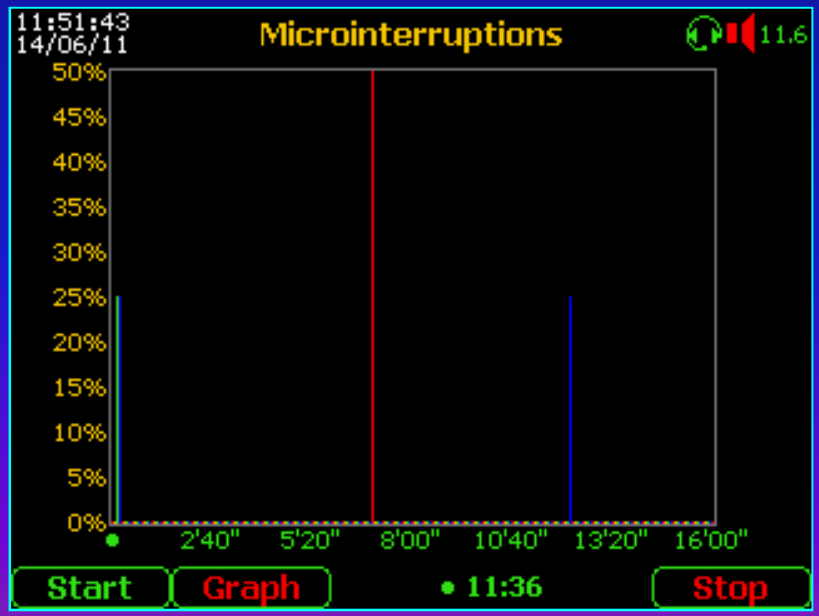
AF Channel - Microinterruptions Test - End-to-End







Micro-Interruptions Specifications

- O.62 (**Base** and **Middle Band**)

Threshold level : -3 ÷ -20 dB - 2 kHz Test Tone (default) or on programmable input frequency 200 Hz to 6 MHz.

Monitoring time : 4 min. ÷ 24 ours.

Events indicators : - 5 Counters (0.3ms ÷ >1min);
- Event/Time ;
- Seconds with Events.

Readout : Tabular and Time Domain Histogram representation.

Measure facilities : 2 kHz reference tone output from TX connector for loopback tests.

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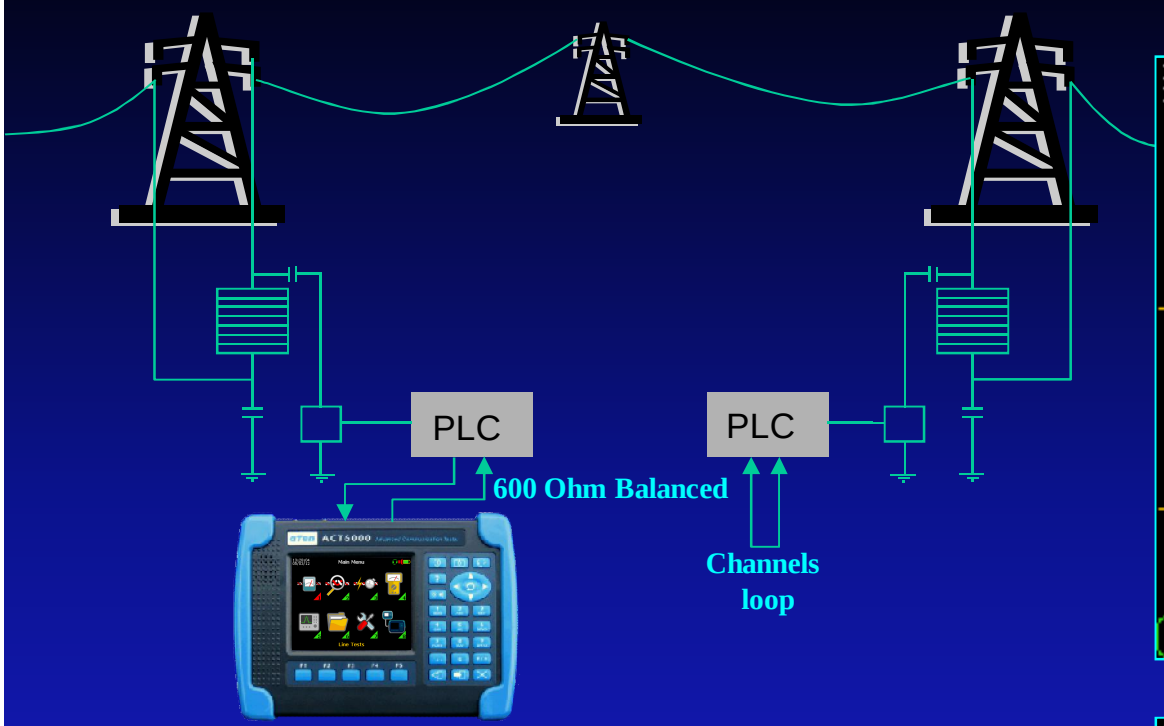
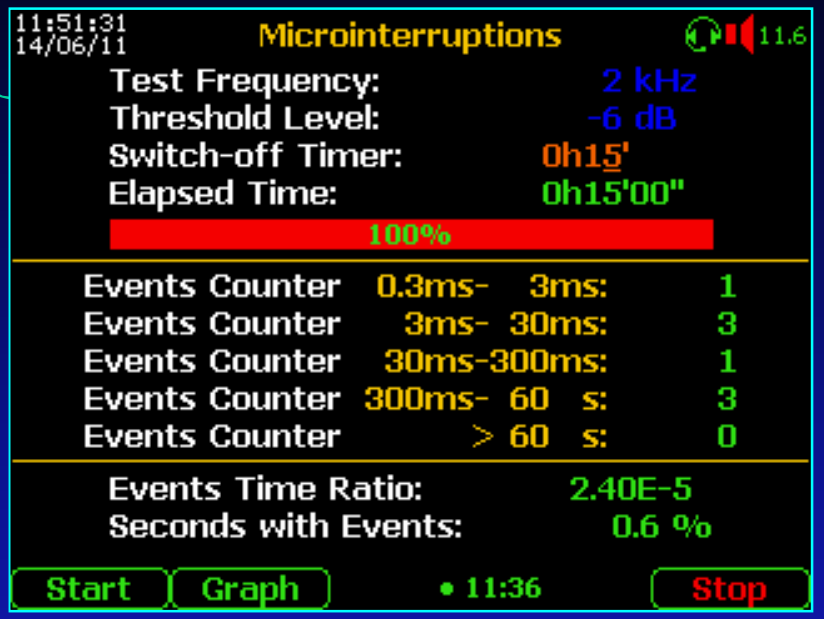
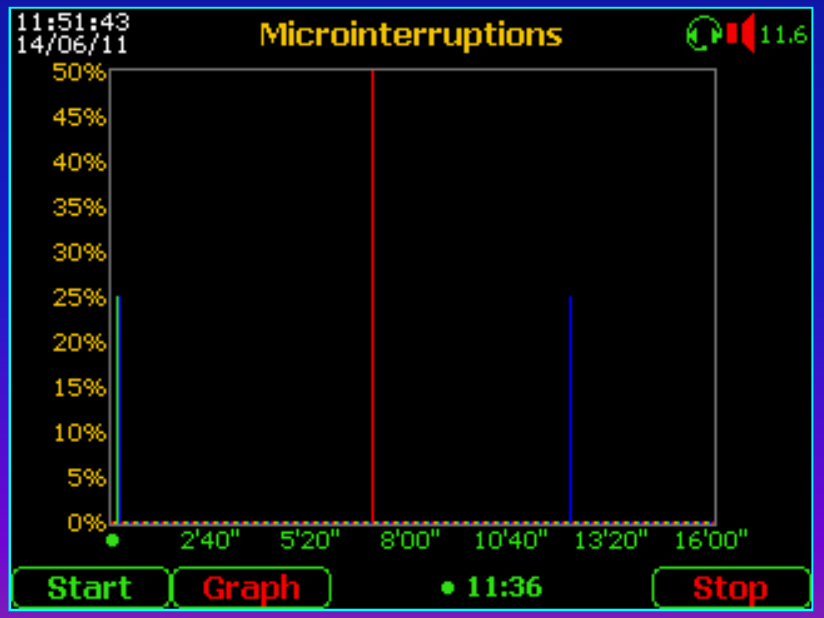
AF Channel - Microinterruptions Test - Single-End + loopback



ACT6000
Generator and
Meter /Counter





ACT6000 - PLC

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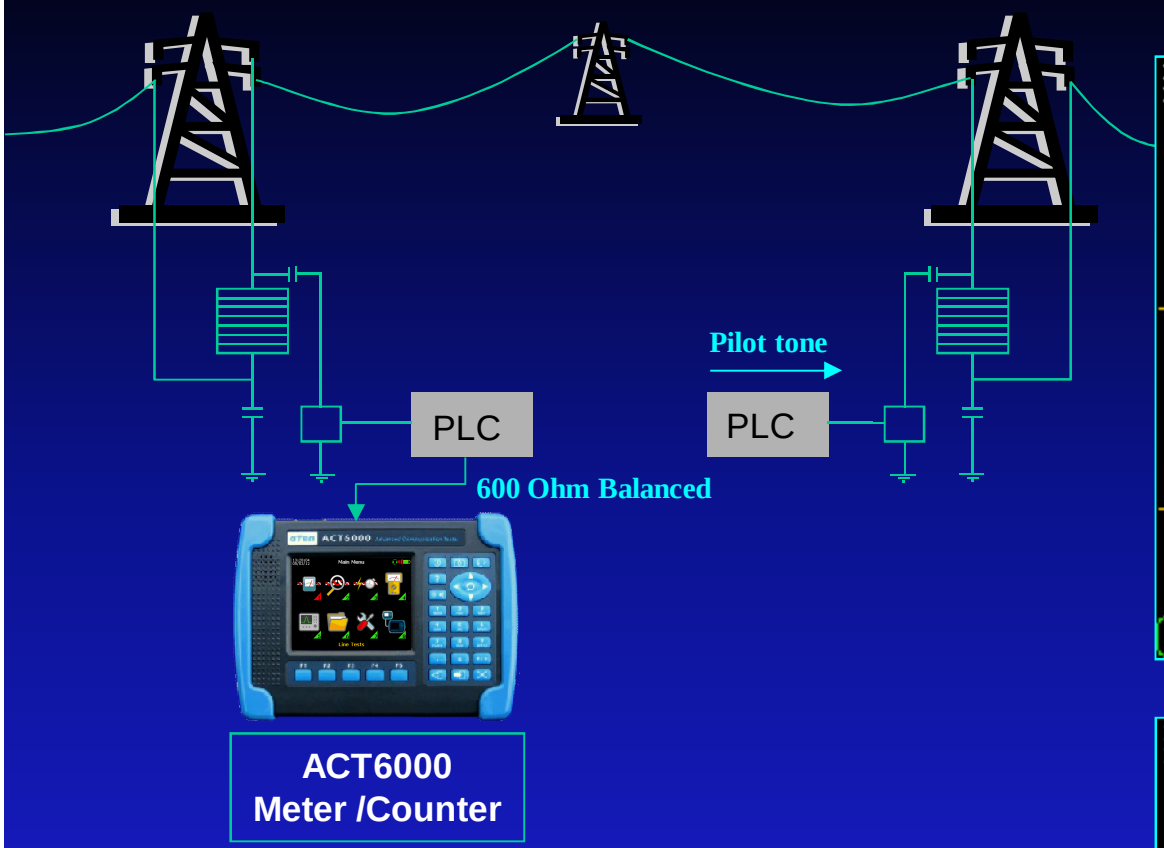
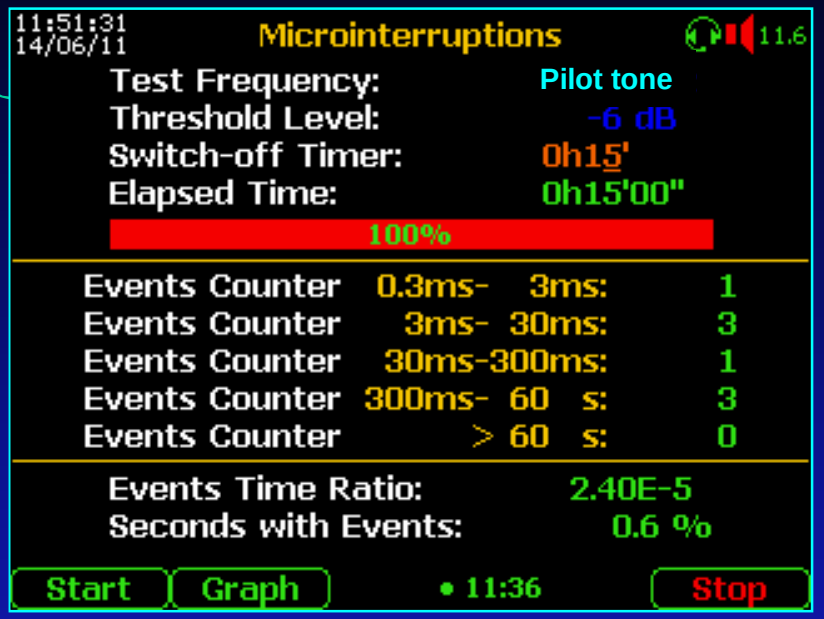
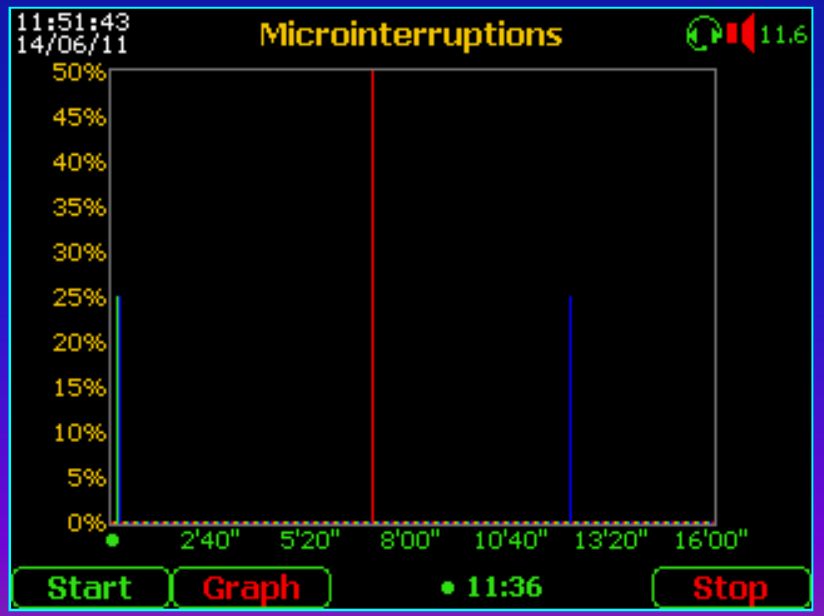
AF Channel - Microinterruptions Test - Pilot Tone Monitoring







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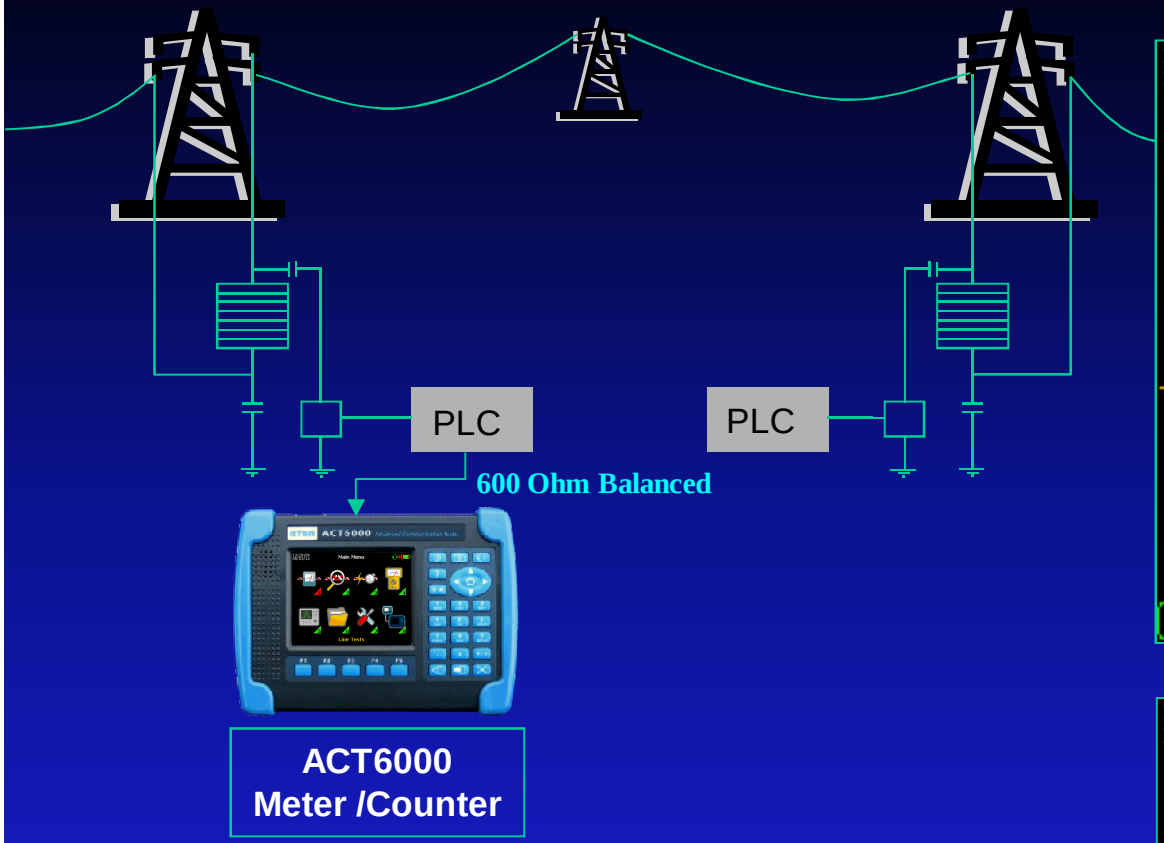
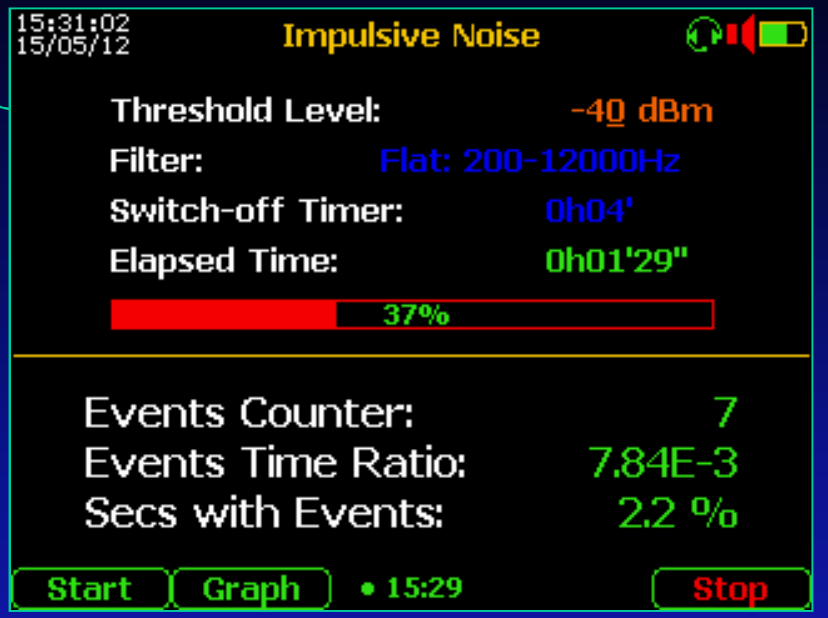
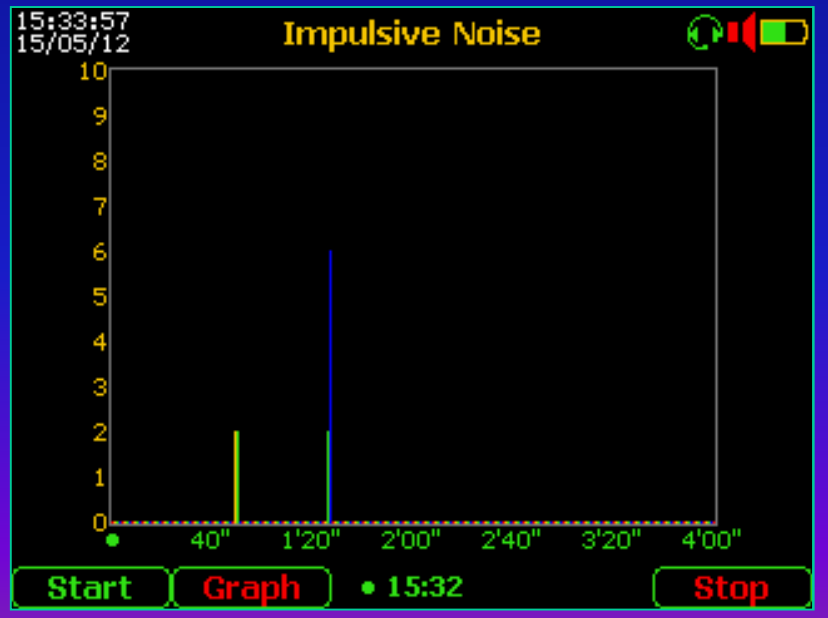
AF Channel - Impulsive Noise Test







Impulsive Noise Specifications

O.71 (**Base** and **Middle Band**)

- Threshold level : 0 ÷ -60 dBm.
- Base band BW filters : - 200 ÷ 12,000 Hz Flat,
  - 600 ÷ 3,000 Hz,
  - 300 ÷ 500 Hz.
- Monitoring time : 4 min. ÷ 24 hours.
- Events indicators : - 1 Event Counter;
  - Event/Time Ratio;
  - Secs. with Events.
- Readout : Tabular and Time Domain Histogram representation.

ACT6000 - PLC

aten