CL55C CLICK ANALYSER

The cost competitive, PC-driven, automatic, multi-channel discontinuous interference analyser

Data Sheet

According to CISPR 14-1, Designed in compliance with CISPR 16-1, Advanced software for totally automatic operation, Multi-window real-time display of, Time-domain display, Built-in impulse generator

(DIN EN) ISO 9001: 2000
Certificate Registration n° 44 100 071100

CL55C is the cost competitive, PC-driven, automatic, multi-channel discontinuous interference analyser
CL55C is not just a GO/NO-GO tester. It is a sophisticated analyser fully supporting a thorough investigation on the when, where and why a click occurs.
CL55C so provide a very substantial contribution to problem-solving requirements in a critical domain of equipment compliance.

OVERVIEW

CISPR 14-1 describe limits for phenomena related to unwanted radio emissions from household appliances and portable tools, including the discontinuous disturbances on the mains cord, the so-called "clicks".

DEFINITIONS

A discontinuous disturbance, commonly called "click", is defined as a disturbance exceeding the limit of continuous emission for no longer than 200ms, and that is separated from a subsequent disturbance by at least 200ms.
All automatic, programmed-controlled machines, electrically operated and thermal appliances, and common domestic and light-industry equipment, generate discontinuous disturbances along the power supply cabling. The effects of such disturbances vary with repetition rate and amplitude: the higher the amplitude of the disturbance, the lower should be its frequency of occurrence.

APPLICABLE STANDARDS

For “clicks” - that is for interference emissions that exceed the recognized steady-state limits but for a very limited time - CISPR14-1 has been and is used as the *basic* standard for short-term emissions as well as a *product* standard. It is a quoted as a basic reference in the generic standards **IEC 61000-6-3** for residential and light industrial limits and **IEC 61000-6-4** for industrial environments. Likewise it is referenced in product standard **EN55103** for professional audio/video equipment.

Such requirement is a time-consuming test, that may take several hours per each phase of the EUT (Equipment Under Test).

Thanks to the independence and simultaneous operation of its channels, the AFJ CL55C greatly reduces the test time required.

CISPR COMPLIANCE

CL55C is a four, parallel channel, fixed frequency (**150KHz, 500KHz, 1.4MHz, 30MHz**) RF receiver, with each channel provided with peak and quasi-peak detectors. Q-P detectors, fully comply with CISPR16-1. The way the Q-P detectors are designed, enables to automatically perform tests in full compliance with the requirements of EN55014-1, where requesting to test using an oscilloscope (**time-domain** operation). For the purpose of functional self-assessment, the analyser has a built-in impulse generator, that can produce the entire set of single and multiple disturbance pulses, in the various timing and shift configurations, as required by **CISPR 16-1**. Powerful and user-friendly control software enables it to perform all tests, standard and customized, in a very easy and fully automatic way.

Option CL55/VCCI, makes the click analyser fully compliance with **VCCI** Emission Japanese standard, by through **500kHz / 550kHz** selectable frequencies.

An host PC is connected to AFJ CL55C via high-speed parallel port, enabling the analyzer to be used for automatic test set up and running, and for consistent report generation.
The PC totally controls the analyzer through a friendly application S/W, running under the WINDOWS 95/98/2000/NT.
The S/W enables the operator to set all parameters, setting up the analyzer according to CISPR 14-1 requirements, or any other specific needs.

All information collected by the AFJ CL55C during the test, are displayed in real time on the PC screen, divided into a number of windows corresponding to the number of internal RF channels.

Finally, the real superiority of the analyser, resides in the **built-in power meters**, enabling the continuous monitoring of EUT current consumption: in fact, steep variations in this current are often related with disturbances (click) because of the very large bandwidth, that includes all frequencies able to generate a click.

The CL55C main characteristic , is its ability to sample, in parallel, the peak and quasi-peak levels of the four channels, to recognize and count all clicks (short, long, continuous noise and switching operations), and store all numeric and graphic data, like waveforms, in the PC hard disk.

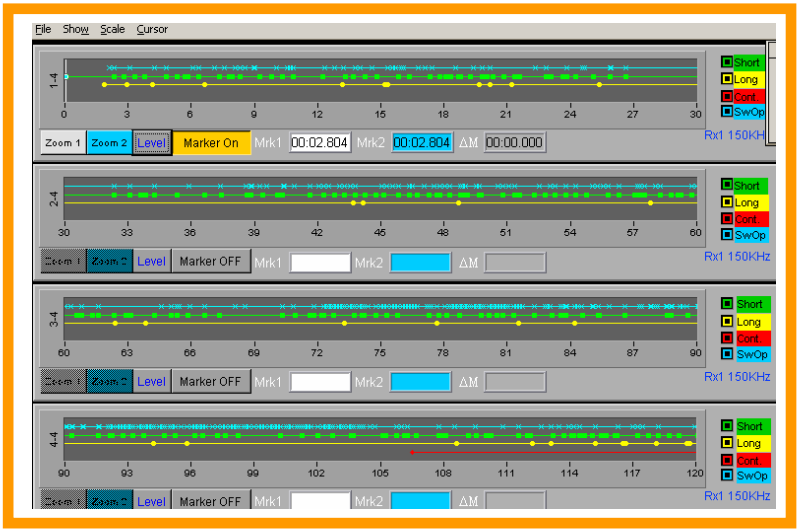
The PC-based operation of the analyzer, means practically unlimited memory capabilities, and the ability to generate assisted, or fully-automatic test reports.

CL55C is not just a GO/NO-GO tester, but a sophisticated analyser fully supporting a thorough investigation on the when, where and why a click occurs, so providing a very substantial contribution to problem-solving requirements in a critical domain of equipment compliance.

CL55C / IF

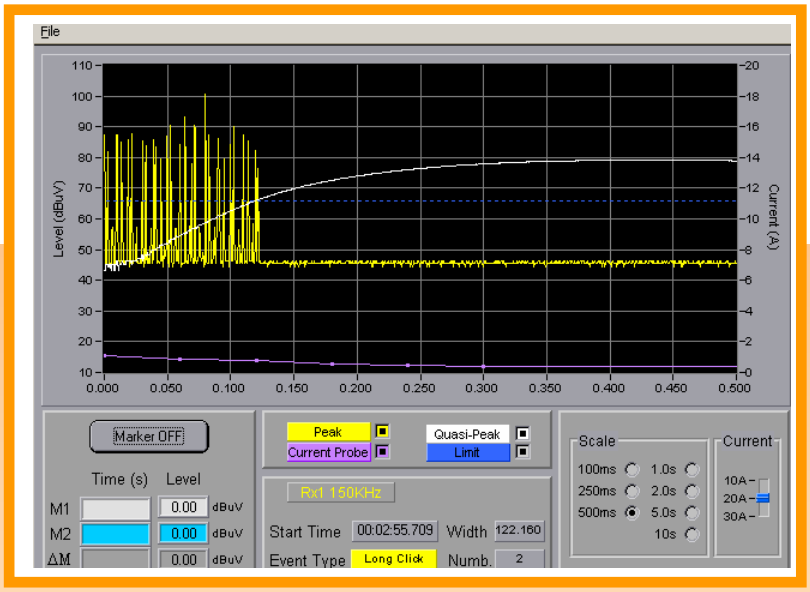
CL55C/IF is the discontinuous disturbances analyser, which is intended to be used tuned to the IF output frequency of any EMI receiver provided with Quasi Peak detector.
CL55 software allows the user to control the CL55/IF operations, giving the possibility to store, analyse and report all the measurements.
CL55C/IF still remain a true analyser system.

"ANALYSE"
Fast overview clicks analysis. **Disturbance class** selection (**short clicks, long clicks, continuous**), is available through the **green, yellow, red** boxes on the right side of the panel. Any mix of the desired selection, is allowed.
The timescale can be adapted to the display requirements, through the **Scale** menu window.

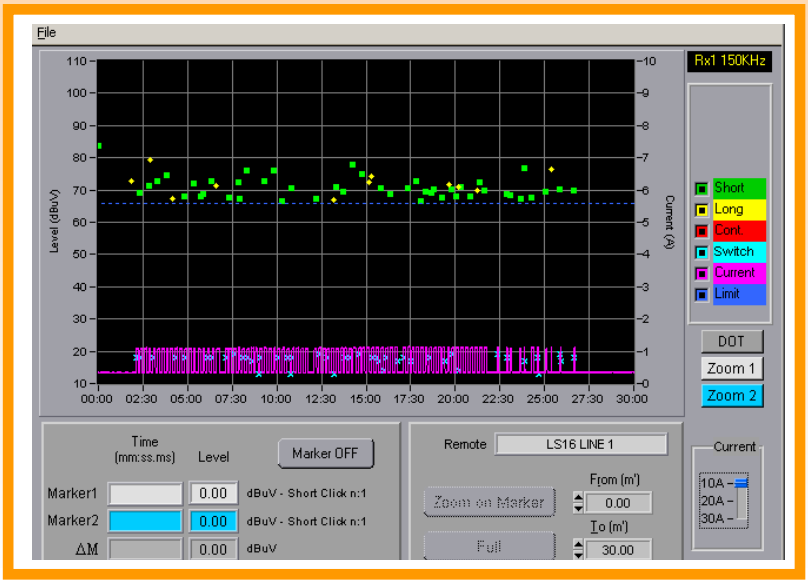


ZOOM "ANALYSE", shows:
- Click **Peak** level curve
- Click **Quasi Peak** level curve
- **Limit** level
- **EUT Current**

X and Y-axes shall be adjusted through appropriate commands on the right-low side.



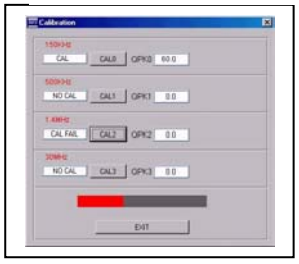
LEVEL "ANALYSE", shows EUT switching operations, supply current and click events level.

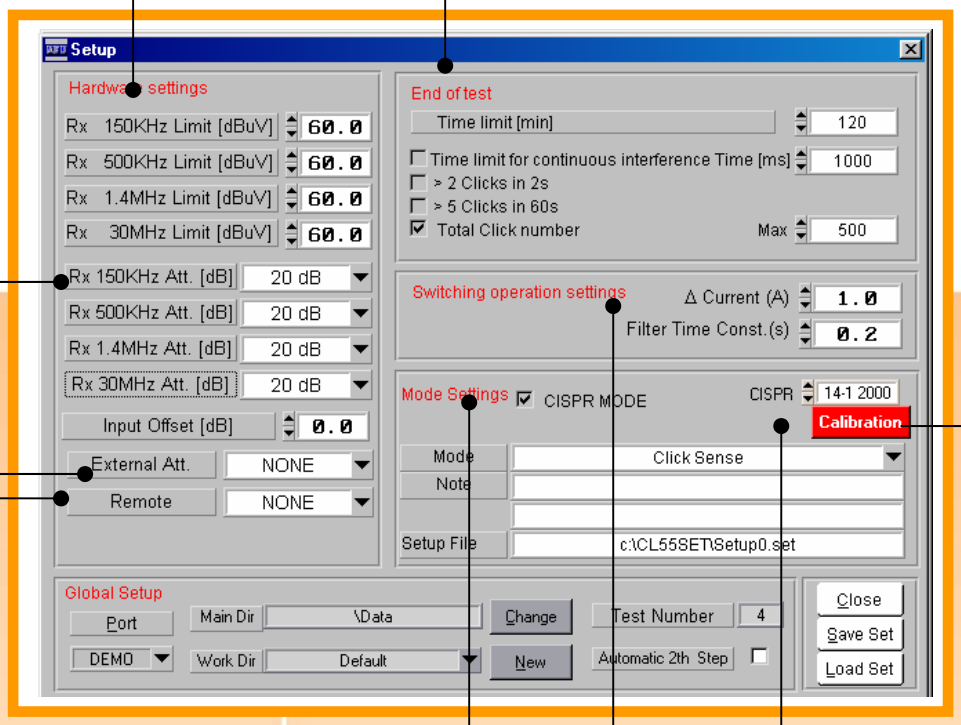


END OF TEST
By the time limit in minutes: **TIME LIMIT (min)**
If the continuous disturbances exceed a set time value: **TIME LIMIT FOR CONTINUOUS INTERFERENCE TIME (ms)**
If a set maximum number of clicks are reached: **Total Click number.**

HARDWARE SETTINGS: For each of the four channels, the IF threshold level, in dBμV, that must be exceeded to detect a signal.

SELF CALIBRATION Routine





INTERNAL ATTENUATION
Level can be set for each channel

EXTERNAL ATTENUATION & OFFSET

REMOTE: select the appropriate LISN model

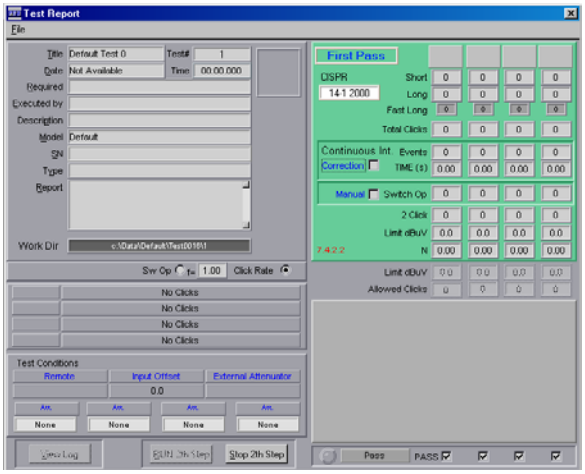
MODE SETTINGS: allows the programming of the Analyser according to one of the two operating modes:

- **Click Sense**, defines a mode where the Analyser counts clicks only, and not the switching operations
- **Click Sense + SW Operation** defines a mode where the Analyser counts both clicks, and switching operations.
- **CISPR MODE**, the most widely used mode: Analyser acquires and recognises the disturbances only when both the **Peak (IF)** and **Quasi Peak** detectors exceed the set threshold.
  In case the CISPR mode is **non-selected**, any IF signal that is measured exceeding the set threshold by the **Peak** detector is recorded. This function, may be very useful during the **debugging** stage of a device, since allows to understand how a click may turn into a continuous disturbance, or how it may affect the Presence of another click.

CISPR 14-1 2000
Or
CISPR 14 1997

SWITCHING OPERATION SETTINGS
The **Δ Current (A)** parameter, allows setting the minimum value of the DUT current change, suitable for the detection of a switch.
The **Filter Time Const. (s)** allows setting the filter time constant; in order to avoid that unwanted switching operations are detected.

In connection with such an outstanding graphic capability, a complete reporting environment is made available, allowing **text files** generation as well **as bitmap images**.



MEASUREMENT SEQUENCE USING CL55C

1. **Perform the test on the EUT according to applicable standards (CISPR 14-1)**

First Run

a. Determine N by clicks or by switching operation number;
b. Runs for 120mins or until 40 clicks (or 40 switching) have been registered;
c. Calculates click rate N from Number of clicks/time in minutes;
d. Registers where N>30;
e. Registers where all clicks ≤20ms and 90% ≤10ms (Instantaneous Switching);
f. Registers where N≤5;
g. Calculates Lq from 20log30/N + L;

Second Run

h. Runs test again, using the click rate information;
i. Applies L or Lq as necessary;
j. Applies Upper Quartile Method where appropriate or L=Lq+44dB;
k. Give Pass/Fail Information;
l. Generates Test Report including table of each click measured, timing information and amplitude information, limits, etc.

2. **If the EUT test fails, open the analyse window and,**

3. Examine each click event together with the EUT cycle description.

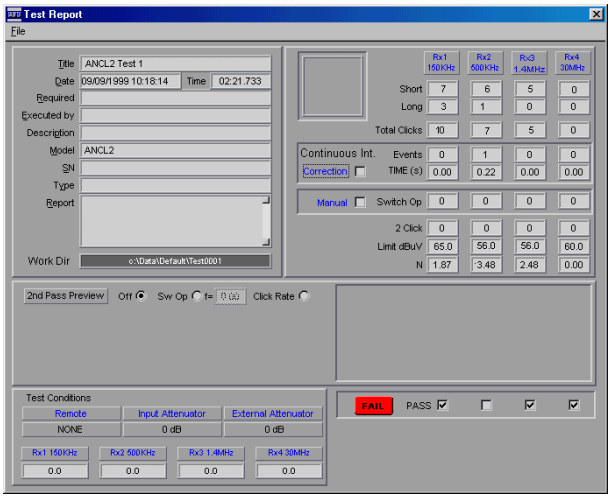
In the time-domain graph, the level of the click is readily appreciated: if just above the limit, it's likely to be easily removed. When the disturbance level is very high, the corrective procedure should trade between reducing total click count working on low- level clicks, or exploiting the relative influence of each click on the overall disturbance spectrum, to bring the EUT within limits.

In this respect, the functionalities supported by CL55C are of highest effectiveness.
Once all appropriate actions have been taken, the EUT will be tested again, results will be compared and a consistent test report will be edited.

SECOND PASS PREVIEW

AFJ CL55C usage, greatly reduce the measurement time thanks to unique internal SW function, called Second Pass preview.

Let's assume that the first test has been finished with the following results (steps a÷f):



- **150kHz** channel shows 10 clicks, of which 7 are lower than 10ms (instantaneous), and 3 are longer than 10ms. Channel demands the calculation of a new limit, Lq (step g).
- **500kHz** channel shows 7 clicks, plus a 220ms continuous disturbance. Channel, according to EN55014 Par. 4.2.3.2, shall consider the whole endurance of all such disturbance as a single click, since lower than 600ms.
- **1.4MHz** channel shows 5 instantaneous clicks, (<10ms). N value must be taken into account, to ascertain we have to calculate a new limit.
- **30MHz** channel, shows no clicks, and therefore fully complies with Standard.

Second Pass Preview

Practical Measurement

To automatically obtain final result without Second test running, select the **Click Rate** box in the **2nd Pass Preview: the N-rate according to Par. 7.4.2.2 of EN55014 is calculated, per each channel.**
SW controls the previously stored Quasi-Peak levels, comparing them versus the new limits, and providing a report on how many of the old clicks are overriding the new limits, thus yielding an immediate and automatic **PASS-FAIL** output (steps g÷l).

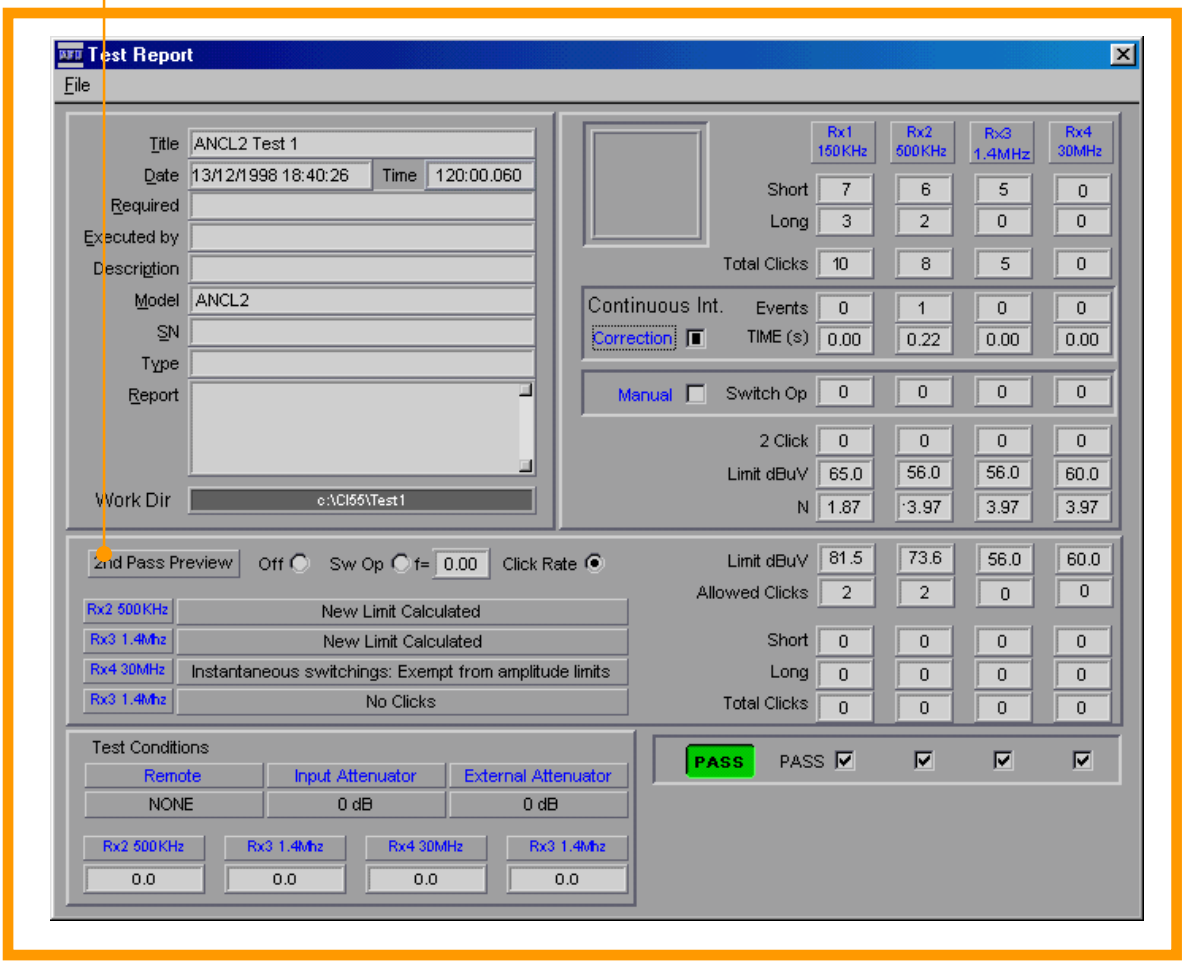
It shall be possible avoid the second run test, saving 50% of measurement time.

How to avoid the second run test, saving up 50% of measurement time!

SECOND PASS PREVIEW

The preview result for the DUT second test is:

- 150kHz channel: New limit set at 81.6dBμV, allowed click number: 2. Pass.
- 500kHz channel: After converting the continuous disturbance <600ms (note below), N has been recalculated, and therefore the new limit is set at 73.6dBμV. allowed click number: 2. Pass.
- 1.4 MHz channel: Exempt from limits, since subject to instantaneous disturbance, and N<5.
- 30 MHz channel: No clicks



No. of Receivers	Four
Internal Receiver Tuned Frequencies	150kHz, 500kHz, 1.4MHz, 30MHz
Frequency Error	<10x10 $^{-6}$
Pulse Response	Peak and Quasi-Peak as CISPR 16-1-1 band B
Impulse Generator	Built-in, CISPR 16-1 compliant
RF Input	BNC Female 50 ohm
VSWR Input 0dB Att.: With Att.:	 <1,5:1 <1,2:1
Max Input	127dBµV
Built-in Attenuator	manual 0÷65dB
Sensitivity	20dBµV
Intermediate Frequency	455 kHz
RF Shielding	3V/m
Noise Floor	<20dBµV
Measuring Error	± 1.5dBmax
Test Time	up to 999 minutes
Display Measure Level	0 to 120dBµV
Image Freq. Rejection	85dB Typ.
Information Displayed for each channel	
Displayed Level Displayed Events	0÷120dBµV No. of clicks: short, long Discontinuous interference Elapsed test time No. of switching operations Continuous Disturbance Time Time Domain Test Report Graphic Editor
Interface	High speed parallel port; USB (by through dedicated converter)
Power Supply, Consumption	110/230V, 50/60Hz, 50VA
Operating Temperature, Storage Temperature	0÷45°C, -20÷70°C
Dimension (HxWxD, mm), Weight	136x450x436, 15 Kg

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