



NOISE XT

DNA Series

Phase Noise and Stability Analyzer

Getting Started Manual



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REVISION

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GLOSSARY

ADC	Analog-to-Digital Converter
DDC	Digital Down Converter
DNA	Digital Noise Analyzer
DUT	Device Under Test
dBFS	dB Full Scale
ENBW	Equivalent Noise Bandwidth
FFT	Fast Fourier Transform
FPGA	Field Programmable Gate Array
GUI	Graphical User Interface
REF	Reference

1 PRECAUTIONS & CONDITIONS OF USE

This product is designed and tested to comply with the requirements of **IEC/EN61010-1** 'Safety requirements for electrical equipment for measurement, control and laboratory use', for Class I, portable equipment and is for use in a pollution degree 2 environment. The equipment is designed to operate from an installation category I and II supply.

Equipment should be protected from the ingress of liquids and precipitation such as rain, snow, etc. When moving the equipment from a cold to a hot environment, it is important to allow the temperature of the equipment to stabilize before it is connected to the supply to avoid condensation forming. The equipment must only be operated within the environmental conditions specified in Chapter 1 'Performance data' in the Operating manual; otherwise the protection provided by the equipment may be impaired.

This product is not approved for use in hazardous atmospheres. If the equipment is to be used in a safety-related application, e.g. avionics or military applications, the suitability of the product must be assessed and approved for use by a competent person.

1.1 Instrument damage caused by cleaning agent

Cleaning agents contain substances that may damage the instrument, for example cleaning agents that contain a solvent may damage the front panel labeling, plastic parts, or the display.

Never use cleaning agents such as solvents (thinners, acetone, etc.), acids, bases, or other substances. The outside of the instrument can be cleaned sufficiently using a soft, lint-free dust cloth.

1.2 Hazard symbols

The meaning of hazard symbols appearing on the equipment is as follows:

Symbol	Nature of hazard
	<i>Dangerous voltage</i>
	<i>General hazard</i>

1.3 Electrical safety

AC supply voltage: This equipment conforms to **IEC Safety Class 1**, meaning that it is provided with a protective grounding lead. To maintain this protection the supply lead must always be connected to the source of supply via a socket with a grounded contact.

Be aware that the supply filter contains capacitors that may remain charged after the equipment is disconnected from the supply. Although the stored energy is within the approved safety requirements, a slight shock may be felt if the plug pins are, touched immediately after removal.

Removal of cover: Do not remove covers, no user serviceable parts inside. See list of ARCALE Service Centers at <https://www.arcale.net/fr/>

CAUTION: If this material is used in others conditions other than these specified by the manufacturer, the operator’s protection is compromised.

1.4 Reduction of Hazardous Substances Overview

European Union legislation **2002/95/EC** (RoHS) that goes in effect in July 1, 2006 requires that manufactures of electrical and electronic equipment choose product materials with more focus on our environment and thus support recycling legislation such WEEE in the EU. The RoHS Directive will ban the placing on the EU market electrical and electronic equipment that exceeds a maximum concentration per HOMEGENEOUS substance:

- 1000 ppm or 0.1 wt% for lead
- 100 ppm or 0.01 wt% for Cadmium
- 1000 ppm or 0.1 wt% for Mercury
- 1000 ppm or 0.1 wt% Hexavalent Chromium
- 1000 ppm or 0.1 wt% for PBB and PBDE flame retardants

Many other countries and US states are implementing similar laws starting in 2006. California “RoHS” type legislation is scheduled for 2007 implementation.

RoHS substances can be found in many locations within products including:

Substance	Example Locations
LEAD	Solder, paints, fans, power supplies, plating, metal parts, cable, circuit breakers, electrical components, glass, fuse, flex circuit, boards
CADMIUM	Paints, coatings, contacts, fasteners, PVC cable, metal finishing/plating, detector/devices/LEDs, recycled plastics
MERCURY	Switches, lamps, paints, PVC, displays
Hex CHROMIUM	Aluminum conversion coating (chem. Film), metal finishing, fasteners, paints
PBB & PBDE	Flame Retardants in plastic, cables, PCB, electrical components, paints, fans

Applicable Categories of Electrical and Electronic Equipment

1. Large household appliances
2. Small household appliances
3. IT and telecommunications equipment
4. Consumer equipment
5. Lighting equipment
6. Electrical and electronic tools (with the exception of large-scale stationary industrial tools)
7. Toys, leisure and sport equipment
8. Automatic dispensers

NOT Applicable Categories of Electrical and Electronic Equipment:

1. Medical Devices
2. Monitoring and Control Instruments

1.5 Waste Electrical and Electronic Equipment (WEEE)

WEEE (Waste Electrical and Electronic Equipment) is an EU directive that aims to reduce the amount of waste electrical and electronic equipment being disposed of in landfill.



When dealing with your waste electrical and electronic equipment you need to choose a vendor that not only has infrastructure to deal with your waste in accordance with the WEEE regulation – you also need to choose a vendor that understands how deal with sensitive or classified data.

This symbol of the crossed out wheeled bin indicates that the product (electrical and electronic equipment) should not be placed in municipal waste. Check local regulation for disposal of electronic products.

1.6 Tilt Facility

When the instrument is in the tilt position, it is advisable, for stability reasons, not to stack other instruments on top of it.

1.7 Risk of electrostatic discharge (ESD)



Electrostatic discharge (ESD) can cause damage to the electronic components of the instrument and the device under test (DUT). ESD is most likely to occur when you connect or disconnect a DUT or test fixture to the instrument's test ports. To prevent ESD, use a wrist strap and cord and connect yourself to the ground, or use a conductive floor mat and heel strap combination.

1.8 Risk of instrument damage during operation

An unsuitable operating site or test setup can cause damage to the instrument and to connected devices. Ensure the following operating conditions before you switch on the instrument:

- All fan openings are unobstructed and the airflow perforations are unimpeded. The minimum distance from the wall is 18 cm.
- The instrument is dry and shows no sign of condensation.
- The instrument is positioned as described in the following sections.
- The ambient temperature does not exceed the range specified in the data sheet.
- Signal levels at the input connectors are all within the specified ranges.
- Signal outputs are correctly connected and are not overloaded.

1.9 EMI impact on measurement results

Electromagnetic interference (EMI) may affect the measurement results.

To suppress generated electromagnetic interference (EMI):

- Use suitable shielded cables of high quality. For example, use double-shielded RF and LAN cables.
- Always terminate open cable ends

1.10 Information Security in Highly Sensitive Areas

Since the SDRAM is erased when power is removed from the phase noise analyzer it does not pose a security risk. No user data is written to the EEPROM and FLASH memories; hence, it is deemed that they do not pose a risk either.

The REMOVABLE SOLID-STATE DRIVE* (* Optional) is the only device that does not lose its memory when power is removed and can contain user data. It can be removed from the phase noise analyzer leaving the customer assured that no user data is stored within the signal and phase noise analyzer.

Note: Optional: The ARCALE® DNA phase noise analyzer can be equipped with the REMOVABLE SOLID-STATE DRIVE address the needs of customers working in highly sensitive areas.

CAUTION: If your System is working in highly sensitive areas and you want calibrate the system. Please remove the SSD from the phase noise analyzer and inform the technical support services to add a new SSD device.

1.11 Battery Information

Instrument Models Covered: **DNA 100 L/F, DNA 400 L/F** products.

There are no batteries in the ARCALE® DNA other than the one on the CPU board used to power the clock in the chipset.

1.12 Exclusive Remedies

The remedies provided herein are Buyer's sole and exclusive remedies. ARCALE S.A.S. shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

1.13 Assistance

Product maintenance agreements and other customer assistance agreements are available for ARCALE products.

For any assistance, contact your nearest ARACLE Sales and Service Office.

Addresses are provided from [Contact us – Arcale](#)

2 GETTING STARTED

2.1 Preparing for Use

This section describes the basic steps to be taken when setting up the ARCALE DNA for the first time.

2.1.1 Unpacking and Checking the Instrument

Check the equipment for completeness using the delivery note and the accessory lists for the various items. Check the instrument for any damage. If there is damage, immediately contact the carrier who delivered the instrument. Make sure not to discard the box and packing material.

Note: *Packing material:*

Retain the original packing material. If the instrument needs to be transported or shipped at a later date, you can use the material to protect the control elements and connectors.

Risk of damage during transportation and shipment

Insufficient protection against mechanical and electrostatic effects during transportation and shipment can damage the instrument.

- Always make sure that sufficient mechanical and electrostatic protection is provided.
- When shipping an instrument, the original packaging should be used. If you do not have the original packaging, use sufficient padding to prevent the instrument from moving around inside the box.
- Secure the instrument to prevent any movement and other mechanical effects during transportation.
- The carrying handles at the front of the casing are designed to lift or carry the instrument. Do not apply an excessive external force to the handles.

Observe the information on transporting heavy instruments in the basic safety instructions

2.1.2 Accessory List

The instrument comes with the following accessories:

- 1x Power supply cable (EU type Plug)
- User Documentation Getting Started

2.1.3 Placing or Mounting the Instrument

The DNA is designed for use under laboratory conditions, either on a bench top or in a rack. If the DNA is operated on a bench top, the surface should be flat. The instrument can be used in horizontal position, standing on its feet.

Risk of instrument damage in a rack: An insufficient airflow can cause the instrument to overheat, which may disturb the operation and even cause damage.

Make sure that all fan openings are unobstructed, that the airflow perforations are unimpeded, and that the minimum distance from the wall is 10 cm.

2.1.4 Connecting the AC Power

The DNA can be used with different AC power voltages and adapts itself automatically to it (110 /220V Auto-Switch). Refer to the datasheet for the requirements of voltage and frequency. The AC power connector is located on the rear panel. (See Figure 1 - DNA AC power supply).



Figure 1 - DNA AC power supply

Connect DNA to the AC power supplies using the supplied power cables; it may only be connected to an outlet that has a ground contact.

2.1.5 Switching the Instrument On and Off

Press the POWER key on the front panel. The DNA switches to start mode



Figure 2 - DNA Power ON /OFF

- Press again the POWER key on the front panel. The DNA switches to shut down mode (Figure 2). The system shut down after few seconds automatically.
- Hold on the POWER key on the front panel 1 second, for brute force shutting down your DNA (only after instrument instability).

CAUTION: Risk of losing data, if you switch off the running instrument when disconnecting the power cord, the instrument loses its current settings. Furthermore, program data may be lost. Press the Power key first to shut down the application properly.

3 INSTRUMENT OVERVIEW

3.1 Front Panel View

This chapter describes the front panel, including all function keys and connectors. All connectors are 50 Ohm impedance
RF IN and EXT RF In are N type. All others are SMA type.



Figure 3 - DNA L (Lite) Front Panel View

1. Power Switch ON/OFF ([Switching the Instrument On and Off](#))
2. Front Panel USB Connectors
3. Touchscreen
4. DUT Input
5. DUT RF Output (After internal RF Splitter)
6. External RF Input (ADC2 & ADC3 see **Erreur ! Source du renvoi introuvable.**)
7. External Reference Input
8. External Reference Output (After internal RF Splitter)
9. External Reference Input (ADC2 & ADC3 see **Erreur ! Source du renvoi introuvable.**)



Figure 4 - DNA F (Full) Front Panel View

1. Power Switch ON/OFF ([Switching the Instrument On and Off](#))
2. Front Panel USB Connectors
3. Touchscreen
4. DUT Input
5. DUT RF Output (After internal RF Splitter)
6. External RF Input (ADC2 & ADC3 see **Erreur ! Source du renvoi introuvable.**)
7. External Reference Input
8. External Reference Output (After internal RF Splitter)
9. External Reference Input (ADC2 & ADC3 see **Erreur ! Source du renvoi introuvable.**)
10. Internal References Output (REF 1 & REF 2 see **Erreur ! Source du renvoi introuvable.**)

3.1.1 Touchscreen

All measurement results are displayed on the screen on the front panel. Additionally, the screen display provides status and setting information and allows you to switch between various measurement tasks. The screen is touch-sensitive, offering an alternative means of user interaction for quick and easy handling of the instrument.

Risk of touchscreen damage during operation

The touchscreen may be damaged by inappropriate tools or excessive force. Observe the following instructions when operating or cleaning the touchscreen:

- Never touch the screen with ball point pens or other pointed objects with sharp edges.
- It is recommended that you operate the touchscreen by finger only. As an alternative, you may use a stylus pen with a smooth soft tip.
- Never apply excessive force to the screen. Touch it gently.
- Never scratch the screen surface, for example with a finger nail. Never rub it strongly, for example with a dust cloth.

3.1.2 RF INPUT

A device under test (DUT) can be connected to the DNA to provide RF input which is then analyzed. The DUT is connected to the instrument's RF INPUT via a cable equipped with an appropriate connector.

Connection should be made as bellow:

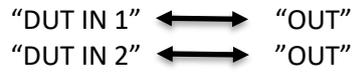


Figure 5 – DUT

DUT IN 1 & DUT IN 2 connectors are also the baseband direct inputs for noise measurements.

CAUTION: Risk of instrument damage, do not overload the input. For maximum allowed values, see the data sheet.

3.1.3 EXTERNAL/INTERNAL REFERENCE INPUT/OUTPUT CONNECTORS

The REF INPUT connector is used to provide an external reference signal to the DNA.

The INT REF Output connectors can be used to provide an internal reference signal to the DNA, or to other devices that are connected to this instrument. **This possibility exists for the DNA-F Series only.**

3.1.3.1 EXTERNAL REFERENCES (DNA F or L versions)

To use external references for the measurements, connect coax cables between connectors (see Figure 6 - DNA F Version & Figure 7 - DNA L Version):

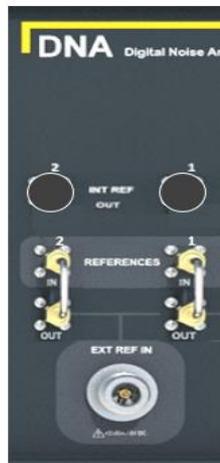
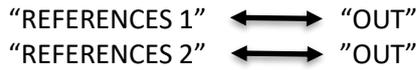


Figure 7 - DNA L Version

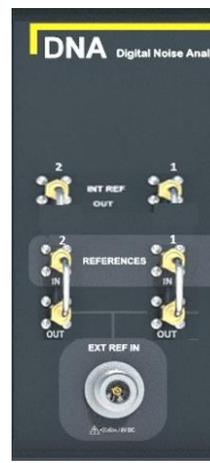


Figure 6 - DNA F Version

3.1.3.2 Use INTERNAL REFERENCES (DNA F version only)

For Use the Internal references for the measurements, connect Coax cables between connectors (see Figure 8 - Internal references):

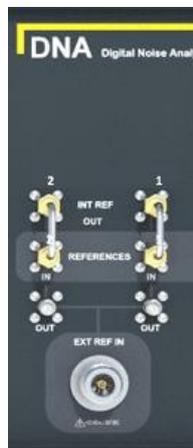
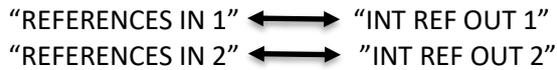


Figure 8 - Internal references

3.1.4 Rear Panel View

This figure shows the rear panel view of the DNA. The individual elements are described in more detail in the subsequent sections.

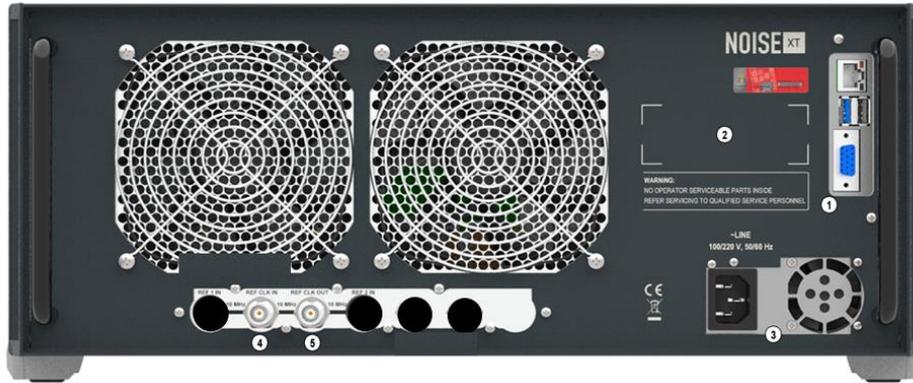


Figure 9 - DNA Lite Rear Panel View

1. Computer Motherboard Connectors
2. Labels Zone
3. AC Power Supply Connection
4. REF CLK IN : 10 MHz Input ^(note 1)
5. REF CLK OUT : 10 MHz output

(Note 1): DNA lite do not has internal reference. The 10 MHz is the oscillator used for all ADC.



Figure 10 - DNA Full Rear Panel View

1. Computer Motherboard Connectors
2. Labels Zone
3. AC Power Supply Connection
4. REF 1 IN : 10 MHz internal reference 1 input
5. REF CLK OUT : 10 MHz Output
6. REF 2 IN : 10 MHz internal reference 2 input

4 Start and stop measurement

After configuring the measurement parameters, use the BACK button to return back to the main GUI interface.

DNA is now set up and ready for measurement and can be launched by clicking on the START ① button. Before the measurement is really launched, the DNA is computing for best internal measurement parameters. During this time, a message popup is shown to inform the users. While the measurement is under progress, users should see the text “Measurement under progress ...” ②.

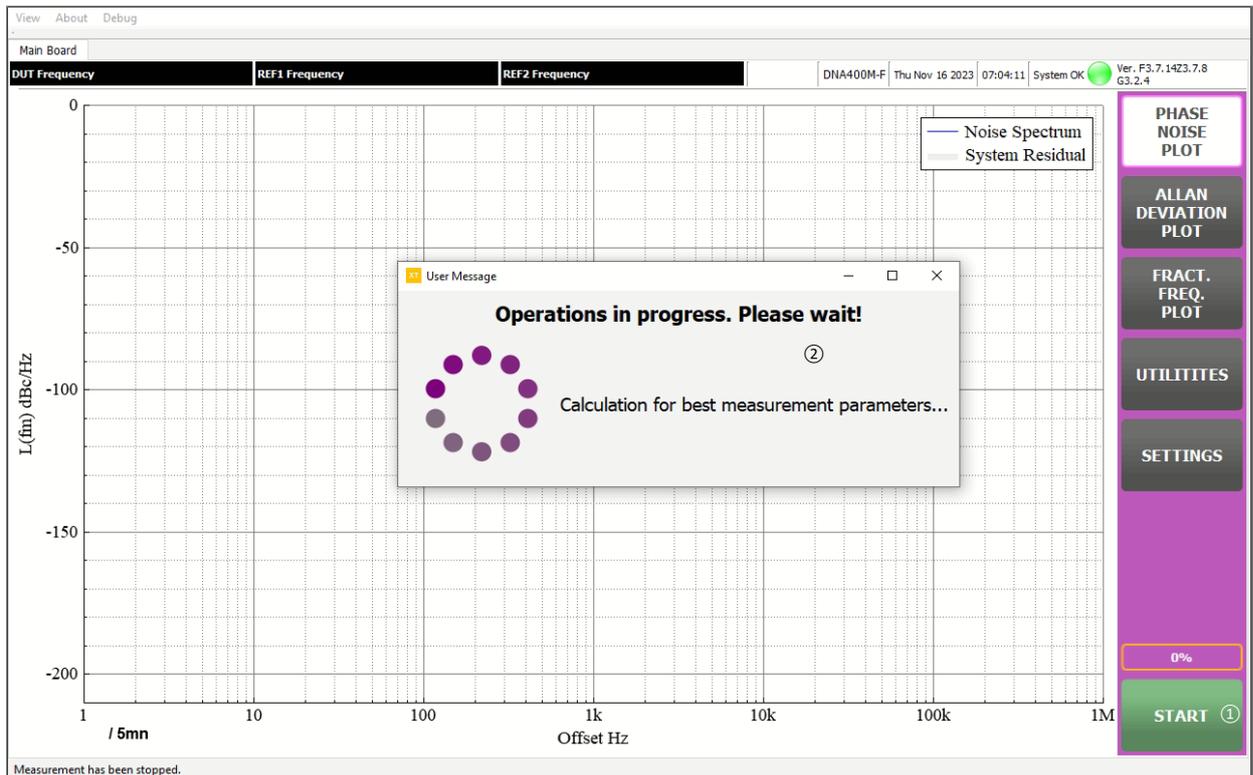


Figure 11 - Start

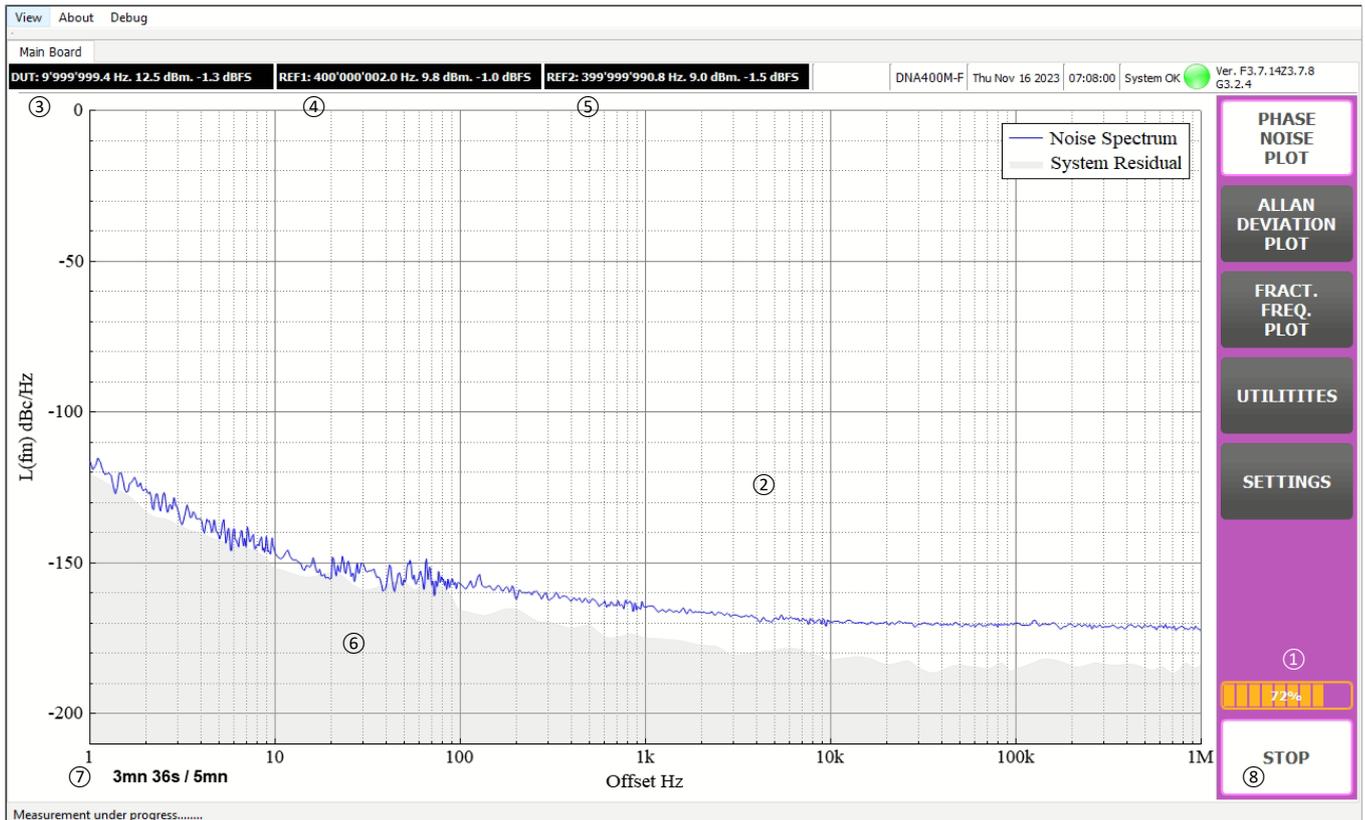


Figure 12 - Running measurement

When Best Calculation is finished measurement selected is being plot.

DUT measurement parameters ③, reference 1 ④ and reference 2 ⑤ are displayed first before plot.

Then DNA catch all data's on the entire frequency offset bandwidth (1 MHz to 1 MHz) even if the displayed offset is on a reduced bandwidth.

DNA displays ② in real-time as soon as it has enough data's.

The result is updated in real-time and the display refreshment frequency is about 4 times per second

1 Hz to 1 MHz plot display takes about 30 s for the first plot. The progress bar status ① shows the progression.

The system residual noise ⑥ is also computed and display.

The ongoing measurement time and measurement time are displayed ⑦ and till the time is not finished or user do not push the stop ⑧ button, DNA will continue to collect data and perform update measurement using cross correlation method.



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