NuDC-4U OVERVIEW

NuDC-4U is an innovative product that provides better solution for power probing. Common DC power statistics including voltage, ampere and even the watt can be read instantly via NuDC-4U. Moreover, up to 4 sets of individual powers can be monitored simultaneously and the LCD screen can also display the maximum and minimum value of the current power during the test.

Besides displaying real-time power status, NuDC-4U can also record all variation of power status and export it to PC via mini-USB port. When conducting long-time tests, NuDC-4U can automatically and periodically save test logs to the folder in PC that users defined previously. Therefore, no testing data will be lost during long testing periods. If the hardware fails, problems can be tracked down and analyzed easily. Also, NuDC-4U can send e-mails to the user-defined e-mail address whenever an error occurs, making it less likely for engineers to miss any crucial test results in a long testing time.

NuDC-4U has the ability to record 4,000 sample data within a second. However, in order to prevent PC crash or lad caused by the enormous data flow, users can define the Display Rate with the utility software. By defining Display Rate, users can set how many data should be sampled within 4,000 sample data generated per second. Not only preventing PCs from crashing or lagging, but this feature also provides more accurate maximum, minimum, and average values of the test.

For different testing requirements, NuDC-4U also has various optional accessories available. These optional accessories include: USB interface for testing USB device power status, DC jack interface for various sizes of the DC jack connectors, PoE interface for devices support Power over Ethernet, bare wire connections for devices with no DC or connectors, and mini daughter boards for PCB and SMD.

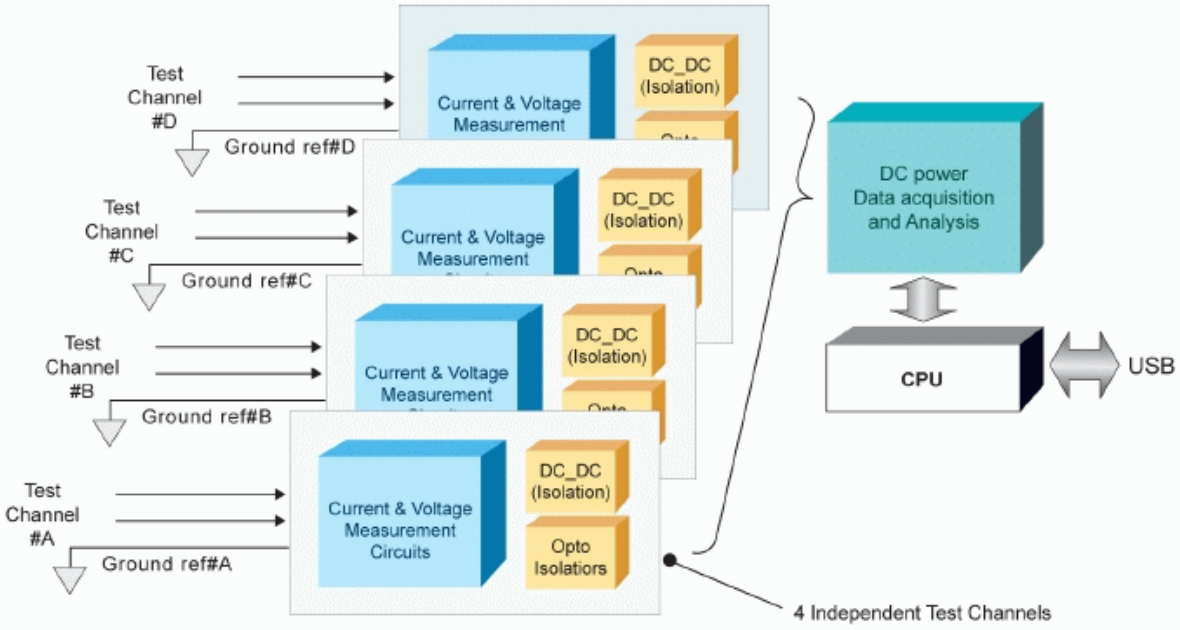
KEY FEATURES

- Monitor 4 DC power sources channels simultaneously.
- Voltage and current in each channel can be monitored at the same time.
- Using mini-USB port as power source, as well as interface for accessing logs and utilities on PCs.
- Utility softwares with oscilloscope-like user-interface with advanced functions such as split-screen, curve select switch, resizing and overlapping.
- When connecting to PC via mini-USB port, GUI utility softwares can provide long-time statistics in diagrams.
- LCD screen embedded on NuDC-4U with real-time statistic displaying function.
- Various instant-readiness optional accessories.
- E-mail notification by pre-defined alarm criteria from users
- High speed and accurate measurement of voltage, current and watt.
- High speed and precise digitizing capture of power status
- Detection range from ±0.1V to ±70V, 10mA to 8A and 0.001W to 560W
- Detection current is up to 16A if circuits are connected in parallel by ASSY-DC SC4S accessory board

MAIN APPLICATIONS

- Debug DC power problem of circuit board
- Long term monitoring of DC power supply
- Warning of unstable DC power supply
- Trace specified power status events
- Compare variation of the same test circuit design on different DUT.
- Detect degradation of electronic component.

NuDC-4U block diagram



Specification

MEASUREMENT	
Measurement Scale	• Voltage: 100mV, 200mV, 500mV, 1V, 2V, 5V, 10V, 20V • Current: 100mA, 200mA, 500mA, 1A, 2A, 5A • Watt: 100mW, 200mW, 500mW, 1W, 2W, 5W, 10W, 20W, 50W
Detection Range	• Voltage: ±0.1V to ±70V • Current: 10mA to 8A (Up to 16A if circuits are connected in parallel by ASSY-DC SC4S accessory) • Power: 0.001W to 560W • Precision: Two places behind the decimal point
Measurement Accuracy	• Recommended Condition: ➢ Power Supply: DC 4.1V ~ 5V ➢ Operation Temperature: 25℃ • RMS Voltage ➢ Input range: 5%~100%, accuracy ±0.1% • RMS Current ➢ Input range: 0.1%~1.0%, accuracy ±0.17% ➢ Input range: 1.0%~100%, accuracy ±0.1%
Overload Protection	• Fast Acting Surface-mount Chip Fuses on accessory board • Rated Current: 8A Current Percentage — Clear time at 25 °C 100% — 4 Hours min. 250% — 5 Seconds max. 400% — 0.05 Second max.
UTILITY SOFTWARE	
Functions & Features	• Monitoring, recording, and comparing power status with graphic curves and statistics • Upgrading NuDC-4U's firmware and accessing its various configuration options • Setting triggers to inform users by UI notification or e-mail sent via SMPT protocol whenever the power status meets the condition of the trigger • 2D power status curve diagrams can be zoomed in for closer comparison • Control button to operate the measurement procedure • Measurement scales can be adjusted for a more detailed or general power status • Power status can be shown in 2D curves or digit number values • Cursor time for comparing values in a period of time • All power status can be saved into log files

Specification (Continued)

INTERFACE		
Ports	**Mini-USB**	Serve as NuDC-4U's power source and data transmitting/receiving port
	DC Connector	Measurement port for Channel A~D
	Ground	One ground port for grounding
Buttons		• Channel selection button: Select one channel (A, B, C, D) that its status is shown on LCD • Function selection button: Switch value between voltage, ampere or watt on LCD • Save button: Start Save maximum and minimum value of all channels • Pause/Clear button: Pause current reading on LCD or clear maximum and minimum value
LEDs		• Top Array LED ▪ Power: Power status ▪ USB: USB connection status ▪ Channel: Connection status of DUT, A, B, C, D (4 LEDs) • Bottom Array LED ▪ Pause: Pause status when Pause button is pressed ▪ Alarm: Show alarm for channel A, B, C, D (4 LEDs)
LCD		• LCD: 16 x 2 characters LCD to display power status • Record maximum and minimum value on NuDC-4U that can be viewed by LCD • Current Channel: A, B, C or D • Current value: voltage, ampere or watt • Maximum and Minimum value during test
HARDWARE		
Dimension		125.4mm x 85mm x 27.5mm
Temperature		Operating: 0°C~ 40°C (32°F~ 104°F) Storage: 0°C~ 50°C (32°F~ 122°F)
Humidity		Operating: 0% ~ 85% RH Storage: 0% ~ 85% RH
Power Source		Powered by PC or external adapter via USB cable

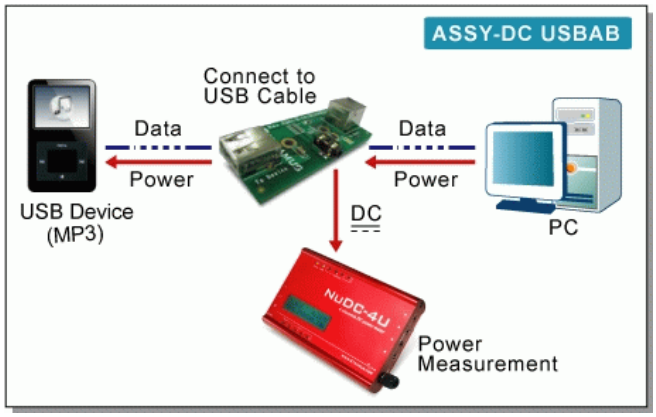
MEASURING POWER STATUS

There are several sets of optional accessories for measuring and recording power status of different device. Those optional accessories can be connected between NuDC-4U's measurement channel and DUT.

Measuring USB Device

ASSY-DC USBAB is a connection board for monitoring the power status of USB device

Connecting ASSY-DC USBAB between the PC (or a USB power adaptor) and the USB device. After that, connect NuDC-4U in order to monitor the power status.



Measuring PoE Device

ASSY-DC POEA (Mode A, powered via Pin 1, 2, 3, 6) and ASSY-DC POEB (Mode B, powered via Pin 4, 5, 7, 8) are connection boards for monitoring the power status of devices that support PoE (Power over Ethernet).

Power over Ethernet or PoE technology (commonly referred as IEEE 802.3af) describes a system able to transfer electrical power, along with data, to remote devices over standard twisted-pair cable in an Ethernet network.

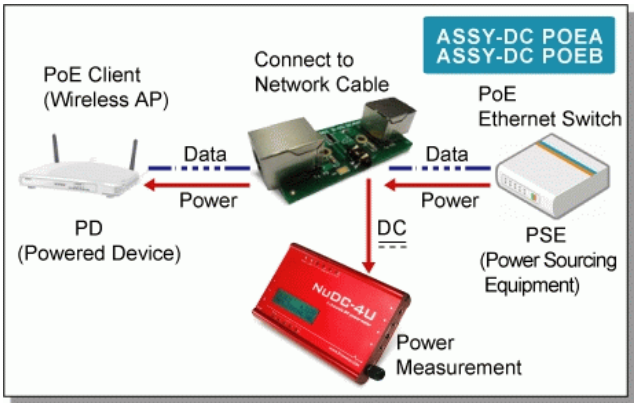
- PSE (Power Sourcing Equipment)

Power Sourcing Equipment is a device (Ethernet Switch for instance) that will be the power source in a PoE structure.

- PD (Powered Device)

A powered device is a device powered by a PSE.

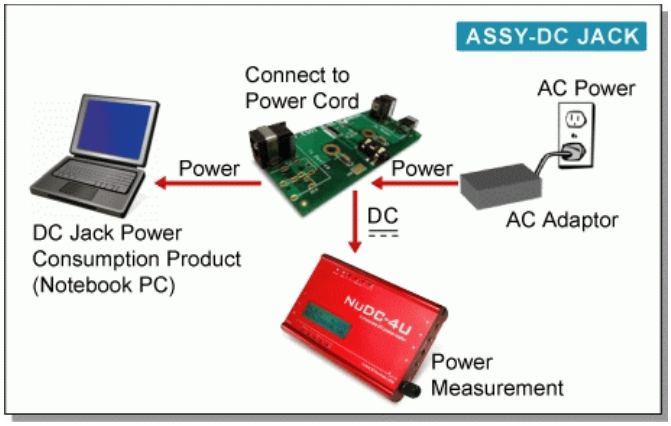
Connect this board between PoE switch and the PD device. After that, connect NuDC-4U in order to monitor the power status.



Measuring DC Jack Device

ASSY-DC JACK is a connection board for monitoring the power status of devices with DC jacks. The specifications of DC jacks may be different in core diameters. Before connecting ASSY-DC JACK to the testing device, please be sure that the size of the DC jacks are matched.

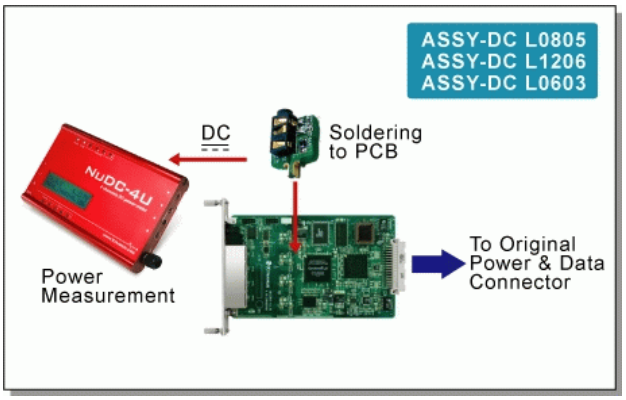
Connect this board between power adaptor and the device that consume DC power. After that, connect NuDC-4U in order to monitor the power status.



Measuring PCB and SMD

ASSY-DC L0805, L1206, and L0603 are mini daughter boards with two soldering conductors for soldering on PCB (printed circuit board). Two conductors of the accessory can be soldered on the surface of PCB. The three accessories have different conductor width for testing on PCB with different width of soldering points.

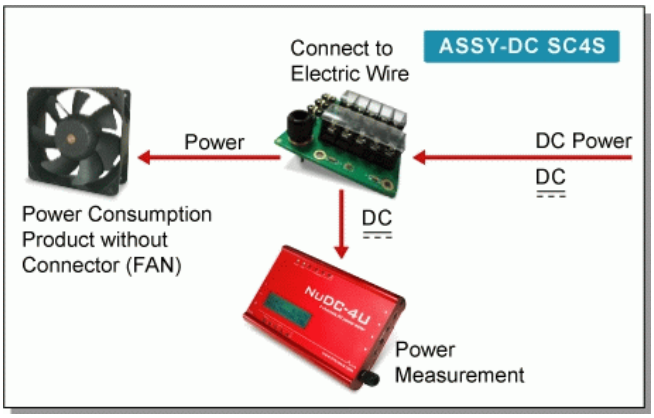
In the design of PCB, it should has ground PIN for the test purpose. All components use the same ground (negative pole) and all ground conductors are linked together electronically. Connect the ground (negative pole) to the ground connector of NuDC-4U. Several accessory daughter boards can be soldered on the same PCB and use the same ground PIN.



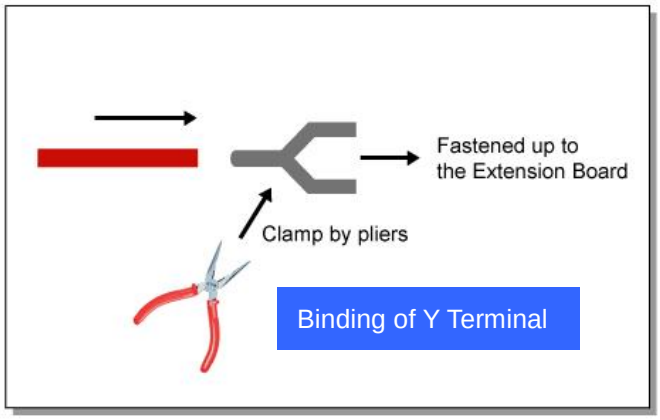
Measure Other DC Powered Device

For other device that is powered by DC, its connector may be varied. It is difficult to have power analysis equipment that has all connectors for all DUT. To solve the problem, fasten up the wire to the extension board ASSY-DC SC4S directly is the simple way.

Connect this extension board between the DC power source and the power consumption device. After that, connect NuDC-4U for monitoring the power status.



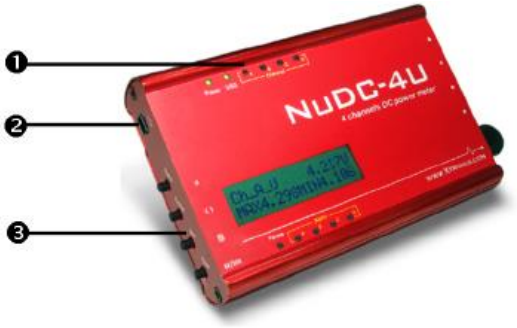
The simplest way is to fasten up the wire to the extension board directly. Also, clamping the Y-shape terminal and then fasten it up to the extension board can fasten the wire tighter and more stable.

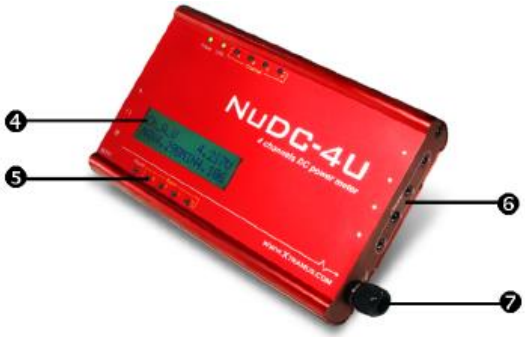


OPERATION OF NuDC-4U

General Description

For configuring the system and accessing logs, NuDC-4U has several control buttons embedded on its panel, and utility softwares for PCs. Also, several optional accessories designed for Nu-DC-4U are available for users with all various DUTs.





❶ Top Array LEDs	❹ Status LCD of Power Measurement
❷ USB Port to PC	❺ Button Array LEDs
❸ Operation Buttons	❻ Measurement Channel to DUT
	❼ Ground Port to DUT

LCD for Displaying Power Measurement Status

On the bottom-left on the top panel, there is a 2x16 characters LCD that shows the power status as the illustration.

❶ V: Voltage, I: Current, W: Watt	❹ Current Value
❷ Channel (A, B, C, D)	❺ Minimum Value
❸ Maximum Value	

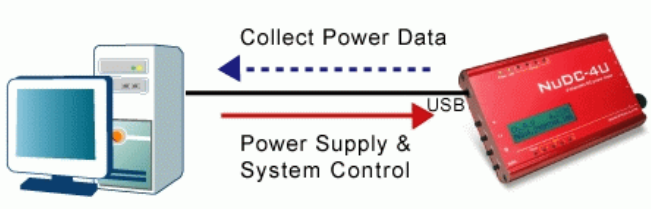
Button Functions

Label	Action	Description
n	Press once or again	Channel selecting button: Select a channel (A, B, C, and D) and its status will be shown on LCD. Keep pressing the button and the channel will loop back and forth.
( )	Press once or again	Function selecting button: Switch values of voltage, ampere or watt on LCD. Keep pressing the button to change the functions.
	Press once	Save button: Save maximum and minimum power status in all 4 test channels
❙❙ /000	Press once	Pause/Clear button: Pause reading on LCD or clear maximum and minimum value

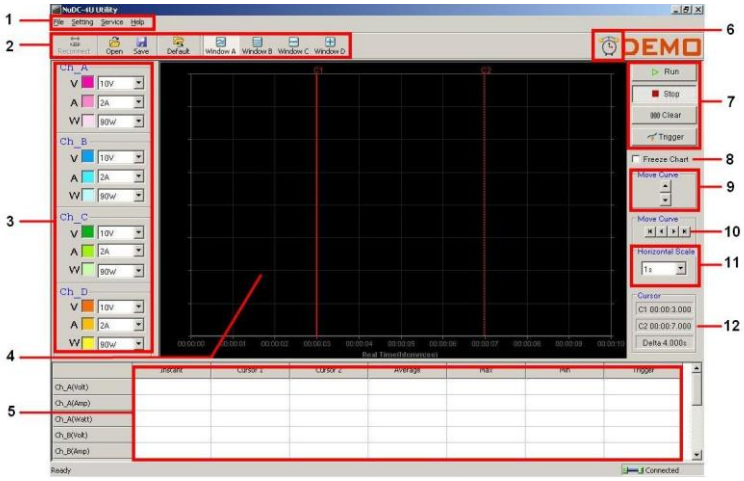
Several control buttons are located on the left-panel of NuDC-4U. Their functions are showed in the table left. You can operate NuDC-4U with these buttons.

Utility Software

NuDC-4U Utility is the software installed on PC that works with NuDC-4U when they are connected via USB cable.



Main Windows of NuDC-4U

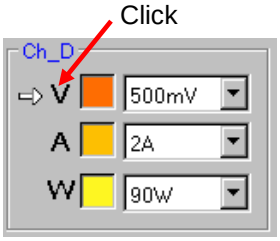


1. Operation Menu	7. Control Buttons
2. Toolbar	8. Freeze Chart
3. Scale of V, A, W of 4 Channels	9. Move Curve (Vertical)
4. Graphic Curve of Power Status	10. Move Curve (Horizontal)
5. Real-Time Value of Power Status	11. Horizontal Scale
6. Alarm	12. Cursor

Moving the Curve

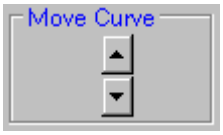
This function can move the power curve under monitoring up or down for comparing the value with other channel

For example, if users want to move the voltage curve in channel D to voltage, click the “V” in Channel D field and a ⇨ cursor will show in front of the Voltage field.



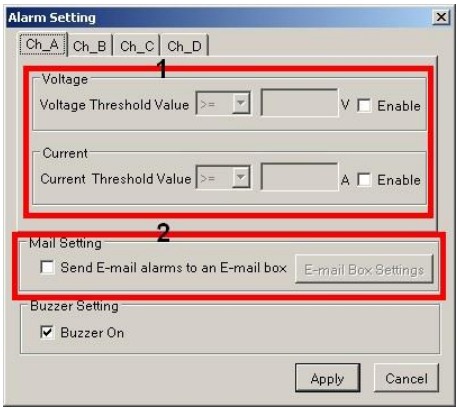
The utility will highlight the voltage curve of Channel D.

User can move the curve by Move Curve buttons as well.



Alarm

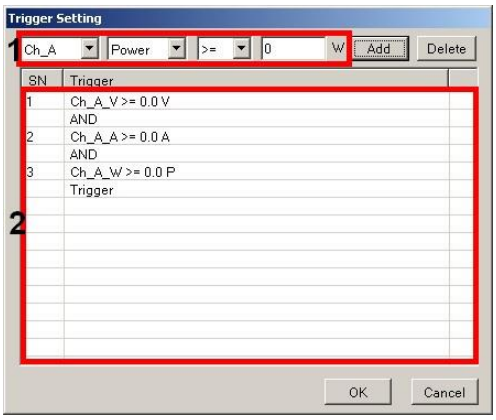
Alarm notifies users when any abnormal situation happens. User can configure a set of alarm base on voltage or ampere. When the power (voltage or ampere) is beyond the standard configured, NuDC-4U Utility will send e-mail to the specified users to inform them the abnormal condition.



1. Alarm criteria
2. Mail Settings

Trigger

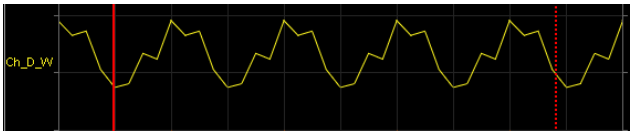
Users can configure several sets of trigger condition with NuDC-4U Utility for tracing certain cases or errors. Either Voltage, Current (ampere) or Power (watt) can be configured as a trigger condition. When the device under test meets these conditions (or in others words, equal to the value configured in the trigger condition), the trigger condition occurrence time will be recorded in the log.



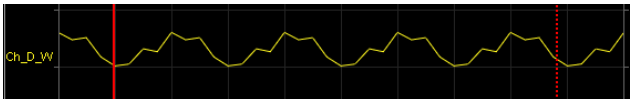
1. Add criteria
2. Trigger Condition

Scale of Power & Test Interval

The oscillation curves become more violent if a smaller scale is set. The oscillation curves will be smoother if a larger scale is set.

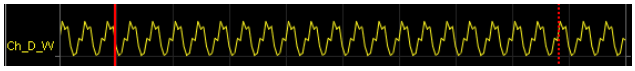


Scale in 1w of Channel D

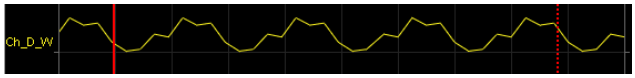


Scale in 2W of Channel D

The oscillation curves will be more compressed if the scale of test duration is set to a longer time period and the test runs for a long period of time. However, the oscillation curves will be less compressed if the scale of test duration is set to a shorter time period with shorter test running duration.



Test duration in 10 seconds in one grid

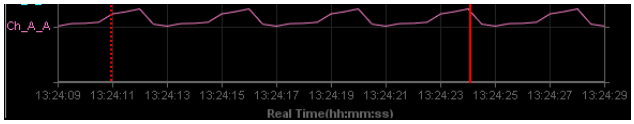


Test duration in 2 seconds in one grid

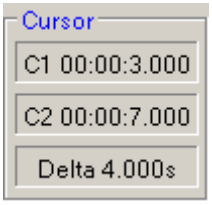
Cursor Time

In NuDC-4U's utility, test interval between two test points (Cursor 1 and Cursor 2 in the oscillation curve down below) are marked with vertical red lines.

Cursor 1 Cursor 2



The value of the interval is listed in the "Delta" field. Users can examine the real-time variation of voltage, ampere and watt between Cursor 1 and Cursor 2, which are shown on the main Window of software utility.



Delta Time is the time duration between Cursor 1 and Cursor 2.

Real-time power status of C1 and C2 in Utility software

	Instant	Cursor 1	Cursor 2	Average	Maximum	Minimum	Trigger
Ch_A_V(Volt)	3.221	3.278	3.278	3.292	3.478		
Ch_A_A(Amp)	1.121	1.128	1.128	1.140	1.250		
Ch_A_W(Watt)	3.611	3.698	3.698	3.754	4.348		

Optional Accessories for DC measurement

NuDC-4U Accessories	
 **Bare Wire Connection**	**ASSY-DC SC4S:** Extension board for connecting DC devices with no connector. The detection range of the current can be doubled if wires are fastened in parallel.
 **PoE Device**	**ASSY-DC POEA:** Connection board for monitoring the power status of PD (Powered Device) of PoE. (Power via Pin 1, 2, 3, 6) - Mode A **ASSY-DC POEB:** Connection board for monitoring the power status of PD (Powered Device) of PoE. (Power via Pin 4, 5, 7, 8) - Mode B
 **USB Device**	**ASSY-DC USBAB:** Connection boards for monitoring USB devices' power status
 **DC Jack Device**	**ASSY-DC JACK:** Connection boards for monitoring power status of devices with different kinds of DC Jacks. Models for different sizes of DC Jack are shown below: ➢ **ASSY-DC JACK065:** ψ0.65mm ➢ **ASSY-DC JACK165:** ψ1.65mm ➢ **ASSY-DC JACK235:** ψ2.35mm ➢ **ASSY-DC JACK13:** ψ1.3mm ➢ **ASSY-DC JACK20:** ψ2.0mm ➢ **ASSY-DC JACK25:** ψ2.5mm
 **PCB and SMD**	**ASSY-DC:** Mini daughter board with two soldering conductors for soldering on PCB. Models with different widths of conductors are shown below: ➢ **ASSY-DC L1206** ➢ **ASSY-DC L0805** ➢ **ASSY-DC L0603**

RELATED PRODUCTS

- **NuOutlet-LN:**
  AC Power Monitor

- **XM-2WL1:**
  AC Power Test Module of NuStreams Chassis

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