U3800 Trace Correlation Manual

Outline:

This software is a sample software that calculates the correlation between two channels developed for our company U3800 CDA (Cross Domain Analyzer) series. First, the personal computer acquires the measurement data from U3800. The correlation is calculated from the acquired data. The setting of U3800 is only a sweep starting and the measurement conditions are not set. Therefore, please set the measurement conditions from the panel before the measurement starts. The results of the correlation (r) are obtained within the range $-1 <= r <= 1$. The 1 becomes a linear correlation, and the 0 becomes none. (Refer to the table below.) The $r < 0$ is negative correlation. The application of the correlation is expected of the causal relation of two waves and the guess of delay time (*1), etc. This software is free software.

Correlation	General interpretation (*2)
1	Complete linear correlation between two variants.
0.9 over	Very high correlation between two variants.
0.7 to 0.9 under	High correlation between two variants.
0.3 to 0.7 under	Medium correlation between two variants.
0.3 under	Low correlation between two variants.
0	No linear correlation between two variants.

Operating environment:

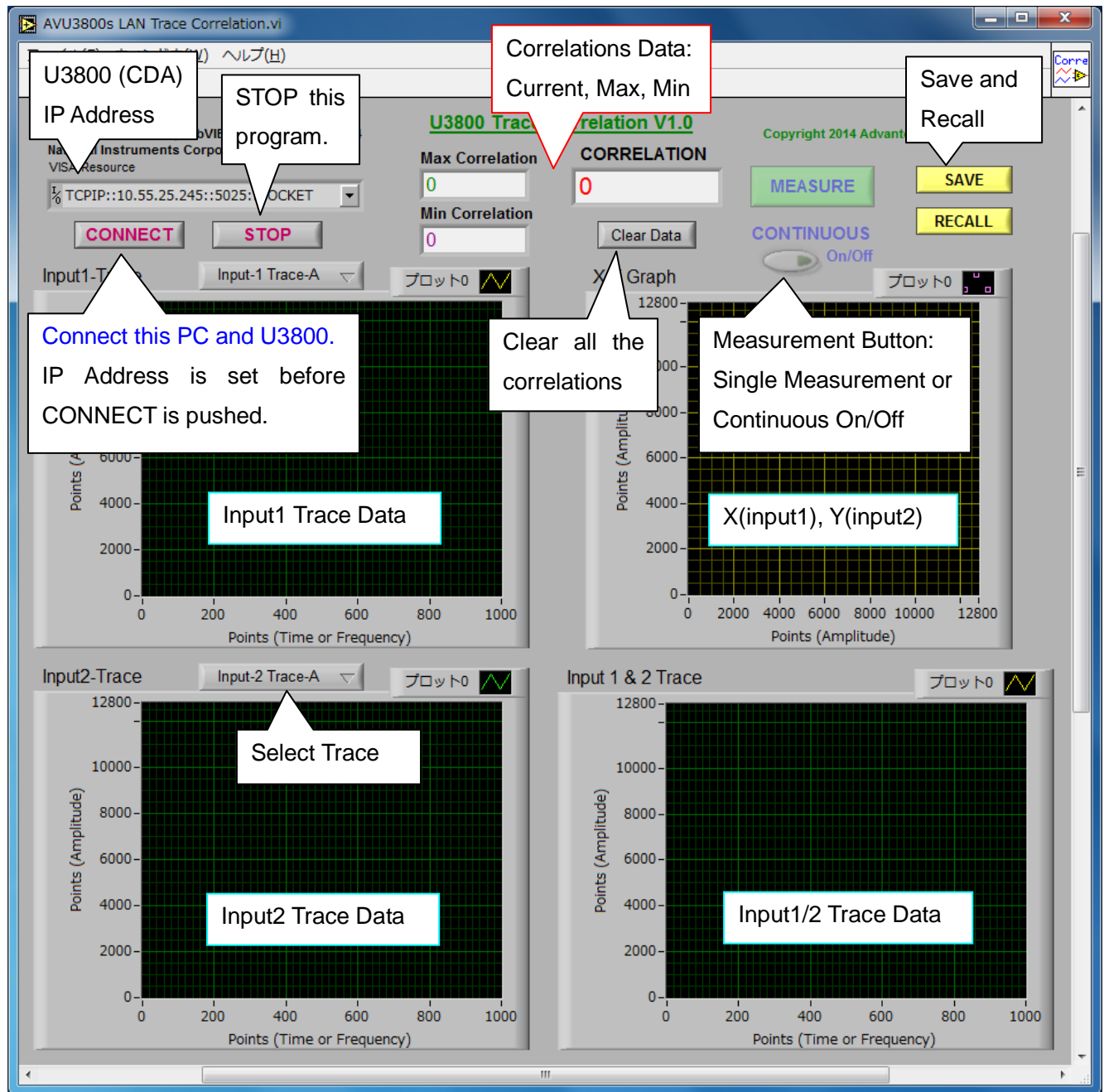|	
U3800 CDA:	U3800 Cross Domain Analyzer series.
CDA Initial setting:	Setup the conditions: Trace-1001Points, AT Command-Mode.
	Additionally, set all measurement conditions.
	(Possible even on the way)
Personal Computer:	Windows XP/ VISTA/ 7 (Checked on part)
Interface:	LAN
Driver:	NI_VISA made by the National Instruments is necessary.
	Please install it from the home page of NI or an attached driver of
	U3800 FEFS…Sample software when PC has not the driver.
	(There are for XP/2000 or VISTA/7)

Installation and startup of software:

1. The installation: Execute the setup.exe in directory of Installer.
2. **Run:** Start →Programs →U3800 Trace Correlation →**U3800 Trace Correlation.**
3. Measurement: IP address of U3800 is confirmed, and it inputs it to the IP address column of the menu. Press the **CONNECT** button. (The last measurement parameter is done from the startup of the second times and the recall is done.)
4. **Stop and Reboot:** It stops with the **STOP** button, and the end is X button. The reboot presses an upper right **=>** and presses the CONNECT button.
5. **Help:** When **"Display Help"** is selected from help of the pull-down menu, the explanation of the button of the mouse point is displayed.
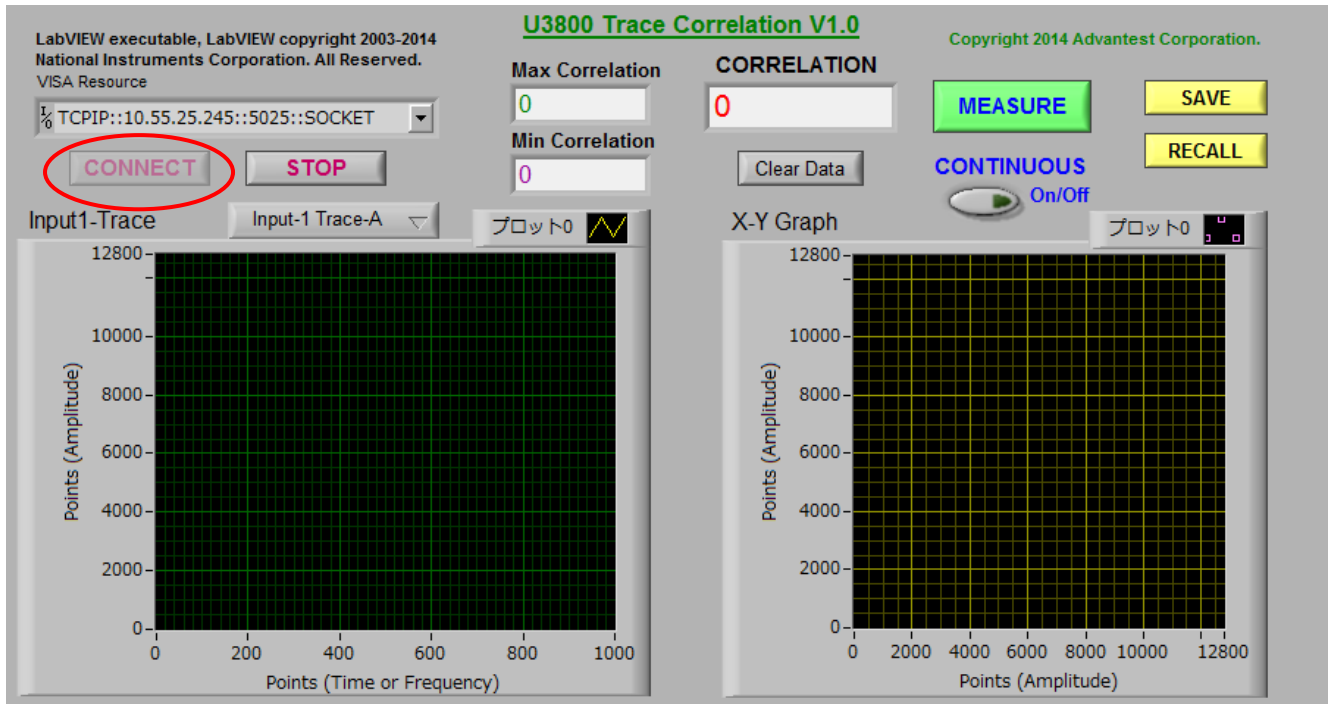
Measuring methods:

1. When the connection of LAN is completed, the MEASURE and the CONTINUOUS button become active (state that the key can be used).

   MEASURE:　　　　One measurement is executed.

   COUNTINUOUS:　　Continuous measurement is executed.

   After the end of sweep (measurement) of U3800, the waveform data is got.

   (One time in one measurement)
2. The comparison trace data can be changed with the trace selection button that exists in the Input1 (2) Trace graph. When the specified trace is turning off, it is automatically set to the Write mode.
   The Write mode is not set when already set to Write or VIEW.
3. The trace data is not related to the measurement condition and acquires the point data. (0 to 12800)
4. **SAVE:** After the measurement ends, the measurement data can be saved. (The format is CSV)
5. **RECALL:** When the saved file is done in the recall, the correlation and the waveform data are displayed. (The recall can be done regardless of LAN connection.)

Software Starting and Menu:

The following screen appears when starting.

AVU3800s LAN Trace Correlation.vi

U3800 (CDA) IP Address

STOP this program.

Correlations Data: Current, Max, Min

Save and Recall

U3800 Trace Correlation V1.0

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National Instruments Corpo
VISA Resource

Max Correlation

CORRELATION

MEASURE

SAVE

TCPIP::10.55.25.245::5025::SOCKET

0

0

RECALL

CONNECT   STOP

Min Correlation

Clear Data

CONTINUOUS
On/Off

Input1-Trace   Input-1 Trace-A   プロット0

X Graph   プロット0

Connect this PC and U3800. IP Address is set before CONNECT is pushed.

Clear all the correlations

Measurement Button: Single Measurement or Continuous On/Off

Input1 Trace Data

X(input1), Y(input2)

Points (Amplitude)

Points (Amplitude)

Points (Time or Frequency)

Points (Amplitude)

Input2-Trace   Input-2 Trace-A   プロット0

Input 1 & 2 Trace   プロット0

Select Trace

Input2 Trace Data

Input1/2 Trace Data

Points (Amplitude)

Points (Amplitude)

Points (Time or Frequency)

Points (Time or Frequency)

Measuring Starting: Push the CONNECT: PC and U3800 are connected in LAN.
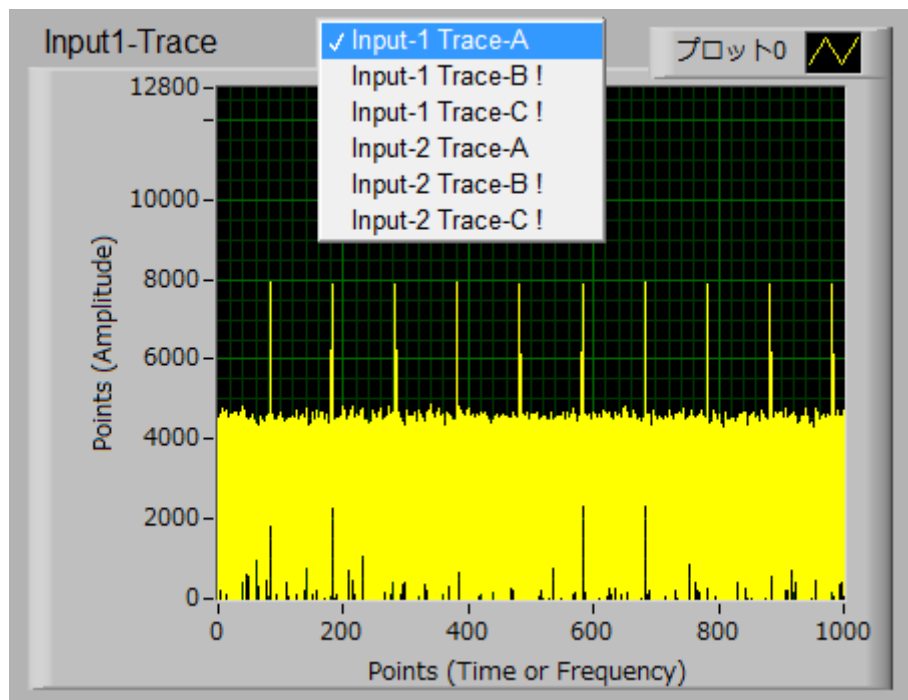

1. If MEASURE is pushed, it becomes a single measurement.

4
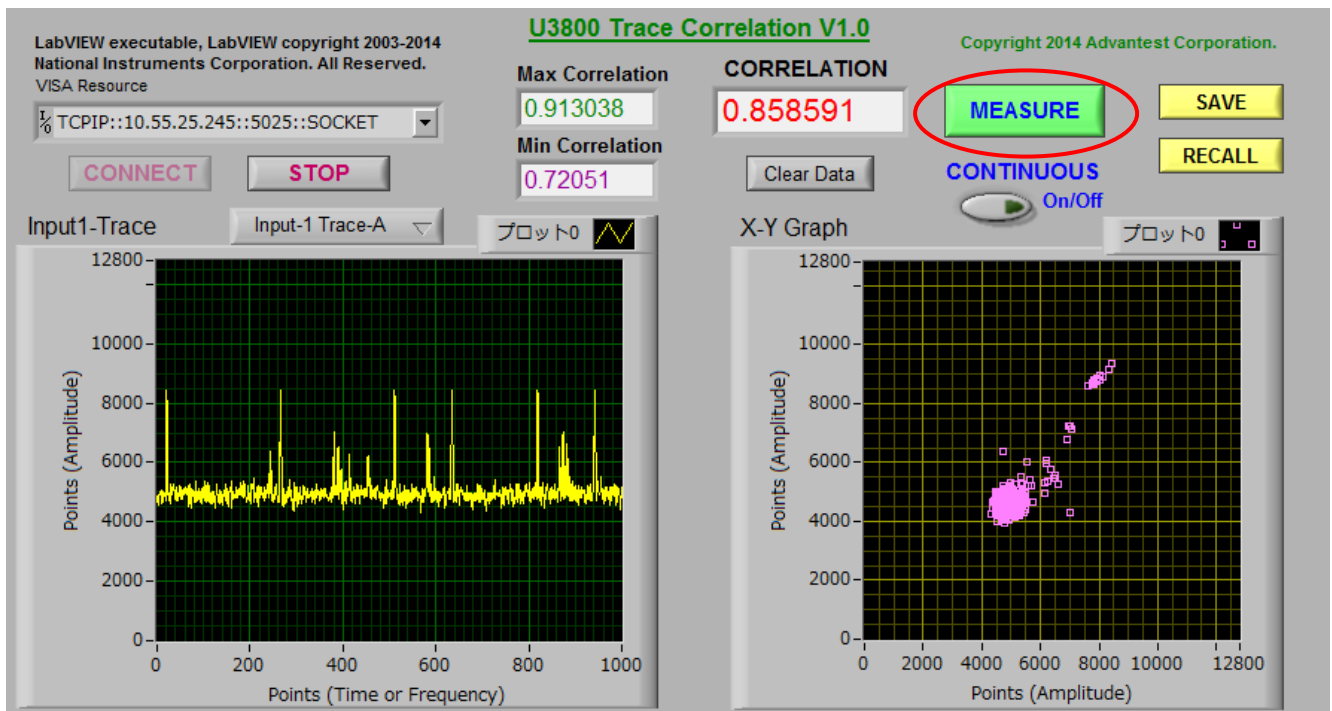
2. If CONTINUOUS is pushed, it becomes a continuous measurement.
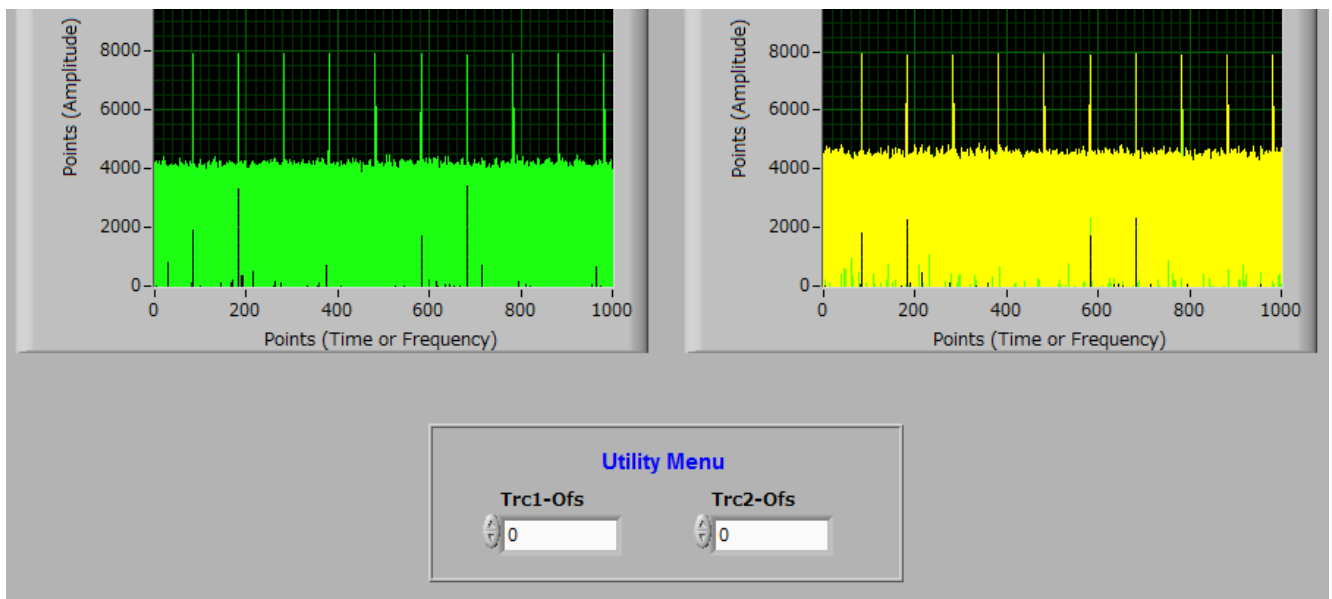### (If CONTINUOUS is pushed again, the measurement can be ended.)
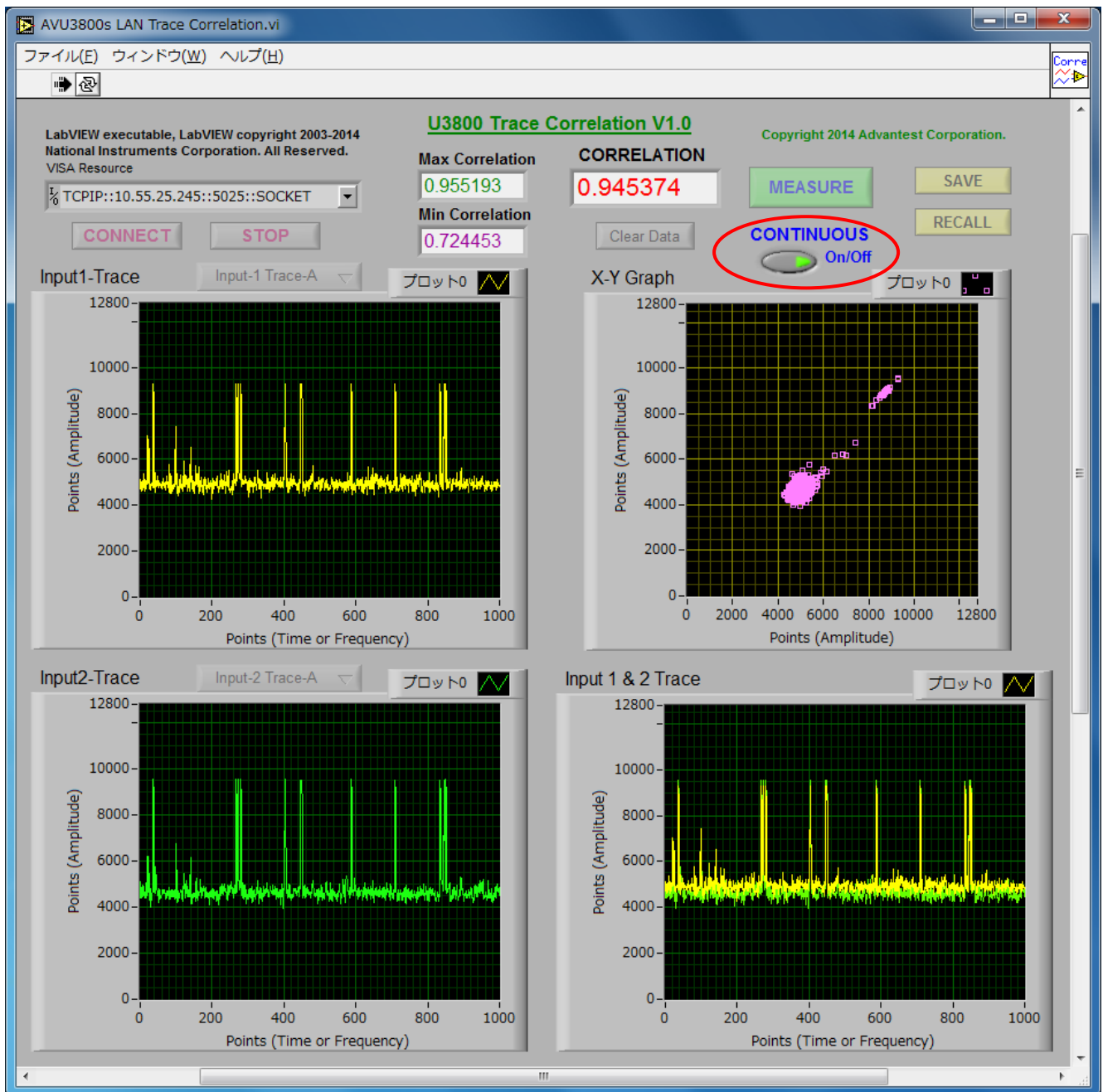
3. It is possible to change in the trace data.
  (It is improper while measuring it.)

Utility Menu: **The additive of the offset data is possible in the trace data.**
  Trace Data = (0 − 12800) ± Offset

CSV File Data Format:

	A	B	C
1	ADVANTEST Trace Correlation: 201404101 60648		
2	Input1−Trace/Offset:		
3	0		
4	0		
5	Input2−Trace/Offset:		
6	3		
7	0		
8	Correlation: Current/Max/Min		
9	0.967909		
10	0.973464		
11	0.965947		
12	Trace Data: (CH1)	(CH2)	
13	11921	12175	
14	11156	11387	
15	5393	5534	
16	4952	5097	
17	5435	5213	
18	8882	8888	
19	9805	9800	
20	6801	6768	

	A	B	C
1003	6091	5498	
1004	1113	−44	
1005	6072	5373	
1006	1292	−690	
1007	5828	5695	
1008	2119	1109	
1009	5904	5343	
1010	761	772	
1011	5878	5611	
1012	1212	1516	
1013	5969	5327	
1014			

Line3:

Trace Mode 0 to 5

0: Input1 Trace A

1: Input1 Trace B

2: Input1 Trace C

3: Input2 Trace A

4: Input2 Trace B

5: Input2 Trace C

Line4:

Input1 Trace offset

Line6:

Trace Mode 0 to 5

Line7:

Input2 Trace offset

Line9:

Correlation (Current)

Line10:

Max Correlation

Line11:

Min Correlation

Line 13 to 1013:

Trace Data 1001 pts

   Column A: CH1

   Column B: CH2

CH1 Trace Data

(1001 points)

CH2 Trace Data

(1001 points)

A full scale of the trace data is 0-12800. The scale might be exceeded.

<u>Reference:</u>

Operational expressions of correlation:

Correlation r = Covariance XY / Standard deviation X * Standard deviation Y

$$\text{Covariance } Sxy = \Sigma (Xi - X)(Yi - Y) / (N - 1)$$

$$\text{Standard deviation} = (\sqrt{\text{Variance}})\ S = \sqrt{V}$$

$$\text{Variance } V = \Sigma (Xi - X)^2 / N - 1$$

Reference materials:

*1: ADVANTEST R9211B/C/F (Discontinuance): Operation Manual: Chapter 8 Waveform Mode

*2: Hokkaido University of Education Home Page: Fukuda Lab: Lecture/Social Linguistics