Real-time Digital Signal Processing System
Model: DSP-APV8508-14-CN

Instruction Manual

1.5.1 Edition　Jun. / 2018

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Disclaimer

We thank you for your continued confidence and patronage.
Thank you very much for truly about using our product.

Take no responsibility in the folling cases of using our product.
・Damage claim about equipment and connection epuipment and software damage.
・All of the damage compensation , including secondary damages.
Please use is self-responsibility.

DON'T

- Please do not use in applications requiring reliability such as related to human life or accident.
- Please do not use in special environment such as high temperature, high humidity, a vibration-prone area. (The measures the product is excluded.)
- Please do not turn on the power in a state contacting the metal with the board.
- Please do not apply a voltage exceedin the rating.
- Resale is prohibited.

CAUTION

- Please immediately turn off the power if smoke or abnormal heat generation.
- It may not work properly in a noisy environment.
- Please be aware of the static electricity.
- The contents of specifications and related document of the product are subject to change without notice.

Guarantee conditions

Warranty conditions are as follows:

- Warranty period　　Buy after one year.
- Warranty information　　If you have trouble in use within the warrantry period, We will do the repair or replacement.
- Out of warranty as follows:
  (1) If you use in other than the above methods of use.
  (2) The trouble due to causes other than our product and natural disaster.
  (3) Expendables, etc.

TEHCNO AP CO., LTD.

Contents

1. Abstracts

The APV8508-14 is a waveform analysis board for scintillation detectors. Each channel (8 CH) is equipped with high-speed, high resolution ADC (500 MHz, 14 bit). The APV8508-14 is able to correspond to the high rates of more than 100 kcps per CH in the list mode with using the Gigabit Ethernet (Gb Ether) connection.

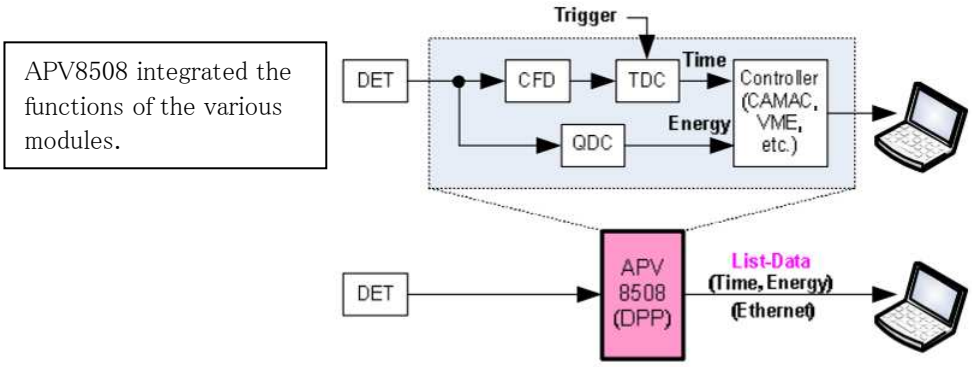


Fig. 1-0-1. DPP structure

※In this instruction manual, “List” and “Event” are equivalences.
※In this instruction manual, “Histogram” and “Spectrum” are equivalences.

1. 1. Specification

(1) Analog Input
- Number of Channel : 8CH
- Input Range : ±1V
- Coarse Gain : 1x, 3x
- Input Impedance : 50Ω

(2) ADC
- Sampling Frequency : 500MHz
- Resolution : 14bit
- SNR : 68.3dBFS@605MHz

(3) Performance
- QDC Throughput : More than 1Mcps
- Time Resolution : 7.8ps(LSB)

(4) MCA
- Measurement Mode : Wave Mode, Histogram Mode, Time Histogram Mode, List Mode
- Event Transmission Rate : Approx. 10Mbyte / sec. In case of 10Byte (80Bit) / Event, CH total is 1Mcps.

(5) I/F
- LAN I/F : Ethernet TCP/IP1000Base-T (List data acquisition), UDP/IP (config data, states data sent / received)

(6) Form
- VME type : APV8508-14(8CH)

(7) Wattage
+5V : 3.0A (Max.)
+12V : 0.8A (Max.)
−12V : 0.4A (Max.)

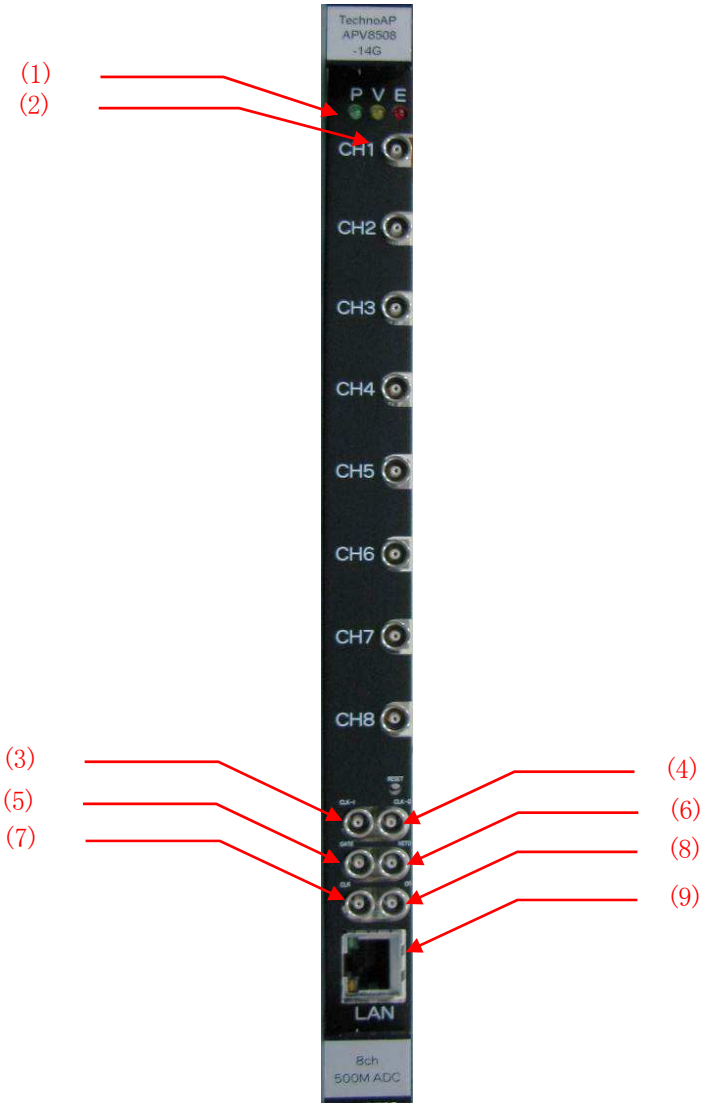
1. 2. System Requirements

- Microsoft Windows 7 or later

1. 3. Revision History

Nov./01/2014	1.0.0	First Edition
Dec./01/2014	Rev. 1.1.0	Added TimeSpectrum Tab
Feb./06/2015	Rev. 1.2.0	Added Deadtime (%)
Mar./20/2015	Rev. 1.3.0	Modified command format and table for SiTCP
Aug./03/2015	Rev. 1.4.0	Added SiTCP Command transmission and reception
Mar./08/2017	Rev. 1.4.1	Modified 3.2「connection」and command configuration (P.41)
Jun./12/2018	Rev. 1.5.0	Modified 6.4「Command Table」and command configuration (P.38) Added 5.4「Wave Data File」(P.31)
Jun./18/2018	Rev. 1.5.1	Pictures adds for explaining a config parameters.

2. External



(1)	LED	Turn on a power; light a red lamp.
(2)	CH1～CH8	LEMO00 series connector for signal input.
(3)	CLK-I	LEMO00 series connector for external signal (TTL Signal) input. APV8508 work with external clock. Turn on the power after input of 25MHz of theTTL signal.
(4)	CLK-O	LEMO00 series connector for external signal (TTL Signal) output.This connector outputs the 25MHz of the TTL signal.
(5)	GATE	LEMO00 series connector for external signal (TTL Signal) input.This connector enter the GATE signal. You can acquire the data while input is high.
(6)	VETO	LEMO00 series connector for external signal (TTL Signal) input. “This connector enter the VETO signal. To disable the date acquisition when the input is high.
(7)	CLR	LEMO00 series connector for external signal (TTL Signal) input.It clears the time counter data on the rising edge of ‘high’.
(8)	AUX	LEMO00 series connector for external signal (TTL Signal) output.Board #3 (IP:192.168.10.130) is CLK-O function. Board #4 (IP:192.168.10.131) is CLR signal when measurement is start.
(9)	LAN	RJ45 connector for Ethernet.

3. Preparation

3. 1. Installation of the application

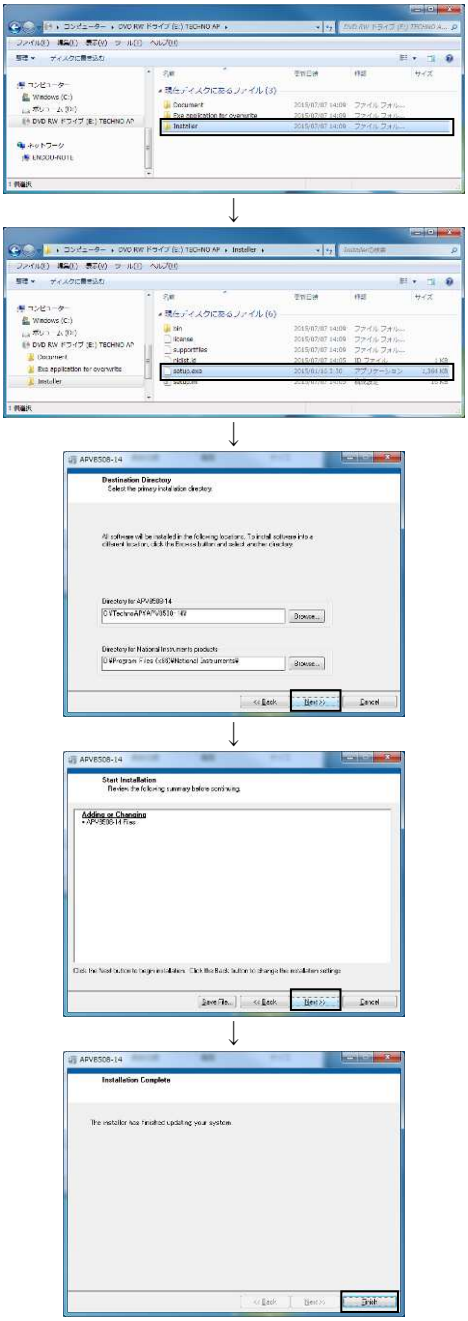
Application is upgraded. You are able to install application after uninstall current application.

(1) Recommended computer environment is below.
Microsoft Corp. Windows 7 32Bit, screen resolution XGA(1024×768) or more.

(2) Log in with administrative privileges.

(3) Insert the installation CD to your computer. Run「Installer」folder「setup.exe」.

(4) After finished of installation, restart PC.

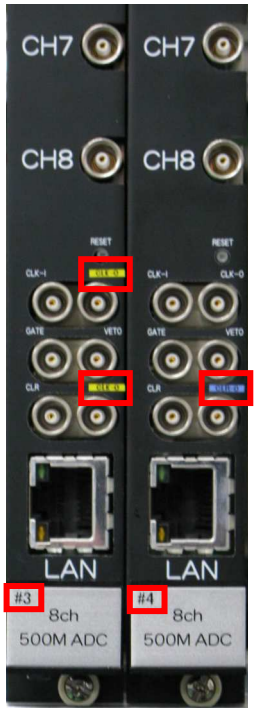


Uninstall is「Start- Control panel - Add or Remove Programs.

3. 2. Connection

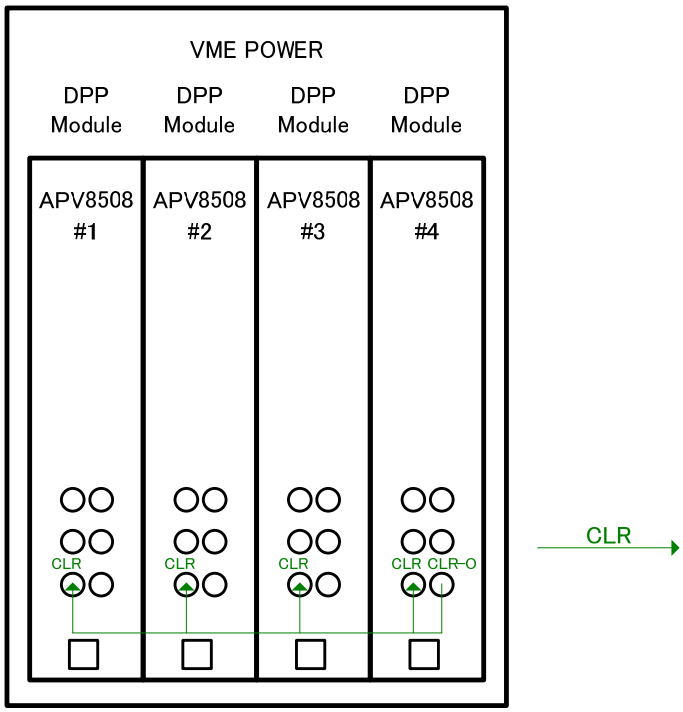
(1) There is a board number of each APV8508. Please confirm a number “#3” and “#4”.

(2) Board #3 have two output of CLK-OUT. Board #4 have one of CLR-O.

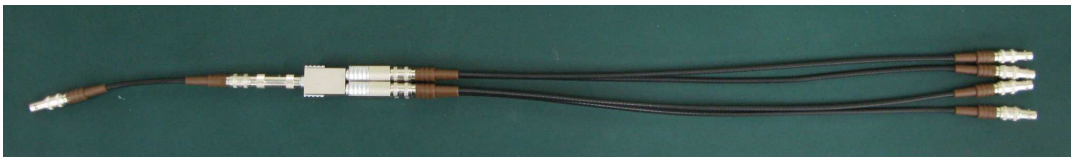


(3) Connect the LAN cable to the APV8508 and the supplied of hub “GS905L”.

(4) Connect the external clear as follows. Use the supplied coaxial cable.
Connect the clear output that is branched from “#4 CLR-O” to each “CLR”.

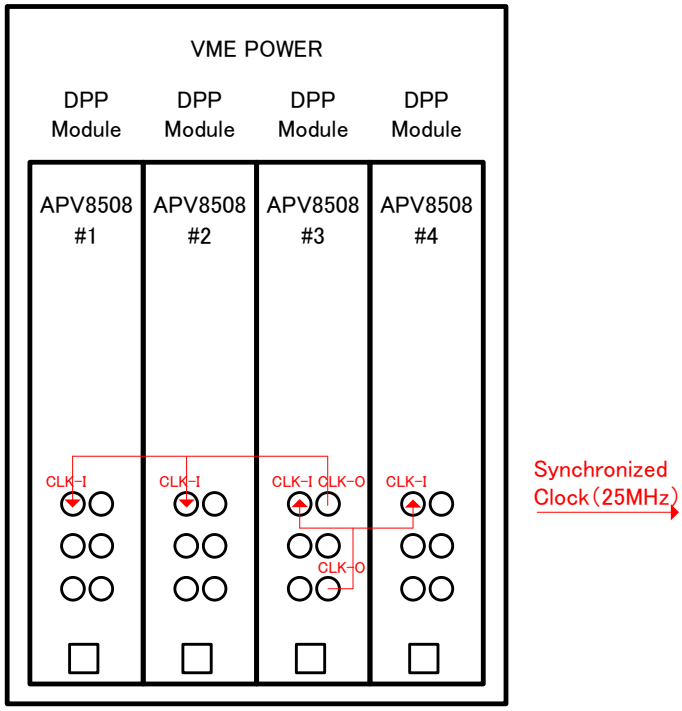


※Caution! Please be sure to connect from “#4 CLR-O”



(5) Connect the external clock as follows. Use the supplied coaxial cable.

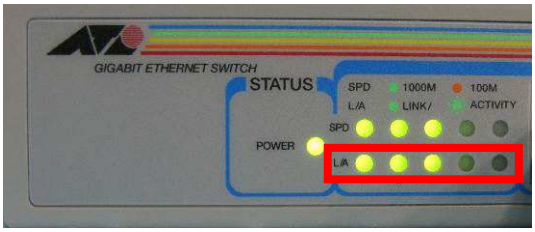
Connect the clock that is branched from one of “#3 CLK_O” to 2 board “CLK_I”.
Connect the clock that is branched form another “#3 CLK_O” to other “CLK_I”.
※Caution ! Don’t connect the “CLK_O” each other.



3. 3. Power ON and IP Connection Confirmation

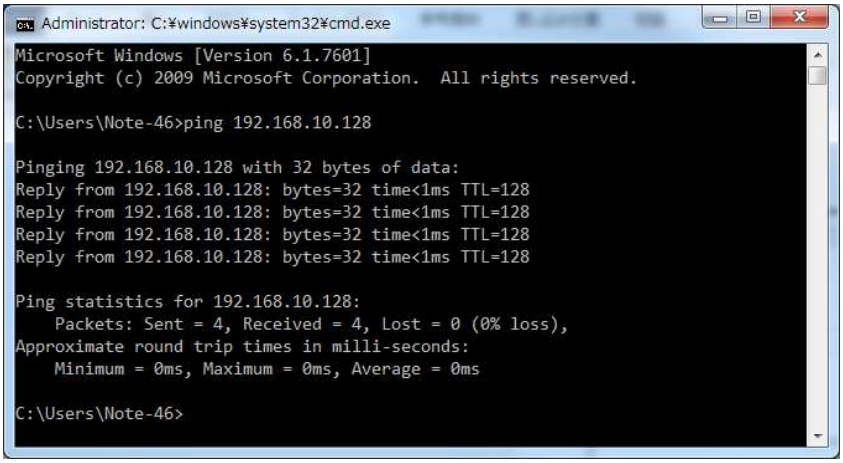
(1) Confirm power on the PC and Hub, and ON the VME power switch.

(2) Please wait 30 second until the Hub LED lighting.
Confirm LED lighting at 5 port L/A.

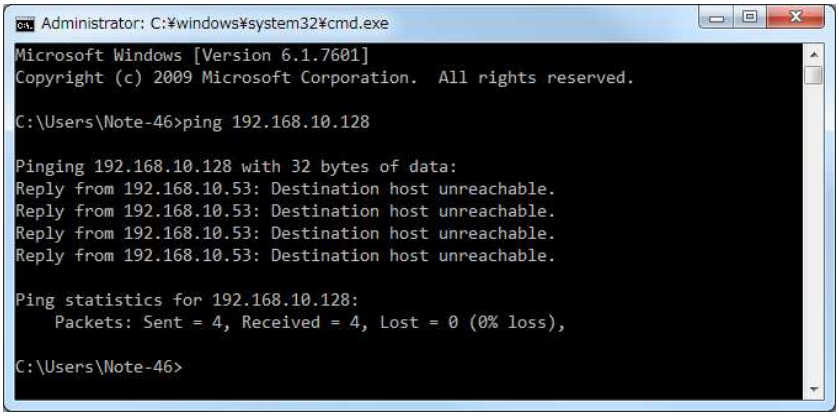


(3) Start the windows application “cmd.exe”. Confirm Ethernet connection as follows.
「ping 192.168.10.128」
「ping 192.168.10.129」
「ping 192.168.10.130」
「ping 192.168.10.131」

※Case of success

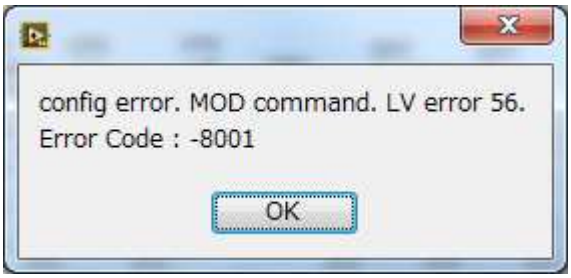


※Case of failure



(4) Start application「APV8508-14」.

※When it fail to start application, display as follows message.



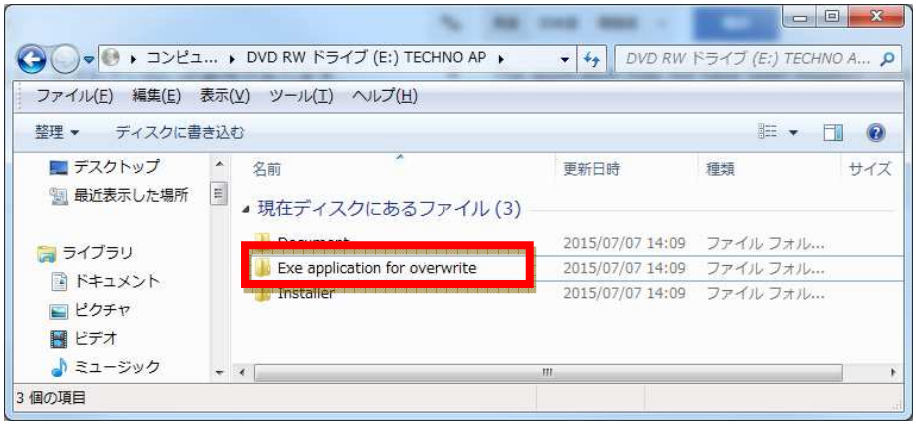
※It will show the main cause below.

- It is insufficient insertion of LAN cable.
- PC network setting is “DHCP”.
- IP address of TCP/IPv4 is not the range ”192.168.10.2” to “192.168.10.255” except for “192.168.10.128” and “192.168.10.129”.

※Please try again following.

- After application is closed, it will restart the VME power.
- Confirm connection of “EXT clock”.
- The application may not have been installed correctly.

  Please overwrite the executable application to「C:¥TechnoAP¥APV8508-14」.
  There is executable application in the install CD.



3. 4. Display

Recommended monitor resolution is more than XGA(1024x768).

4. Screen

4. 1. Startup Screen

The following opening screen is displayed when you carry out “Start”-“TechnoAP”-“APV8508-14”.

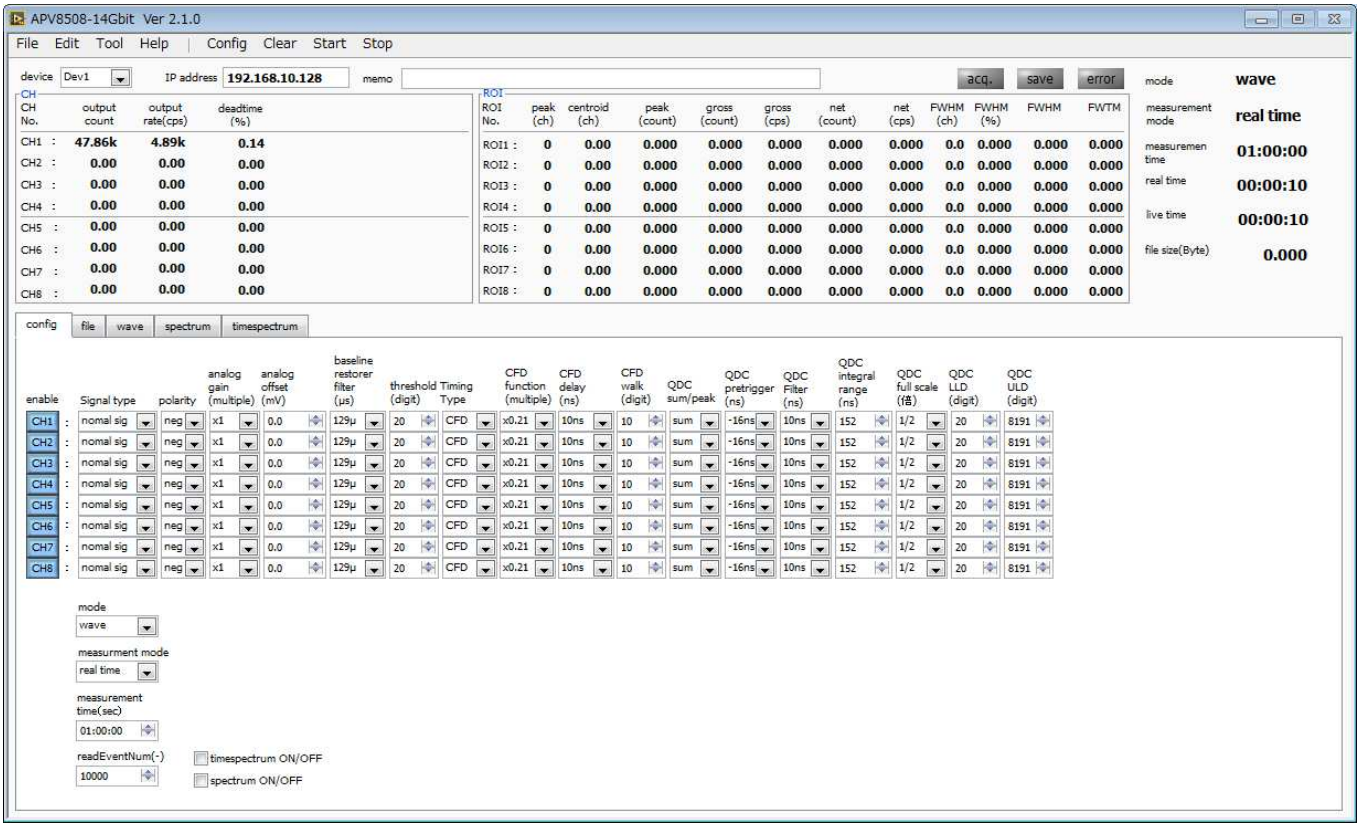


Fig. 4-1-1 DPP MCA Start screen

The following description is about Start screen.

・Menu

The configuration of “File”, “Edit”, “Config”, “Clear”, “Start”, “Stop”.

“File”-“open config”	:	Reading of the config file
“File”-“save config”	:	Save current setting in a config file
“File”-“save histogram”	:	Save current histogram data in a file
“File”-“save wave”	:	Save the wave data
“File”-“save image”	:	Save the DPP MCA screen in PNG format image
“File”-“quit”	:	Quit of the application
“Edit”-“copy setting of CH1”	:	Setting of CH1 in the “CH” tab is reflected by setting of all other CH
“Edit”-”IP configuration”	:	Change IP address of current display device
“Edit”-”calibration”	:	Calibrate the device
“Edit”-”instruction manual”	:	Open the instruction manual in PDF format.
“Tool”-”Auto threshold”	:	Auto threshold.
“Tool”-”Auto walk”	:	Auto walk.
“Help”	:	Open the instruction manual of current tab in PDF format
“Config”	:	Send all setting to DPP
“Clear”	:	Initialize histogram data in DPP
“Start”	:	Send “Measurement start” to DPP
“Stop”	:	Send “Measurement stop” to DPP

・Tab

“config”	:	DPP setting and Setting about the measurement

"File" : Setting of waveform and save of list data
"wave" : Display of input waveform, CFD waveform and QDC waveform
"spectrum" : Display of histogram from QDC of list data
"timespectrum" : Display a time lag spectrum of CH1 and CH2 from time information of list data

・CH

Display a state each CH.
"output count" : Output total count. Output event number of total.
"output rate (cps)" : Output count rate. Number of the output events / second.
"deadtime (%)" : Deadtime ratio

・ROI

Display a calculation result between ROI.
"peak (ch)" : CH of the maximum count
"centroid (ch)" : Calculated center value (CH) by the total of all counts
"peak (count)" : Maximum count
"gross (count)" : The sum of the count between ROI
"net (count)" : The sum of the count obtained by subtracting the background between the ROI
"net (cps)" : Count of CPS obtained by subtracting the background between the ROI
"FWHM (ch)" : Half Width at Half Maximum (ch)
"FWHM (%)" : Half Width at Half Maximum (%).
Half Width at Half Maximum / ROI Definition Energy x 100
"FWHM" : Half Width at Half Maximum
"FWTM" : 1/10 width

・Device : Choose the DPP for targeted measurement.
・IP Address : IP address. IP address of the selected device will be display
・Memo : You can enter notes
・Acq. LED : Blinking LED when during measure.
・Save LED : Blinking LED when during save List Data.
・Error LED : Blinking LED when during occurrence of an error.
・Mode : "hist", "wave" and "list"
・Measurement Mode : Measurement Mode; "Real Time", "Live Time"
・Measurement Time : It is the measurment time set
・Real Time : It is a measurement time of the first CH.
・Live Time : It is a live time of the first CH. Live time = real time - dead time
・File Size (Byte) : It is a capacity of the list mode saved current file

4. 2. Config Tab

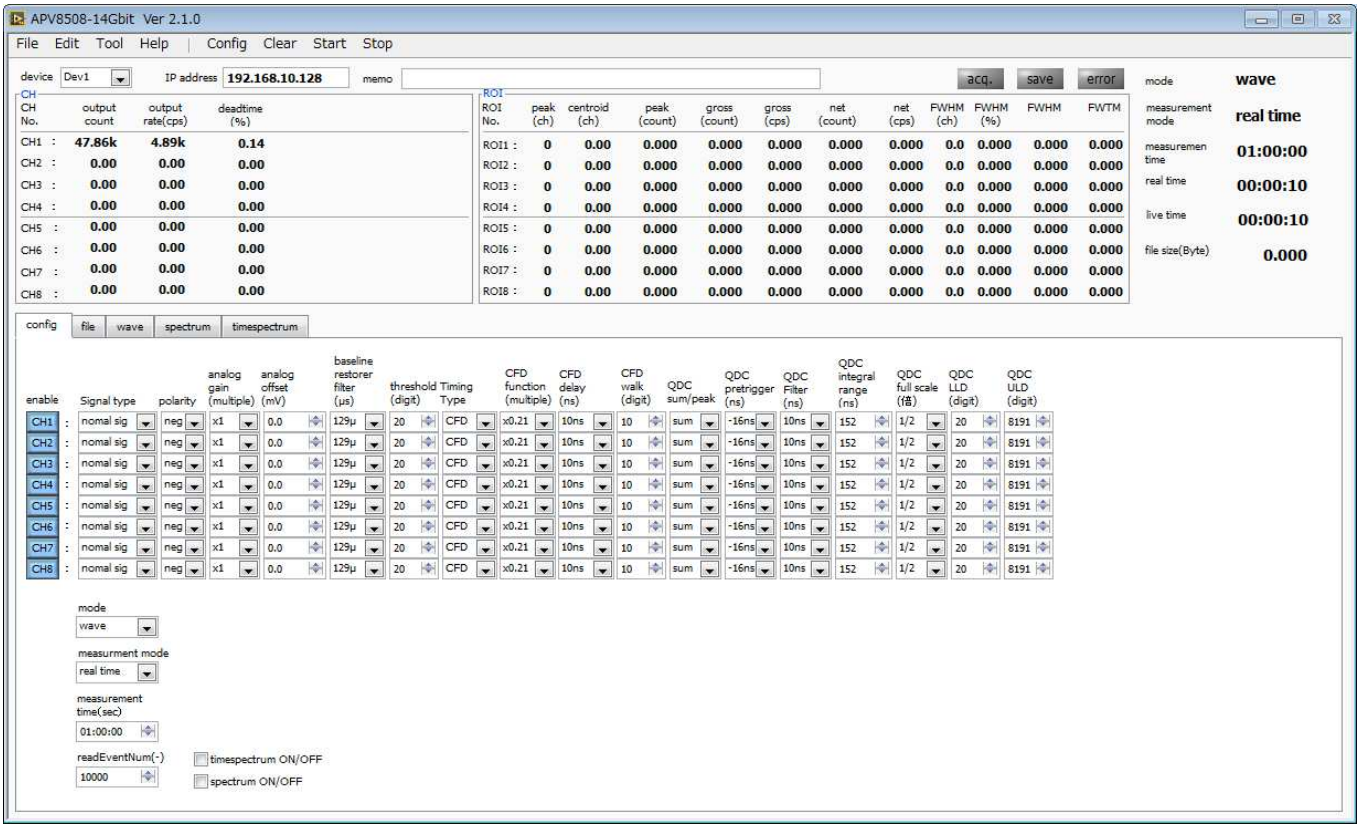


Fig. 4-2-1 Config Tab

・Enable : Please enable all CH

・Signal Type : This select the type of the input waveform. Fast rise of the signal, please to NIM signal setting. For example, NIM signal and 4ns following the rising edge.

・Polarity : This select the polarity of the input signal.

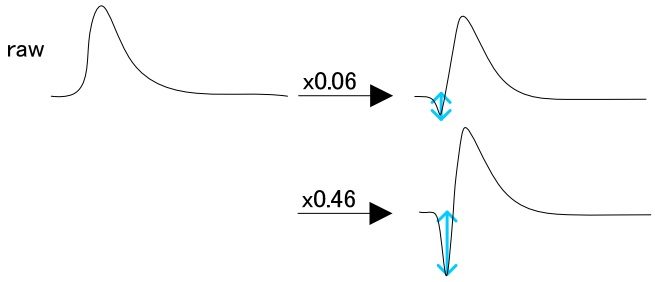
・Analog Gain : Choose the Analog Gain, 1x, 3x.

・Analog Offset : Choose the Analog Offset. The range is ±1000mV. Nomally set 0.0mV.

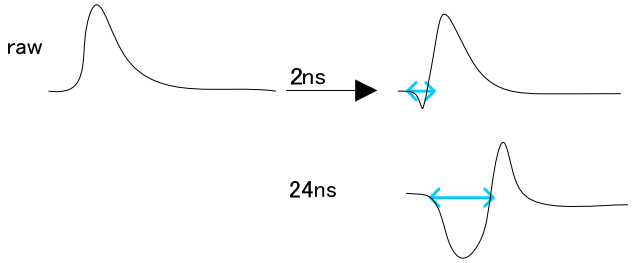
・Baseline Restorer Filter: This set the time constat of the baseline restorer filter. Ext (AutoBLR off)、Fast、4μs、85μs、129μs、260μs. Nomally set to 85μs.

・Threshold : Set the threshold. Unit is digit. Range is 0 to 8191.

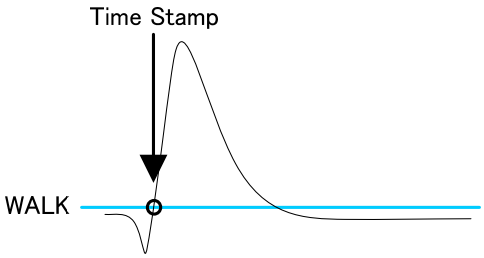
・CFD Function : This magnification use to reduce the input signal. Set value is ×0.03, ×0.06, ×0.09, ×0.12, ×0.15, ×0.18, ×0.21, ×0.25, ×0.28, ×0.31, ×0.34, ×0.37, ×0.40, ×0.43, ×0.46.



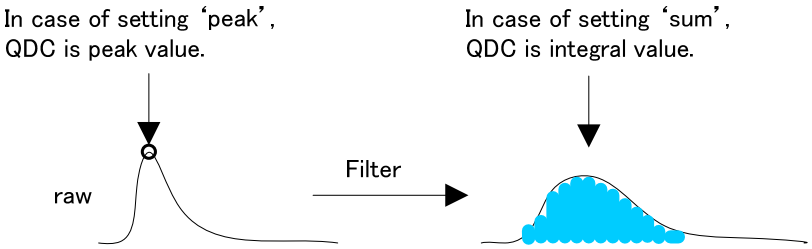
・CFD Delay : Set the time of delay for CFD signal generation. Set velue is 2ns to 24ns every 2ns.



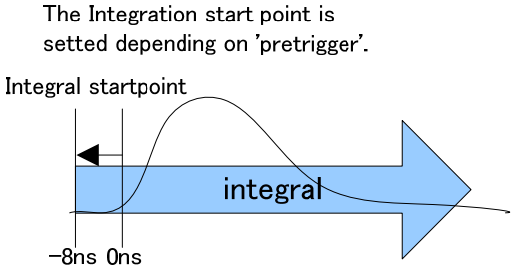
・CFD Walk : Set the value for timestamp. Nomally set 10 digit.



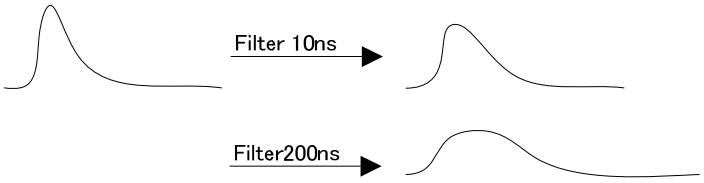
・QDC Sum or Peak : Set the type of QDC data. Type select from the PEAK and SUM. PEAK is the peak value of raw signal. SUM is the integral value of QDC waveform.



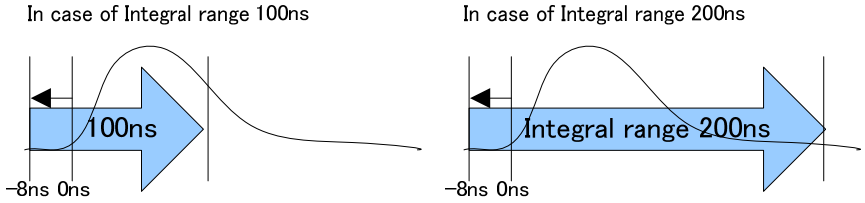
・QDC Pretrigger : Set the time of the integral start point for QDC waveform. Value select 0ns, −8ns, −16ns, −32ns, −40ns.



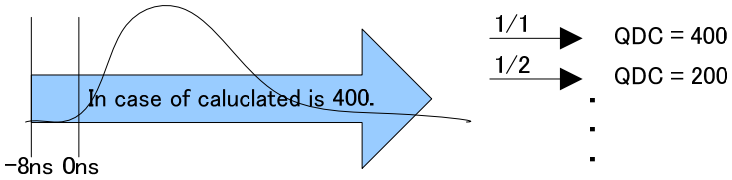
・QDC Filter : Set the time constant of QDC waveform generation. Value select Ext, 10ns, 20ns, 50ns, 100ns, 200ns



・QDC Integral Range : Set the integral time of QDC waveform. Range is 0ns from 32000ns.



・QDC Full Scale : Set the gain of QDC integral value. Value selet 1/1, 1/2, 1/4, 1/8, 1/16, 1/32, 1/64, 1/128, 1/512.



・QDC LLD : Set the LLD(Lower Level Discriminator) of QDC. It does not get the time stamp data and QDC integral data if the QDC integral data smaller than LLD. Please set LLD smaller than ULD. Range is 0 from 8191 digit.

・QDC ULD : Set the ULD(Upper Level Discriminator) of QDC. It does not get the time stamp data and QDC integral data if the QDC integral data greater than ULD. Range is 0 from 8191 digit.

・Timing Type : Select the wavefrom for time stamp. You can select the CFD waveform and the LED (raw) waveform.

“LET” : Leading Edge Timing
It is the timing that has been reached to trigger. Timestamp timing is different by the signal height.

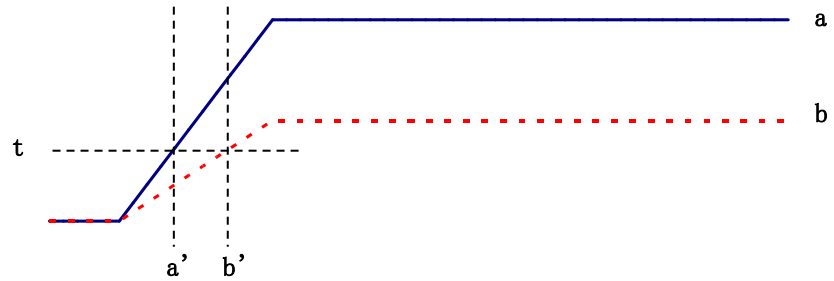


Fig. 4-2-2 How to use Leading Edge Timing

“CFD”　:　Constant Fraction Disicriminator Timing

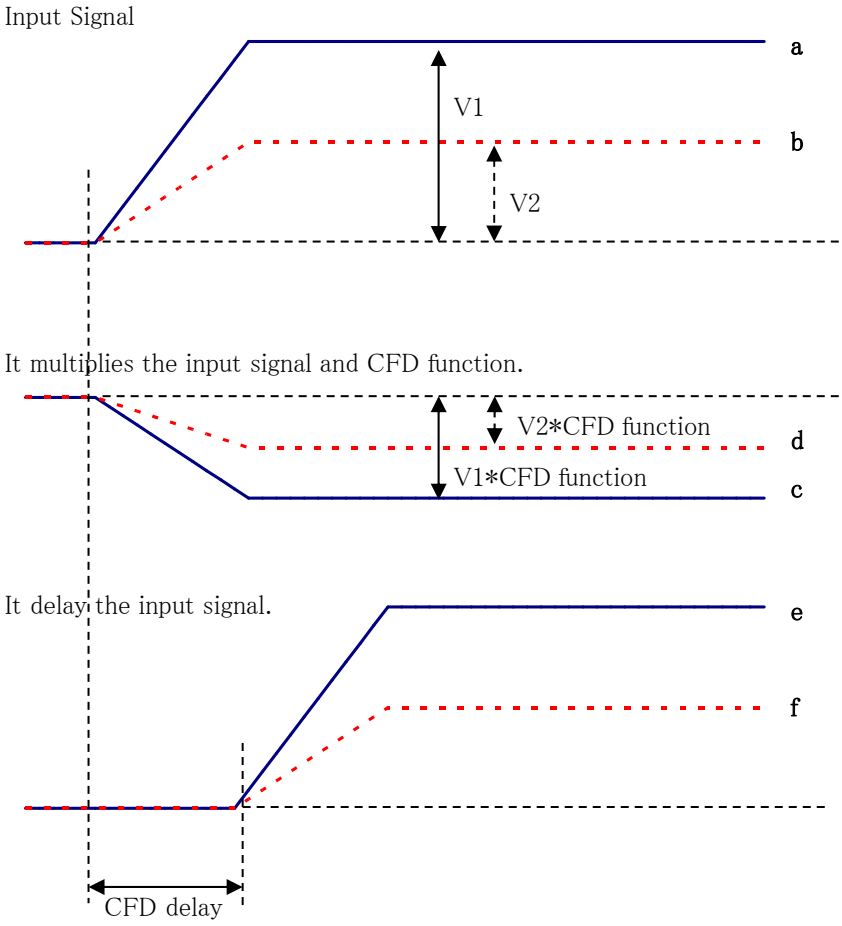


Fig. 4-2-3 How to use Constant Fraction Disicriminator Timing

Timestamp timing is the same by CFD wave generation.

c, d　:　a and b multiplying the input signal and CFD function.

e, f　:　a and b delay the setting value.

g, h　:　it sam the each wave.

Features of CFD wave form is the same even though different wave high.

・Mode : Choose the mode; Hist Mode, List Mode and Wave Mode.
・Mesurement Mode : Choose the measurement mode; Real Time、Live Time. Measurement is ended by a time of measurement mode.
・Mesurement Time : Set the measurement time. Max value is 8760 hours.
・Read Event Num : The set the unit read number. Normally set 10,000. When the count rate is small, you can set a smaller valuel.
・Time Spectrum On/Off : Select the enable of the time spectrum. Please do not ON If you want to get only the list data. If you ON at the high rate count, the acquisition of data is slow.
・Energy Spectrum On/Off : Select the enable of the energy spectrum. Please do not ON If you want to get only the list data. If you ON at the high rate count, the acquisition of data is slow.

4. 3. File Tab

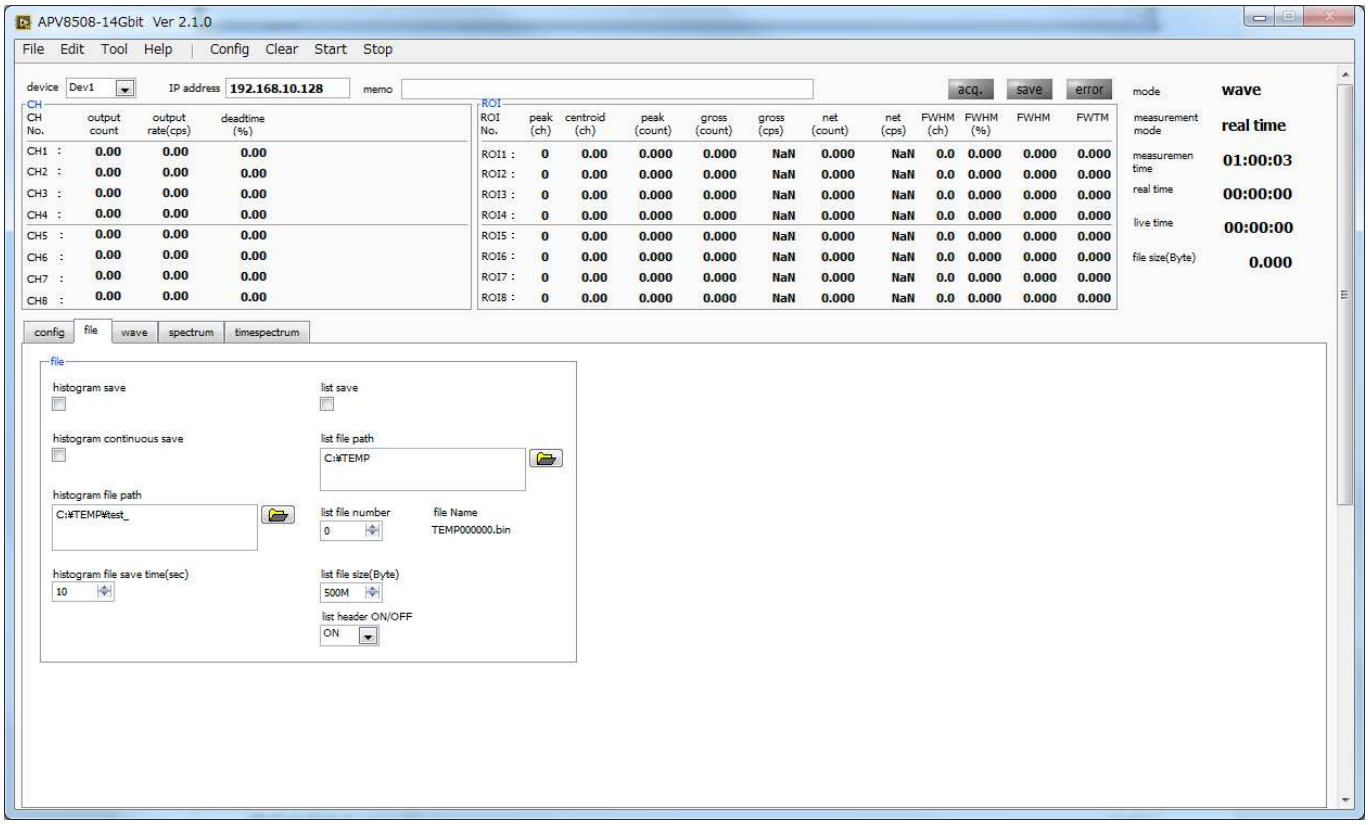


Fig. 4-3-1 File Tab

・Histogram Save : It will save the histogram data at the time of measurement end. It is enable when「mode」select「hist」.

・Histogram Continuous Save : It can select the enable of continues save at the set time intervals. It is enable when「mode」select「hist」.

・Histogram File Path : Set the absolute path of the histogram data. You can also choose not to extension.
※Caution※
File name format is as follow.
example:
「histogram file path」set「C:¥Data¥histogram.csv」,「histogram file save time(sec)」set「10」, date is 2010/09/01 and 12:00:00.
File name format of the start is「C:¥Data¥histogram_20100901_120000.csv」.
After 10 second is「C:¥Data¥histogram_20100901_120010.csv」.
※It may be off by one second increments.

・Hisutogram File Save Time (sec) : Set the time interval of continue save of histogram data. Unit is second. Range is 3600 second from 5 second.

・List Save : Choose whether you want to save the data. It is enable when「mode」select「list」.

・List File Number : Set the start value of the list data number. Range is 999999 from 0. It will return to 0 if it exceeds 999999.

・List File Size (Byte) : Set the maximum value of the list data file size.
If the file size exceed this size, file will close. And it will continue the file save after the file number increment.

・list header ON/OFF : Set the ON/OFF of the list data header. Header is IP address. When it set OFF, the list data nothing include the header.

4. 4. Wave Tab

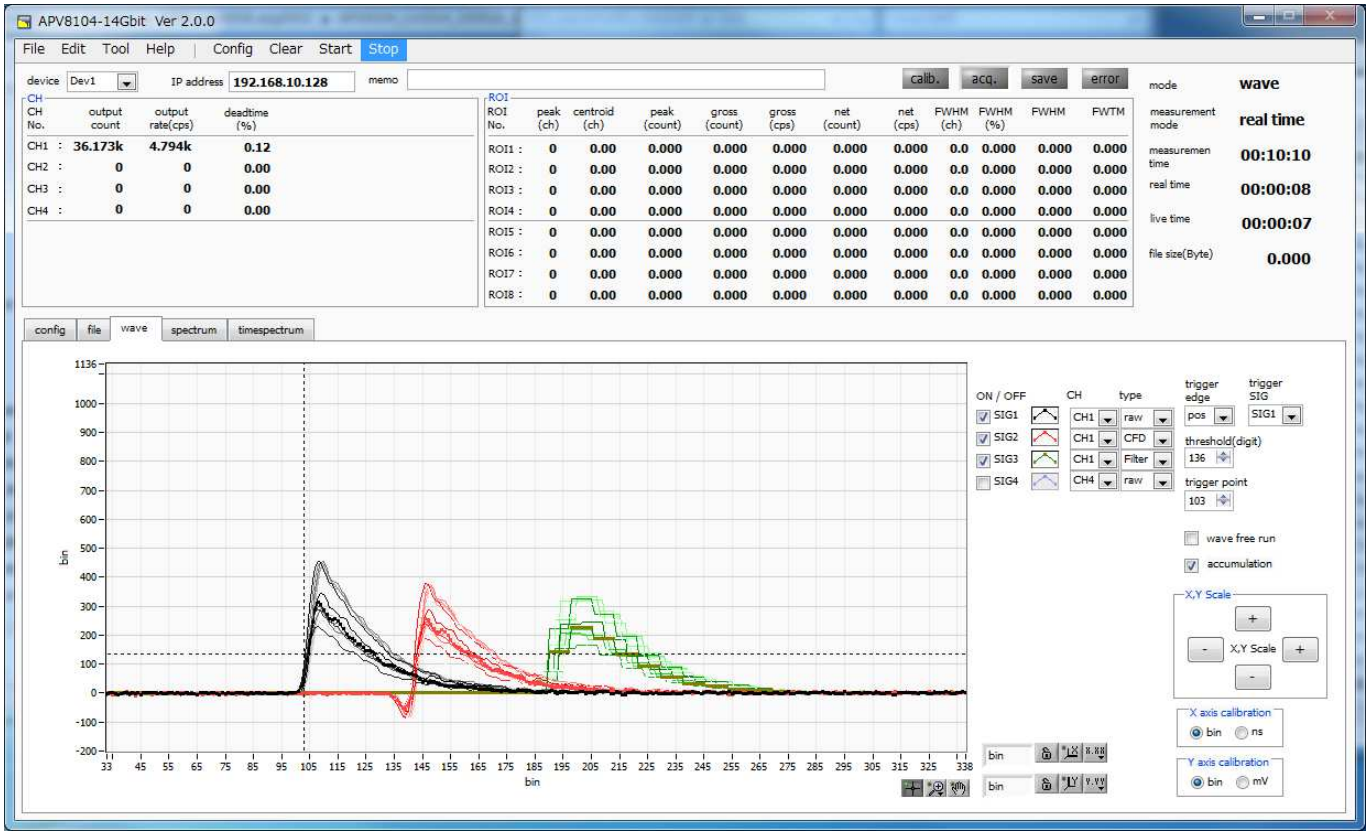


Fig. 4-4-1 wave tab

Graph : Waveform graph.
It is enable when「mode」select「wave」.

・On/Off : Select the ON/OFF of the wave display. APV8508 can display the 8 waveform.

・CH : Select the CH of the waveform display.

・Type : Select the type of the waveform display.
「raw」 － 'raw' is the raw waveform that was BLR processing.
「CFD」 － 'CFD' is the CFD waveform that was CFD shaping.
「Filter」 － 'Filter' is the waveform tha was the filter shaping.

・Trigger Edge : Select the polarity of the trigger. Nomally set the 'pos'.

・Threshold : Set the threshold value of the trigger. Set is possible by moving the cursor in the graph.

・Trigger Point : Set the start point of the display waveform. Set is possible by moving the cursor in the graph.

・Trigger SIG : Select the SIG of the trigger. Nomally set the 'SIG1'.

・Wave Free Run : 'ON' is displayed the waveform of the trigger free. 'OFF' is displayed the waveform of the triggered.

・Accumlation : Select the accumulation of the waveform.

・XY Scale : Adjust 'Xscale' and 'Yscale' at the button. Extension is '＋'. Reduction is '－'.

・X Axis Calibration : Select the unit of 'X-axis'.

・Y Axis Calibration : Select the unit of 'Y-axis'. ※ 'mV' is a reference value.

・X Axis Range : Dialog will be displayed if you right-click on the graph.「自動スケール」is auto scale. If you want to change the minimum or maximamu value, placed the mouse pointer on top of the numerical value, it can be changed by clicking or double-click.

・Y Axis Range : Dialog will be displayed if you right-click on the graph.「自動スケール」is auto scale. If you want to change the minimum or maximamu value, placed the mouse pointer on top of the numerical value, it can be changed by clicking or double-click.

: This is tool of the cursor moving. It can move the ROI cursor on the graph if you want to set the ROI.

: This is zoom. It can select the zoom type as the follow.

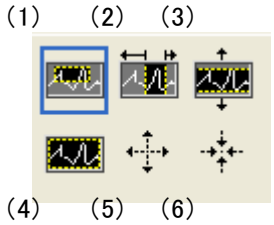


Fig. 4-4-2 zoom in or zoom out Tool

(1)Tetragon :It surrounds the area using the mouse. And it will be zoom.
(2)X-Zoom :This will zoom along the X-axis.
(3)Y-Zoom :This will zoom along the Y-axis.
(4)Fit Zoom :This will be auto scale.
(5)Zoom out to center a point :Click a center point of the zoom out.
(6)Zoom in to center a point :Click a center point of the zoom in.

 : Pan tool. It can move the graph by this icon.

4. 5. Spectrum Tab

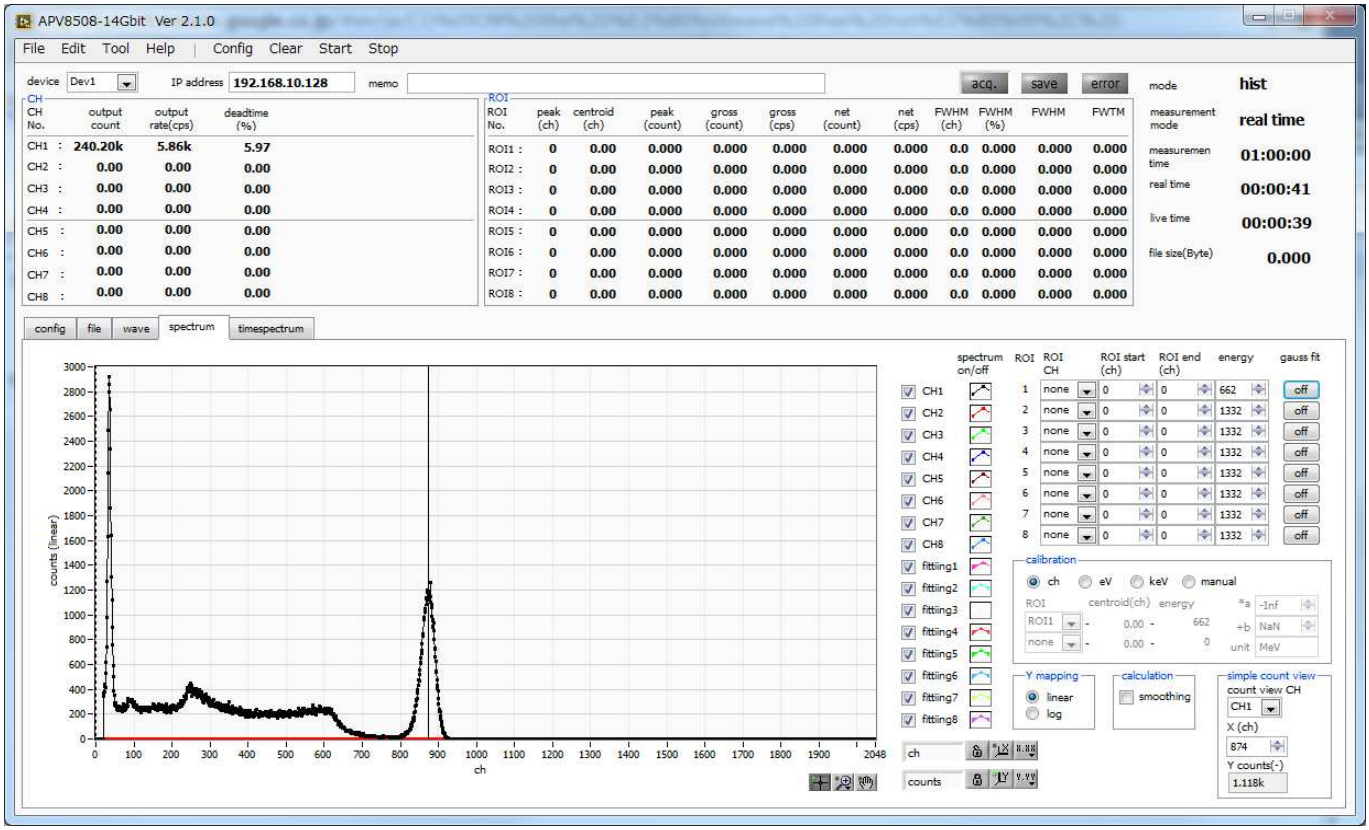


Fig. 4-5-1 Spectrum Tab

Graph : Energy Spectrum
It is enable when「mode」select「hist」or「list」. If「mode」is「list」, you need to ON of「spectrum ON/OFF」.

Check BOX : It make the setting of wether or not to display the histogram of each CH in the graph.

ROI CH : Set the CH of the ROI. It can set the maximum eight ROI per a CH.

ROI Start (ch) : Set the start point of the ROI. Unit is ch.

ROI End (ch) : Set the end point of the ROI. Unit is ch.

Energy : It define the energy value of the peak ch. Example ^{60}Co set 1173(keV) or 1332(keV).
If set「ch」of「calibration」, it will detect the peak between the ROI. The FWHM is calculate by the peak and the energy.

Calibration : Select the unit of X-axis. X-axis Label will be changed by the setting.

ch : Display unit is ch.

eV : Display unit is eV. If you set the two ROI, it run a two-point calibration. X-axis will be converted to the unit eV by the slope and intercept of the primary function y=ax+b.

keV : Display unit is KeV. If you set the two ROI, it run a two-point calibration. X-axis will be converted to the unit KeV by the slope and intercept of the primary function y=ax+b.
Example:
If 5717.9ch is 1173.24keV of 60Co and 6498.7ch is 1332.5keV of 60Co, it be calculated 0.20397 of slope and 6.958297 of intercept.

manual : You can set manual value of the slope and the intercept.

Y mapping : Select the mapping of Y-axis. Y-axis Label will be changed by the setting.
Linear : Linear
Log : Log

Smoothing : This is a smoothing function if the statistics are less. You can get a FWHM faster than nomal.

Simple count view : Set the view CH and x-ch. Count will be displayed.

Gauss fit : It runs a Gaussian fit between ROI.

4. 6. Timespectrum Tab

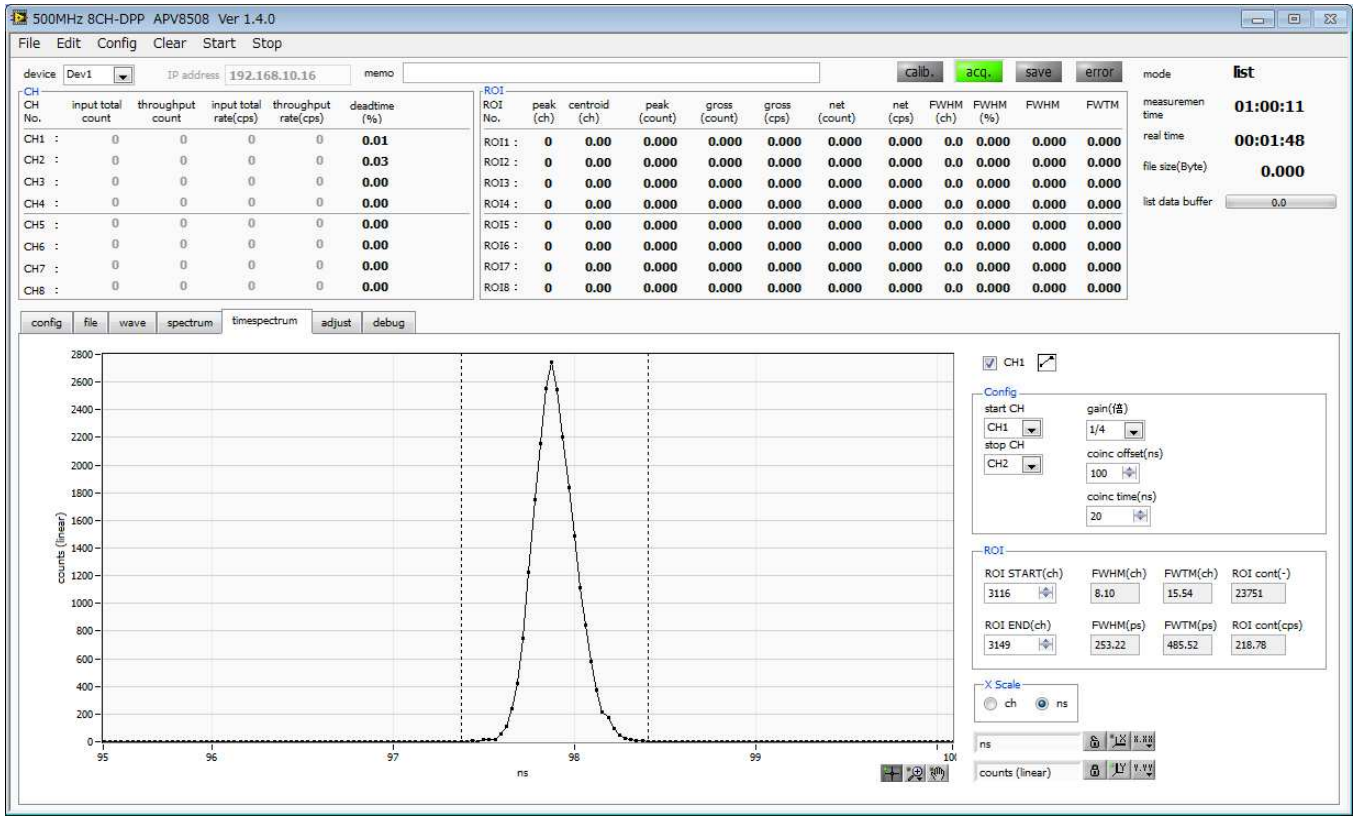


Fig. 4-6-1 Timespectrum Tab

・Graph : Grapht is timespectrum.
It is enable when「mode」select「list」. You need to ON of「timespectrum ON/OFF」.

・Check BOX : It make the setting of wether or not to display the timespectrum in the graph.

Config : This area is setting value.

Start CH : Start CH

Sotp CH : Stop CH

Gain : 1x from 1/128x
At the time of 1time, full scale about 780 ns (about 7.8ps per 1digit). The 1/128 time full scale about 100 μs (1 ns per 1digit).

Coinc Offset : Set an offset at 1ns unit.

Coinc Time : Set an coincdencetime at 1ns unit.

ROI : It is setting about calculation.

ROI START : It is the start point of the ROI.

ROI END : It is the end point of the ROI.

FWHM : This is a calculated FWHM value.

FWTM : This is a calculated FWTM value.

Xscale : Select the unit of X-axis.

CH : Unit: ch

ns : Unit: ns

4. 7. Auto Threshold Function

Auto threshold function can open from Menu “Tool-auto threshold”. This function is the auto calculation at threshold.

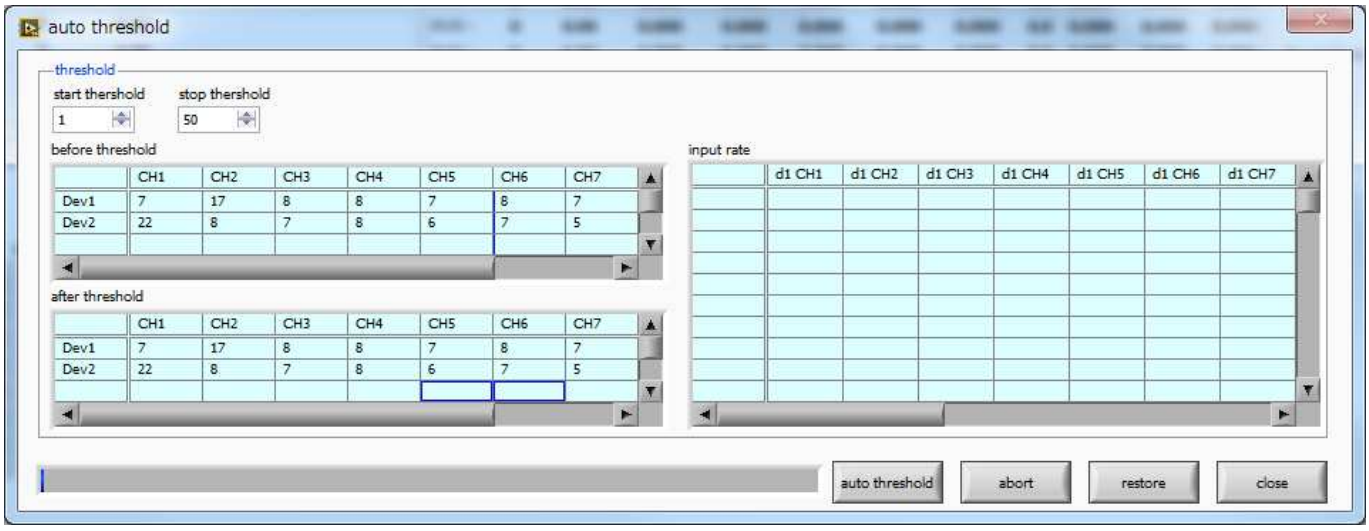


Fig. 4-7-1 Auto Threshold of Opening Screen

Threshold part

Start Threshold : Set the calculation start value. Default is 1.
Stop Threshold : Set the calculation stop value. Default is 50.
Before Threshold : This numerical value is the threshold before adjustment.
After Threshold : This numerical value is the threshold after adjustment.
Input Rate : It display ICR measurements at the time of the auto-adjustment.

Other Display ・ Operating parts

Progressive Bar :It display the progress of the auto threshold function in the screen lower the left.
Auto Threshold :This is the start button.
Abort :This is the calculation interruption button.
Restore :It gose back up in a value before calling a function and sets it.
Close :This is the finish button.

4. 8. Auto Walk Function

Auto walk function can open from Menu “Tool-auto walk”. This function is the auto calculation at walk.
Walk value decide from the waveform pattern.

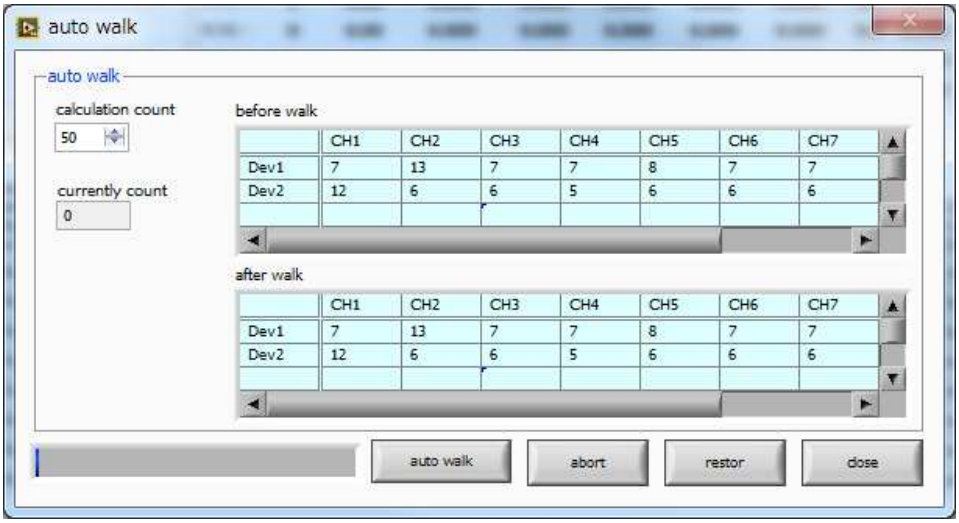


Fig. 4-8-1 Auto Walk of Opening Screen

Calculation Count :Set the get number of waveform. Default is 50.
Currently Count :A walk value pulling is displayed.
Before Walk :This numerical value is the WALK before adjustment.
After Walk :This numerical value is the WALK after adjustment.

Other Display ・ Operating parts
Progressive Bar :It display the progress of the auto walk function in the screen lower the left.
Auto Threshold :This is the start button.
Abort :This is the calculation interruption button.
Restore :It gose back up in a value before calling a function and sets it.
Close :This is the finish button.

5. File

5. 1. Histogram Data File

(1) File format
Tab-delimited text format

(2) File name
Arbitrary file name

(3) Structure
"Header" and "Calculation" and "Status" and "Data".

・Header parts
This parts save every CH as follow.

Measurement Mode	:	Measurement Mode
Measurement Time	:	Measurement Time (Unit: sec)
Real Time	:	Real Time
Start Time	:	Measurement Start Time
End Time	:	Measurement End Time

※Be saved each CH.

POL	:	Polarity
TGE	:	Waveform display trigger CH
TGC	:	Waveform trigger polarity
RJT	:	Waveform getting threshold
CCF	:	CFD Function
CDL	:	CFD Delay
CWK	:	CFD Walk
CTH	:	CFD Threshold
FLK	:	Baseline Time Constant
PTS	:	QDC Pretrigger
LIG	:	QDC Filter Time Constant
LIT	:	QDC Sum or Peak
AFS	:	QDC Integral reduction
CLD	:	QDC LLD
CUD	:	QDC ULD
TTY	:	Timing Type

Only once is saved as follow.

MOD	:	Mode
MTM	:	Measurement Time
MEMO	:	Memo

・Calculation Parts

This parts save every ROI. They are the calculated value between ROI. They saved only devicd in the display.

ROI_Ch	:	Set CH.
ROI_Start	:	ROI Start position CH
ROI_End	:	ROI End position CH
Enegy (keV)	:	ROI energy(keV)
Peak (ch)	:	Peak CH at calculated(ch)
Centroid (ch)	:	Centroid CH at calculated(ch)
Peak (count)	:	Peak counts at calculated
Gross (count)	:	Gross sum counts at calculated.
Gross (cps)	:	Gross cps at calculated.
Net (count)	:	Sum counts that attracted a background.
Net (cps)	:	Csp that attracted a background.
FWHM (ch)	:	Full width at half maximum(ch)
FWHM (%)	:	Energy resorution of full width at half maximum(%)
FWHM (keV)	:	Energy value of Full width at half maximum(keV)
FWTM (keV)	:	Energy resorution of full width at tenth maximum(keV)

・Status Parts

※This parts save every CH

Input Total Count	:	Total Counts
Throughput Count	:	Throughput Counts
Input Total Rate	:	Total Count Rate
Throughtput Rate	:	Throughput Count Rate
Dead Time	:	Dead Time Ratio

・Data Parts

Histogram data of each CH. Maximamu: 8192 points

5. 2. Wave Data File

(1) File Format
Tab Separated Values Type

(2) File Name
Arbitrarily Name

(3) Structure
"Header" and "Calculation" and "Status" and "Data".

・Header Parts

Measurement Mode	:	Measurement Mode
Measurement Time	:	Measrement Time (Unit: sec)
Real Time	:	Real Time
Start Time	:	Measurement Start Time
End Time	:	Measurement End Time

※Be saved each CH.

POL	:	Polarity
TGE	:	Waveform display trigger CH
TGC	:	Waveform trigger polarity
RJT	:	Waveform getting threshold
CCF	:	CFD Function
CDL	:	CFD Delay
CWK	:	CFD Walk
CTH	:	CFD Threshold
FLK	:	Baseline Time constant
PTS	:	QDC Pretrigger
LIG	:	QDC Filter Time Constat
LIT	:	QDC Sum or Peak
AFS	:	QDC Integral reduction
CLD	:	QDC LLD
CUD	:	QDC ULD
TTY	:	Timing Type

Only once is saved as follow.

MOD	:	Mode
MTM	:	Measurement Time
MEMO	:	Memo

・Status Parts

※This parts save every CH

Outtput Count	:	Output Counts
Outtput Rate	:	Output Rate
Dead Time	:	Dead Time Ratio

・Data Parts
Waveform data of each CH.

5. 3. List Data File

(1) File Format
Binary File, Big Endian File

(2) Structure

80Bit (10Byte, 5WORD) / event

Bit79	TDC[55..40]		64
63	TDC[39..24]		48
47	TDC[23..8]		32
31	TDC[7..0]	24 23	16
		TDCFP[7..0]	
15 13	12		0
CH[2..0]	QDC [12..0]		

Fig. 5-3-1 List Data (80 Bit)

・Bit79 to Bit24 TDC counts. 56Bit
In case of APV8508; 1Bit = 2ns
In case of APV8104; 1Bit = 1ns

・Bit23 to Bit16 TDCFP counts. 8Bit
In the case of APV8508; 1Bit = 7.8125ps
It is the calculated value of between 2ns.
2ns / 256 = 7.8125 ps

In the case of APV8104; 1Bit = 3.90625ps
It is the calculated value of between 1ns.
1ns / 256 = 3.90625 ps

・Bit15 to Bit13 $CH_{。}$ 3Bit
0:CH1, 1:CH2, 2:CH3, 3:CH4, 4:CH5, 5:CH6, 6:CH7, 7:CH8

・Bit12 to Bit0 This is the integral valud of QDC. $13Bit_{。}$

(3) When you use plural boards, and saved.
Format is Header(IP) + Listdata + Header(IP) + Listdata・・・. List data saved to a one file.
Example,
IP is「192.168.10.128」and「192.168.10.129」. Read Event Num set 100. The list data are saved as follows.

Header Parts (192.168.10.128) 0x3139322E3136382E31302E313238	List Parts (1000Byte)	Header Parts (192.168.10.129) 0x3139322E3136382E31302E313239	List Parts (1000Byte)	・・・・

You can save the list data without a header, too.
In this case, please set OFF header in the 'file' TAB of application.

5. 4. Wave Data File

(1) File Format
Binary File, Big Endian File

(2) Structure

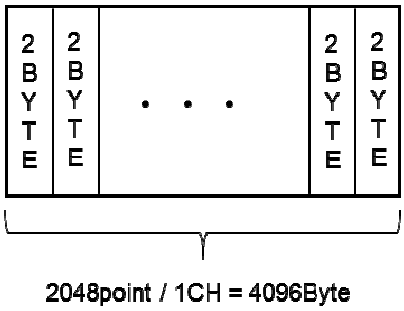


Fig. 5-4-1 Wave Data (4096Byte)

Wave data incude offset of 16384digit. When you use this data, you must pull an offset.
You must set continuous CH1 to CH8.

6. Command

6. 1. General Outline

Setting or getting data depend on TCP/IP or UDP via the ethernet.
Special libraly is not used. Special library is not used. If you are based on acommunication format (command), you can control DPP by any application.

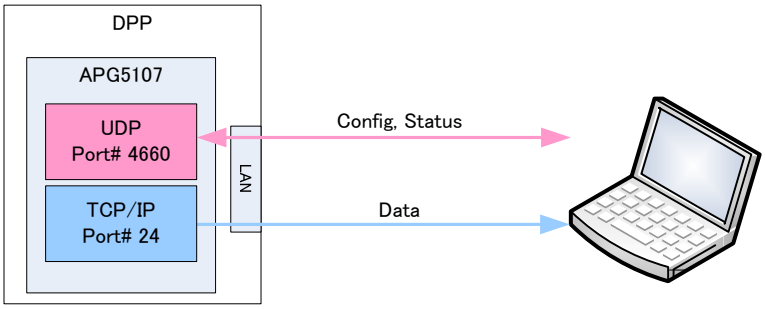
A board for communication is put on DPP.

Board for communication	Communication standard	Comunication Protocol	Command method
APG5107	1000Mbps	TCP/IP or UDP	Address + pallameter

This chapter lists it about a command when you are putting APG5107 on a board for communication.

APG5107 is adopting SiTCP to realize high-speed data communication. SiTCP is a technique to connect an apparatus developed in university combination use engine corporation High Energy Accelerator Research Organization (http://www.kek.jp/ja/, following KEK) to ethernet and is transferred the skill to Bee Beans Technologies (http://www.bbtech.co.jp, following BBT) which is from KEK venture company Co., Ltd. now. When you use SiTCP, be receiving licensing from BBT. Please refer to each manual of the BBT company website for the details of the transmission and reception of SiTCP and data.

The kind of the command is classified roughly into "Config (setting) and Status (Status) ", two of "Data (data)". Two protocols of TCP/IP and the UDP are working to transmit and receive these two kinds of commands in SiTCP without competing, and be defining the communication port of the equipment side in each. Config and Status are UDP, and the port number is by default the 4660th. Data is TCP/IP, and the port number is by default the 24th.



List below it about a format and the kind of the command.

6. 2. Command Format

In the case of Config note, in the case of Status reading, the format of the command may include Data reading. Be comprised of ″header part″ and ″address part″ and ″parameter part″ and department of ″data″.

Six items of Ver/Type/CMD/FLAG/ID/Data Length in conformity with specifications of SiTCP are included in ″header part″. Data Length (the data head) is fixed 2Byte, and, in DPP, the size of the header part becomes 4Byte.

″Address part″ is an address of 4Byte of the register in DPP.

″Parameter part″ is a value of 2Byte to set to a register in DPP.

Department of ″data″ is measurement data from DPP.

6. 3. Command Type

(1) Config command

【UDP】

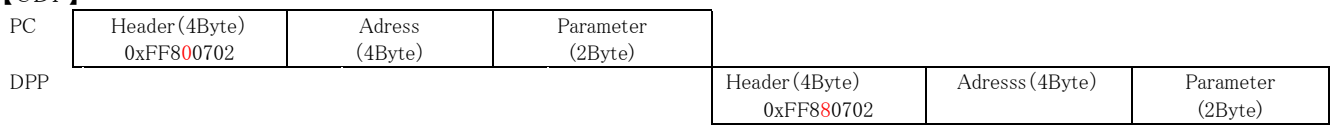


Fig. 6-3-1 In the case of Config Comannd

We have a reply for the Config command for the setting from a PC from DPP.

【Setteing from a PC】
"Header part" is "FF800702" by 4Byte, a hex digit. Contents are F (Ver.) F(Type)8(CMD)0(FLG)07(ID)02(Data Length).
"Address part" sets 4Byte, an address level of the parameter.
"Parameter part" is 2Byte, a parameter level to set.

【Reply from DPP】
"Header part" is "FF880702" by 4Byte, a hex digit. Contents are F (Ver.) F(Type)8(CMD)8(FLG)07(ID)02(Data Length).
ACK bit of FLG becomes 1 if normal, and become 8.
An address level of the parameter that "address part" is 4Byte and set returns.
There is not "parameter part", and the value that you set does not come back.

(2) Status Command

【UDP】

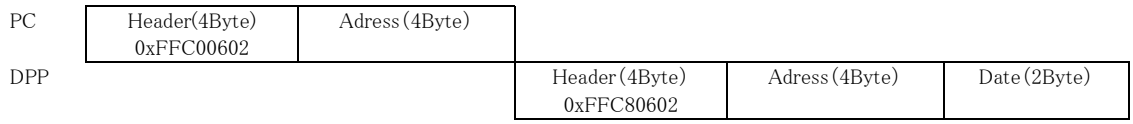


Fig. 6-3-2 In the case of Status Comannd

We have a reply for the Status command for the demand from a PC from DPP.

【Demand from a PC】
"Header part" is "FFC00602" by 4Byte, a hex digit. Contents are F (Ver.) F(Type)C(CMD)0(FLG)06(ID)02(Data Length).
"Address part" sets 4Byte, an address level of status data.

【Reply from DPP】
"Header part" is 4Byte, and be "FFC80602" with a hexadecimal. Contents are F (Ver.)
F(Type)C(CMD)8(FLG)06(ID)02(Data Length). ACK bit of FLG becomes 1 if normal, and become 8.
4Byte, an address level of the parameter that you required return to "address part".
Department of "data" is 2Byte, a status data level.

(3) Data Command

A PC can read list data by Data command. At first require list data by UDP, and there is a reply of the department of data by TCP/IP from DPP.

【TCP/IPDPP down-link】
List data begin to collect to the board for communication when they let they set a list mode by UDP and start.

【The TCP/IPPC data reception】
Hold it for any byte in TCP, and can perform reading. The list data, please perform the reading by the 10byte unit for 10byte unit.

6. 4. Command Table

No.	Type	Port No.	HEX Address	Contents	Setting range (digit)	Motion	Command length (Byte)	Reply (Byte)
1	CH Setting	UDP 4660	B40001DE	Input Waveform Type	0, 2	Setting	10	8
						Request of setting	8	10
2			B400011A	Input Polar Character Switch	0, 1	Setting	10	8
						Request of setting	8	10
3			B4000160	CFD Function	1..15	Setting	10	8
						Request of setting	8	10
4			B4000162	CFD Delay	0..11	Setting	10	8
						Request of setting	8	10
5			B4000164	CFD Walk	0.. $2^{10}-1$	Setting	10	8
						Request of setting	8	10
6			B4000166	Threshold	0.. $2^{13}-1$	Setting	10	8
						Request of setting	8	10
7			B400016E	Baseline Restorer Filter	0..254	Setting	10	8
						Request of setting	8	10
8			B40001C0	QDC Pretrigger	0..4	Setting	10	8
						Request of setting	8	10
9			B40001C6	QDC Filter	0..5	Setting	10	8
						Request of setting	8	10
10			B40001C8	QDC sum/peak	0, 1	Setting	10	8
						Request of setting	8	10
11			B400010C	QDC Full Scale	0..8	Setting	10	8
						Request of setting	8	10
12			B40001DC	QDC Integral Range	0.. $2^{12}-1$	Setting	10	8
						Request of setting	8	10
13			B4000168	QDC LLD	0.. $2^{13}-1$	Setting	10	8
						Request of setting	8	10
14			B400016A	QDC ULD	0.. $2^{13}-1$	Setting	10	8
						Request of setting	8	10
15			B400010E	Analog Gain	0, 1	Setting	10	8
						Request of setting	8	10
16			B4000170	Analog Offset	0.. $2^{12}-1$	Setting	10	8
						Request of setting	8	10
17			B40001D0	Time Stamp Timing	0, 1	Setting	10	8
						Request of setting	8	10

※The above-mentioned address is CH1. The head address of CH1 is B4000100. The head address of CH2 is B4000200. Therefore the address of adding 0x100 is the head of each CH setting.

No.	Type	Port No.	HEX Address	Contents	Setting range (digit)	Motion	Command length (Byte)	Reply (Byte)
18	Single Setting	UDP 4660	B4000000	Mode	0, 1, 2	Setting	10	8
						Request of setting	8	10
19			B4000002	Measurement Mode	0, 1	Setting	10	8
						Request of setting	8	10
20			B4000006 B4000008 B400000A B400000C	Measurement Time Setting	0..2^{54}−1	Setting	10*4 times	8*4 times
						Request of setting	8*4 times	10*4 times
21			B4000004	Measurement Start	0, 1	Setting	10	8
22			B4000090	Data Clear	0, 1	Setting	10	8
23	Stetas	UDP 4660	B4000004	Measurement State	−	**Request of stetas**	10	8
24			B4000120 B4000122 ※	Outout Count Total			10*2 times	8*2times
25			B4000130 B4000132 ※	Output Count Rate			10*2 times	8*2 times
26			B40001E0 B40001E2 B40001E4 B40001E6 ※	Dead Count			10*4 times	8*4 times
27			B400000E B4000010 B4000012 B4000014	Real Time			10*4 times	8*4 times
28			B400009A	Histogram CH Data			10	32768

No.	Type	Port No.	HEX Address	Contents	Setting range (digit)	Motion	Command length (Byte)	Reply (Byte)
29	Single Setting	UDP 4660	B40001C2	Wave Select	See below	Setting	10	8
						Request of setting	8	10
30			B4000032	Trigger edge	0, 1	Setting	10	8
						Request of setting	8	10
31			B4000110	Wave threshold	1..8191	Setting	10	8
						Request of setting	8	10
32			B400008C	Wave trigerr point	10..510	Setting	10	8
						Request of setting	8	10
33			B4000036	Wave free run	0, 1	Setting	10	8
						Request of setting	8	10
34			B4000030	Trigger signal	See below	Setting	10	8
						Request of setting	8	10
35	Stetas		B400009C	Wave CH Data	−	−	10	4096

※The ※ mark of the above-mentioned address is CH1. A value of each CH setting is an address to add 0x100.

6. 5. Description

CH Setting

1. Input Waveform Type Selection
   - Comment : Select the type of input waveform
   - Address : 0xB40001DE
   - Setting : Command length 10Byte, Reply 8Byte
   - Request : Command length 8Byte, Reply 10Byte
   - Port No. : 4660(UDP)
   - Type : Channel setting
   - Range : 0 or 1
     - 0: Normal waveform
     - 1: NIM waveform

2. Input Polar Character Switch
   - Comment : Select the polar character of input signal
   - Address : 0xB400011A
   - Setting : Command length 10Byte, Reply 8Byte
   - Request : Command length 8Byte, Reply 10Byte
   - Port No. : 4660(UDP)
   - Type : Channel setting
   - Range : 0 or 1
     - 0: Negative
     - 1: Positive

3. CFD Function
   - Comment : Setting of CFD function. The signal reduction ratio which to use the CFD waveform calculation.
   - Address : 0xB4000160
   - Setting : Command length 10Byte, Reply 8Byte
   - Request : Command length 8Byte, Reply 10Byte
   - Port No. : 4660(UDP)
   - Type : Channel setting
   - Range : 1 to 15
     - 1: 0.03 x
     - 2: 0.06 x
     - 3: 0.09 x
     - 4: 0.12 x
     - 5: 0.15 x
     - 6: 0.18 x
     - 7: 0.21 x
     - 8: 0.25 x
     - 9: 0.28 x
     - 10: 0.31 x
     - 11: 0.34 x
     - 12: 0.37 x
     - 13: 0.40 x
     - 14: 0.43 x
     - 15: 0.46 x

4. CFD Delay

Comment : Setting of CFD delay. The delay time of the reversed signal which to use the CFD waveform calculation.
Address : 0xB4000162
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Channel setting
Range : 0 to 7
0: 2ns
1: 4ns
2: 6ns
3: 8ns
4: 10ns
5: 16ns
6: 22ns
7: 28ns

5. CFD Walk

Comment : Time stamp setting for ADC data
Address : 0xB4000164
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Channel setting
Range : 0 to 1023

6. Threshold

Comment : Threshold setting of the input waveform
Address : 0xB4000166
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Channel setting
Range : 0 to 8191

7. Baseline Restorer Filter

Comment : Filter time constant of baseline restorer filter
Address : 0xB400016E
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Channel setting
Range : 0 to 4
0 : off
64 : fast
128 : 4μs
250 : 85μs
252 : 129 μs
254 : 260 μs

8. QDCPretrigger

Comment : Set a timing to start the addition
Address : 0xB40001C0
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Channel setting
Range : 0 to 4
0: 0ns
1: Start the addition before 8ns of the timing of threshold.
2: Start the addition before 16ns of the timing of threshold.
3: Start the addition before 24ns of the timing of threshold.
4: Start the addition before 32ns of the timing of threshold.

9. QDC Filter

Comment : Filter time constant of original waveform which QDC integrates.
Address : 0xB40001C6
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Channel setting
Range : 0 to 5
0: non-filter
1: 10ns
2: 20ns
3: 50ns
4: 100 ns
5: 200 ns

10. QDC sum/peak

Comment : Type ot output data of QDC.
Address : 0xB40001C8
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Channel setting
Range : 0 or 1
0: peak Output a peak value of the waveform as QDC data
1: sum Output an integral value of the filtered waveform as QDC data

11. ADC Full Scale

Comment : Gain of QDC data
Address : 0xB400010C
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Channel setting
Range : 0 to 8
0: 1/1 x
1: 1/2 x
2: 1/4 x
3: 1/8 x
4: 1/16 x
5: 1/32 x
6: 1/64 x
7: 1/128 x
8: 1/512 x

12. QDC Integral Range

Comment : The setting of the integral time included the setting time of QDC pretrigger.
Address : 0xB40001DC
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Channel setting
Range : 0 to 4095 (1digit = 8ns, 4095 = 32768ns)

13. QDC LLD

Comment : LLD of the value of integral of QDC.
Address : 0xB4000168
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Channel setting
Range : 0 to 8191

14. QDC ULD

Comment : ULD of the value of integral of QDC.
Address : 0xB400016A
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Channel setting
Range : 0 to 8191

15. Analog Gain

Comment : Gain of analog circuit
Address : 0xB400010E
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Channel setting
Range : 0 or 1
0: 3 x
1: 1 x

16. Analog Offset

Comment : Offset adjustment of analog circuit
Address : 0xB4000170
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Channel setting
Range : 0 to 4095
0: ＋1000mV ※Default; 2047
～
4095: -1000mV

17. Time Stamp Timing

Comment : When the time stamp of the time information, which do you choose the timing of waveform?
Address : 0xB40001D0
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Single setting
Range : 0 or 1
0: The timing is the setting in CFDWALK for CFD waveform.
1: The timing is the setting reading edge in CFDWALK for original waveform.

Single setting

18. Mode

Comment : Operation mode. Select of Hist (Histogram) mode, Wave (Waveform) mode, List (List) mode.
Address : 0xB4000000
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Single setting
Range : 0 to 2
0: Hist Mode
1: Wave Mode
2: List Mode

19. Measurement Mode

Comment : Select of Real Time or Live Time
Address : 0xB4000002
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Single setting
Range : 0 to 1
0: Real Time
1: Live Time

20. Measurement Time

Comment : Measurement time
Address : 0xB4000006(MSB), 0xB4000008, 0xB400000A(LSB)
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Single setting
Range : 0 to 2^{54}−1 digit
1digit is 8ns. Maximum setting is 8760 hours.。

21. Measurement Start

Comment : Select of measurement start or stop
Address : 0xB4000004
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Single setting
Range : 0 or 1
0: Measurement Stop
1: Measurement Start

22. Data Clear

Comment : Data Clear
Address : 0xB4000090
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Single setting
Range : If you want to clear the data, please set data consecutively with 0→1→0.

Status

23. Measurement State

Comment : This is to confirm the setting.
Address : 0xB4000004
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Status
State : 0 or 1
0: During a measurement stop
1: During a measurement

24. Throughput Count Total

Comment : Signal processed total number of counts within QDCLLD and QDCULD.
Address : 0xB4000120(MSB), 0xB4000122(LSB)
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Status(CH)
State :

25. Throughput Count Rate

Comment : Throughput count total / sec
Address : 0xB4000130(MSB), 0xB4000132(LSB)
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Status(CH)
State :

26. Dead Count

Comment : Total Dead Counts
Address : 0xB40001E0(MSB)、0xB40001E2、0xB40001E4、0xB40001E6(LSB)
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Status(CH)
State :

27. Real Time

Comment : Real Time (8ns/Count)
Address : 0xB40001E0(MSB)、0xB40001E2、0xB40001E4、0xB40001E6(LSB)
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Status
State :

28. Histogram CH Data

Comment : Request of histogram data
Address : 0xB400009A
Setting : Command length 10Byte, Reply 32768Byte
Port No. : 4660(UDP)
Type : Setting
State :

0: Request of CH1 histogram
1: Request of CH2 histogram
2: Request of CH3 histogram
3: Request of CH4 histogram
4: Request of CH5 histogram
5: Request of CH6 histogram
6: Request of CH7 histogram
7: Request of CH8 histogram

※For Example:
If you want to acquire histogram data of CH0, there is data reply of histogram data (32768 byte) of CH0 by UDP when you set data (0x0000) in address (0xB400009A).

29. Wave selects

Comment : Select CH or wave type for wave acquisition.
Address : 0xB40001C2
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Single setting
Range : See below

Select CH	Select wave type	Send data
1	RAW	0x0000
1	CFD	0x0001
1	Filter	0x0002
2	RAW	0x0100
2	CFD	0x0101
2	Filter	0x0102
…	…	…
8	RAW	0x0700
8	CFD	0x0701
8	Filter	0x0702

30. Trigger edge

Comment : Select trigger pole for wave acquisition.
Address : 0x B4000032
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Setting
State : 0, 1
0: negative edge
1: postive edge

31. Wave threshold

Comment : Threshold setting of the wave acquisition.
Address : 0x B4000110
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Setting
State : 1 to 8191

32. Wave trigger point

Comment : This can set of start point of wave rise point.
Address : 0x B400008C
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Setting
State : 10 to 510

33. Wave free run

Comment : Select wave free run mode or wave trigger mode.
Address : 0x B4000036
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Setting
State : 0 or 1
0: trigger mode
1: free mode

34. Trigger signal

Comment :
Address : 0x B4000030
Setting : Command length 10Byte, Reply 8Byte
Request : Command length 8Byte, Reply 10Byte
Port No. : 4660(UDP)
Type : Setting
State : See below

setthing	DATA
SIG1	1
SIG2	2
SIG3	4
SIG4	8
SIG5	16
SIG6	32
SIG7	64
SIG8	128

35. Wave CH Data

Comment : Request of wave data
Address : 0xB400009C
Setting : Command length 10Byte, Reply 4096
Port No. : 4660(UDP)
Type : stetas
State :

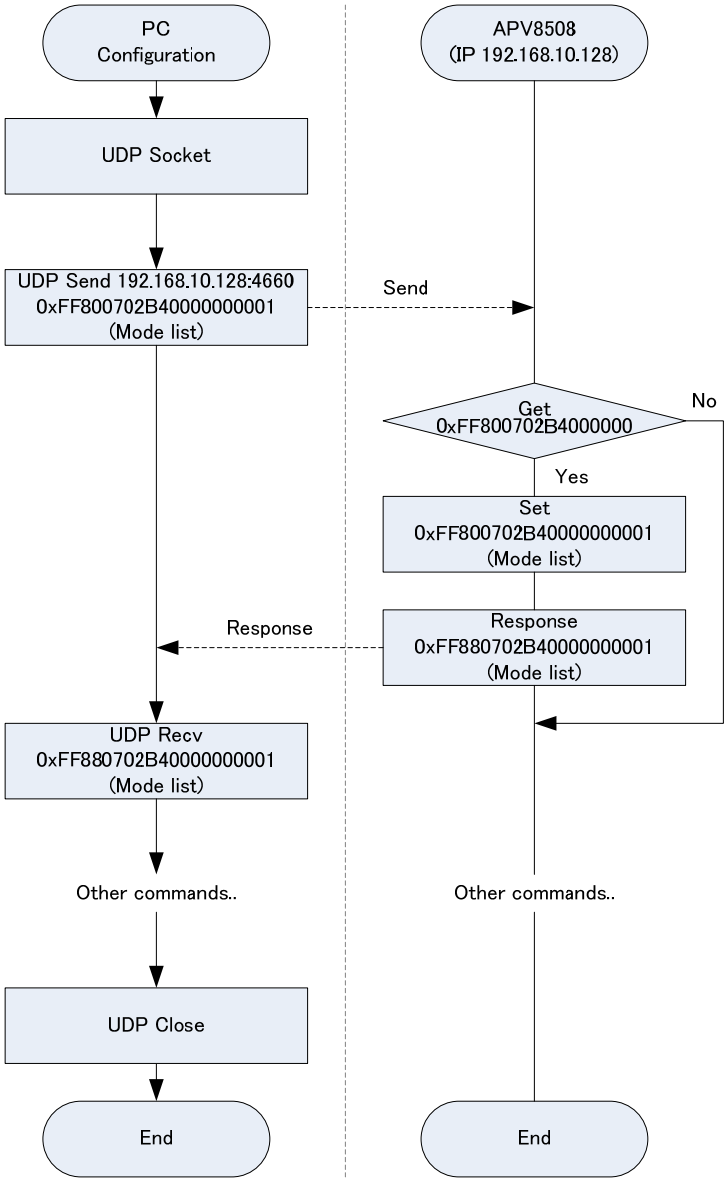
0: Request of CH1 wave
1: Request of CH2 wave
2: Request of CH3 wave
3: Request of CH4 wave
4: Request of CH5 wave
5: Request of CH6 wave
6: Request of CH7 wave
7: Request of CH8 wave

※For Example:
If you want to acquire wave data of CH0, there is data reply of wave data (4096byte) of CH0 by UDP when you set data (0x0000) in address (0xB400009C).
You must set continuous CH1 to CH8.

6. 6. Command transmission and reception example

List below an example of configuration, clear, start, hist, list, wave. The port number of the PC side to use in UDP socket is arbitrary. The port number to use in UDP send to the APV8508 side is 4660. The port number to use in TCP/IP socket is 24. The byte order of the command is big endian (MSB First).

(1) configuration



※List Config practice procedure from the following page.

```
//
// Commands of Configuration
//

UDP socket

//MODE
UDP send  0xFF800702B40000000001
UDP recv  0xFF880702B40000000001

// Measurement Time Setting
UDP send  0xFF800702B40000060000
UDP recv  0xFF880702B40000060000
UDP send  0xFF800702B40000080068
UDP recv  0xFF880702B40000080068
UDP send  0xFF800702B400000AC617
UDP recv  0xFF880702B400000AC617
UDP send  0xFF800702B400000C1400
UDP recv  0xFF880702B400000C1400

// polarity
UDP send  0xFF800702B400011A0000
UDP recv  0xFF880702B400011A0000
UDP send  0xFF800702B400021A0000
UDP recv  0xFF880702B400021A0000
UDP send  0xFF800702B400031A0000
UDP recv  0xFF880702B400031A0000
UDP send  0xFF800702B400041A0000
UDP recv  0xFF880702B400041A0000
UDP send  0xFF800702B400051A0000
UDP recv  0xFF880702B400051A0000
UDP send  0xFF800702B400061A0000
UDP recv  0xFF880702B400061A0000
UDP send  0xFF800702B400071A0000
UDP recv  0xFF880702B400071A0000
UDP send  0xFF800702B400081A0000
UDP recv  0xFF880702B400081A0000

// QDC full scale (multiple)
UDP send  0xFF800702B400010C0001
UDP recv  0xFF880702B400010C0001
UDP send  0xFF800702B400020C0001
UDP recv  0xFF880702B400020C0001
UDP send  0xFF800702B400030C0001
UDP recv  0xFF880702B400030C0001
UDP send  0xFF800702B400040C0001
UDP recv  0xFF880702B400040C0001
UDP send  0xFF800702B400050C0001
UDP recv  0xFF880702B400050C0001
UDP send  0xFF800702B400060C0001
UDP recv  0xFF880702B400060C0001
UDP send  0xFF800702B400070C0001
UDP recv  0xFF880702B400070C0001
UDP send  0xFF800702B400080C0001
UDP recv  0xFF880702B400080C0001

// CFD function (multiple)
UDP send  0xFF800702B40001600007
UDP recv  0xFF880702B40001600007
UDP send  0xFF800702B40002600007
UDP recv  0xFF880702B40002600007
UDP send  0xFF800702B40003600007
UDP recv  0xFF880702B40003600007
UDP send  0xFF800702B40004600007
UDP recv  0xFF880702B40004600007
UDP send  0xFF800702B40005600007
UDP recv  0xFF880702B40005600007
UDP send  0xFF800702B40006600007
UDP recv  0xFF880702B40006600007
UDP send  0xFF800702B40007600007
UDP recv  0xFF880702B40007600007
UDP send  0xFF800702B40008600007
UDP recv  0xFF880702B40008600007

// CFD delay
UDP send  0xFF800702B40001620004
UDP recv  0xFF880702B40001620004
UDP send  0xFF800702B40002620004
UDP recv  0xFF880702B40002620004
UDP send  0xFF800702B40003620004
UDP recv  0xFF880702B40003620004
UDP send  0xFF800702B40004620004
UDP recv  0xFF880702B40004620004
UDP send  0xFF800702B40005620004
UDP recv  0xFF880702B40005620004
UDP send  0xFF800702B40006620004
UDP recv  0xFF880702B40006620004
UDP send  0xFF800702B40007620004
UDP recv  0xFF880702B40007620004
UDP send  0xFF800702B40008620004
UDP recv  0xFF880702B40008620004

// CFD walk
UDP send  0xFF800702B4000164000A
UDP recv  0xFF880702B4000164000A
UDP send  0xFF800702B4000264000A
UDP recv  0xFF880702B4000264000A
UDP send  0xFF800702B4000364000A
UDP recv  0xFF880702B4000364000A
UDP send  0xFF800702B4000464000A
UDP recv  0xFF880702B4000464000A
UDP send  0xFF800702B4000564000A
UDP recv  0xFF880702B4000564000A
UDP send  0xFF800702B4000664000A
UDP recv  0xFF880702B4000664000A
UDP send  0xFF800702B4000764000A
UDP recv  0xFF880702B4000764000A
UDP send  0xFF800702B4000864000A
UDP recv  0xFF880702B4000864000A

// threshold
UDP send  0xFF800702B40001660014
UDP recv  0xFF880702B40001660014
```

UDP send 0xFF800702B40002660014
UDP recv 0xFF880702B40002660014
UDP send 0xFF800702B40003660014
UDP recv 0xFF880702B40003660014
UDP send 0xFF800702B40004660014
UDP recv 0xFF880702B40004660014
UDP send 0xFF800702B40005660014
UDP recv 0xFF880702B40005660014
UDP send 0xFF800702B40006660014
UDP recv 0xFF880702B40006660014
UDP send 0xFF800702B40007660014
UDP recv 0xFF880702B40007660014
UDP send 0xFF800702B40008660014
UDP recv 0xFF880702B40008660014

// QDC LLD
UDP send 0xFF800702B40001680014
UDP recv 0xFF880702B40001680014
UDP send 0xFF800702B40002680014
UDP recv 0xFF880702B40002680014
UDP send 0xFF800702B40003680014
UDP recv 0xFF880702B40003680014
UDP send 0xFF800702B40004680014
UDP recv 0xFF880702B40004680014
UDP send 0xFF800702B40005680014
UDP recv 0xFF880702B40005680014
UDP send 0xFF800702B40006680014
UDP recv 0xFF880702B40006680014
UDP send 0xFF800702B40007680014
UDP recv 0xFF880702B40007680014
UDP send 0xFF800702B40008680014
UDP recv 0xFF880702B40008680014

// QDC ULD
UDP send 0xFF800702B400016A1FFF
UDP recv 0xFF880702B400016A1FFF
UDP send 0xFF800702B400026A1FFF
UDP recv 0xFF880702B400026A1FFF
UDP send 0xFF800702B400036A1FFF
UDP recv 0xFF880702B400036A1FFF
UDP send 0xFF800702B400046A1FFF
UDP recv 0xFF880702B400046A1FFF
UDP send 0xFF800702B400056A1FFF
UDP recv 0xFF880702B400056A1FFF
UDP send 0xFF800702B400066A1FFF
UDP recv 0xFF880702B400066A1FFF
UDP send 0xFF800702B400076A1FFF
UDP recv 0xFF880702B400076A1FFF
UDP send 0xFF800702B400086A1FFF
UDP recv 0xFF880702B400086A1FFF

// baseline restorer filter
UDP send 0xFF800702B400016E00FC
UDP recv 0xFF880702B400016E00FC
UDP send 0xFF800702B400026E00FC
UDP recv 0xFF880702B400026E00FC
UDP send 0xFF800702B400036E00FC
UDP recv 0xFF880702B400036E00FC

UDP send 0xFF800702B400046E00FC
UDP recv 0xFF880702B400046E00FC
UDP send 0xFF800702B400056E00FC
UDP recv 0xFF880702B400056E00FC
UDP send 0xFF800702B400066E00FC
UDP recv 0xFF880702B400066E00FC
UDP send 0xFF800702B400076E00FC
UDP recv 0xFF880702B400076E00FC
UDP send 0xFF800702B400086E00FC
UDP recv 0xFF880702B400086E00FC

// QDC pretrigger
UDP send 0xFF800702B40001C00002
UDP recv 0xFF880702B40001C00002
UDP send 0xFF800702B40002C00002
UDP recv 0xFF880702B40002C00002
UDP send 0xFF800702B40003C00002
UDP recv 0xFF880702B40003C00002
UDP send 0xFF800702B40004C00002
UDP recv 0xFF880702B40004C00002
UDP send 0xFF800702B40005C00002
UDP recv 0xFF880702B40005C00002
UDP send 0xFF800702B40006C00002
UDP recv 0xFF880702B40006C00002
UDP send 0xFF800702B40007C00002
UDP recv 0xFF880702B40007C00002
UDP send 0xFF800702B40008C00002
UDP recv 0xFF880702B40008C00002

// QDC Filter
UDP send 0xFF800702B40001C60001
UDP recv 0xFF880702B40001C60001
UDP send 0xFF800702B40002C60001
UDP recv 0xFF880702B40002C60001
UDP send 0xFF800702B40003C60001
UDP recv 0xFF880702B40003C60001
UDP send 0xFF800702B40004C60001
UDP recv 0xFF880702B40004C60001
UDP send 0xFF800702B40005C60001
UDP recv 0xFF880702B40005C60001
UDP send 0xFF800702B40006C60001
UDP recv 0xFF880702B40006C60001
UDP send 0xFF800702B40007C60001
UDP recv 0xFF880702B40007C60001
UDP send 0xFF800702B40008C60001
UDP recv 0xFF880702B40008C60001

// QDC sum/peak
UDP send 0xFF800702B40001C80001
UDP recv 0xFF880702B40001C80001
UDP send 0xFF800702B40002C80001
UDP recv 0xFF880702B40002C80001
UDP send 0xFF800702B40003C80001
UDP recv 0xFF880702B40003C80001
UDP send 0xFF800702B40004C80001
UDP recv 0xFF880702B40004C80001
UDP send 0xFF800702B40005C80001
UDP recv 0xFF880702B40005C80001

UDP send 0xFF800702B40006C80001
UDP recv 0xFF880702B40006C80001
UDP send 0xFF800702B40007C80001
UDP recv 0xFF880702B40007C80001
UDP send 0xFF800702B40008C80001
UDP recv 0xFF880702B40008C80001

// analog gain (multiple)
UDP send 0xFF800702B400010E0001
UDP recv 0xFF880702B400010E0001
UDP send 0xFF800702B400020E0001
UDP recv 0xFF880702B400020E0001
UDP send 0xFF800702B400030E0001
UDP recv 0xFF880702B400030E0001
UDP send 0xFF800702B400040E0001
UDP recv 0xFF880702B400040E0001
UDP send 0xFF800702B400050E0001
UDP recv 0xFF880702B400050E0001
UDP send 0xFF800702B400060E0001
UDP recv 0xFF880702B400060E0001
UDP send 0xFF800702B400070E0001
UDP recv 0xFF880702B400070E0001
UDP send 0xFF800702B400080E0001
UDP recv 0xFF880702B400080E0001

// analog offset
UDP send 0xFF800702B40001700800
UDP recv 0xFF880702B40001700800
UDP send 0xFF800702B40002700800
UDP recv 0xFF880702B40002700800
UDP send 0xFF800702B40003700800
UDP recv 0xFF880702B40003700800
UDP send 0xFF800702B40004700800
UDP recv 0xFF880702B40004700800
UDP send 0xFF800702B40005700800
UDP recv 0xFF880702B40005700800
UDP send 0xFF800702B40006700800
UDP recv 0xFF880702B40006700800
UDP send 0xFF800702B40007700800
UDP recv 0xFF880702B40007700800
UDP send 0xFF800702B40008700800
UDP recv 0xFF880702B40008700800

//Parameter enable
UDP send 0xFF800702B40001B00001
UDP recv 0xFF880702B40001B00001
UDP send 0xFF800702B40002B00001
UDP recv 0xFF880702B40002B00001
UDP send 0xFF800702B40003B00001
UDP recv 0xFF880702B40003B00001
UDP send 0xFF800702B40004B00001
UDP recv 0xFF880702B40004B00001
UDP send 0xFF800702B40005B00001
UDP recv 0xFF880702B40005B00001
UDP send 0xFF800702B40006B00001
UDP recv 0xFF880702B40006B00001
UDP send 0xFF800702B40007B00001
UDP recv 0xFF880702B40007B00001
UDP send 0xFF800702B40008B00001
UDP recv 0xFF880702B40008B00001

// QDC integral range
UDP send 0xFF800702B40001DC0013
UDP recv 0xFF880702B40001DC0013
UDP send 0xFF800702B40002DC0013
UDP recv 0xFF880702B40002DC0013
UDP send 0xFF800702B40003DC0013
UDP recv 0xFF880702B40003DC0013
UDP send 0xFF800702B40004DC0013
UDP recv 0xFF880702B40004DC0013
UDP send 0xFF800702B40005DC0013
UDP recv 0xFF880702B40005DC0013
UDP send 0xFF800702B40006DC0013
UDP recv 0xFF880702B40006DC0013
UDP send 0xFF800702B40007DC0013
UDP recv 0xFF880702B40007DC0013
UDP send 0xFF800702B40008DC0013
UDP recv 0xFF880702B40008DC0013

// Signal type
UDP send 0xFF800702B40001DE0000
UDP recv 0xFF880702B40001DE0000
UDP send 0xFF800702B40002DE0000
UDP recv 0xFF880702B40002DE0000
UDP send 0xFF800702B40003DE0000
UDP recv 0xFF880702B40003DE0000
UDP send 0xFF800702B40004DE0000
UDP recv 0xFF880702B40004DE0000
UDP send 0xFF800702B40005DE0000
UDP recv 0xFF880702B40005DE0000
UDP send 0xFF800702B40006DE0000
UDP recv 0xFF880702B40006DE0000
UDP send 0xFF800702B40007DE0000
UDP recv 0xFF880702B40007DE0000
UDP send 0xFF800702B40008DE0000
UDP recv 0xFF880702B40008DE0000

// Timing Type
UDP send 0xFF800702B40001D00000
UDP recv 0xFF880702B40001D00000
UDP send 0xFF800702B40002D00000
UDP recv 0xFF880702B40002D00000
UDP send 0xFF800702B40003D00000
UDP recv 0xFF880702B40003D00000
UDP send 0xFF800702B40004D00000
UDP recv 0xFF880702B40004D00000
UDP send 0xFF800702B40005D00000
UDP recv 0xFF880702B40005D00000
UDP send 0xFF800702B40006D00000
UDP recv 0xFF880702B40006D00000
UDP send 0xFF800702B40007D00000
UDP recv 0xFF880702B40007D00000
UDP send 0xFF800702B40008D00000
UDP recv 0xFF880702B40008D00000

//Measurement mode
UDP send 0xFF800702B40000020000 UDP close
UDP recv 0xFF880702B40000020000

// Commands of Configuration
// This command is different every module.
// Configur only one time when module power up
// Board #3 only (IP:192.168.10.130)

UDP socket

// CoarseOffset0 WriteValue
UDP send 0xFF800702B40001B40078
UDP recv 0xFF880702B40001B40078
UDP send 0xFF800702B40002B4007B
UDP recv 0xFF880702B40002B4007B
UDP send 0xFF800702B40003B40069
UDP recv 0xFF880702B40003B40069
UDP send 0xFF800702B40004B40071
UDP recv 0xFF880702B40004B40071
UDP send 0xFF800702B40005B40077
UDP recv 0xFF880702B40005B40077
UDP send 0xFF800702B40006B40073
UDP recv 0xFF880702B40006B40073
UDP send 0xFF800702B40007B40071
UDP recv 0xFF880702B40007B40071
UDP send 0xFF800702B40008B40073
UDP recv 0xFF880702B40008B40073

// CoarseOffset1 WriteValue
UDP send 0xFF800702B40001B6006B
UDP recv 0xFF880702B40001B6006B
UDP send 0xFF800702B40002B60072
UDP recv 0xFF880702B40002B60072
UDP send 0xFF800702B40003B6006C
UDP recv 0xFF880702B40003B6006C
UDP send 0xFF800702B40004B6006F
UDP recv 0xFF880702B40004B6006F
UDP send 0xFF800702B40005B60070
UDP recv 0xFF880702B40005B60070
UDP send 0xFF800702B40006B60077
UDP recv 0xFF880702B40006B60077
UDP send 0xFF800702B40007B60067
UDP recv 0xFF880702B40007B60067
UDP send 0xFF800702B40008B6006D
UDP recv 0xFF880702B40008B6006D

// FineOffset0 WriteValue
UDP send 0xFF800702B40001CC0040
UDP recv 0xFF880702B40001CC0040
UDP send 0xFF800702B40002CC006A
UDP recv 0xFF880702B40002CC006A
UDP send 0xFF800702B40003CC0076
UDP recv 0xFF880702B40003CC0076
UDP send 0xFF800702B40004CC00D5
UDP recv 0xFF880702B40004CC00D5
UDP send 0xFF800702B40005CC006C
UDP recv 0xFF880702B40005CC006C
UDP send 0xFF800702B40006CC0078
UDP recv 0xFF880702B40006CC0078

UDP send 0xFF800702B40007CC00C7
UDP recv 0xFF880702B40007CC00C7
UDP send 0xFF800702B40008CC008E
UDP recv 0xFF880702B40008CC008E

// FineOffset1 WriteValue
UDP send 0xFF800702B40001CE006B
UDP recv 0xFF880702B40001CE006B
UDP send 0xFF800702B40002CE004C
UDP recv 0xFF880702B40002CE004C
UDP send 0xFF800702B40003CE0058
UDP recv 0xFF880702B40003CE0058
UDP send 0xFF800702B40004CE0070
UDP recv 0xFF880702B40004CE0070
UDP send 0xFF800702B40005CE007C
UDP recv 0xFF880702B40005CE007C
UDP send 0xFF800702B40006CE0046
UDP recv 0xFF880702B40006CE0046
UDP send 0xFF800702B40007CE008A
UDP recv 0xFF880702B40007CE008A
UDP send 0xFF800702B40008CE0023
UDP recv 0xFF880702B40008CE0023

// CoarseGain0 WriteValue
UDP send 0xFF800702B40001B8000E
UDP recv 0xFF880702B40001B8000E
UDP send 0xFF800702B40002B8000E
UDP recv 0xFF880702B40002B8000E
UDP send 0xFF800702B40003B8000E
UDP recv 0xFF880702B40003B8000E
UDP send 0xFF800702B40004B8000E
UDP recv 0xFF880702B40004B8000E
UDP send 0xFF800702B40005B8000E
UDP recv 0xFF880702B40005B8000E
UDP send 0xFF800702B40006B8000E
UDP recv 0xFF880702B40006B8000E
UDP send 0xFF800702B40007B8000E
UDP recv 0xFF880702B40007B8000E
UDP send 0xFF800702B40008B8000E
UDP recv 0xFF880702B40008B8000E

// CoarseGain1 WriteValue
UDP send 0xFF800702B40001BA000E
UDP recv 0xFF880702B40001BA000E
UDP send 0xFF800702B40002BA000E
UDP recv 0xFF880702B40002BA000E
UDP send 0xFF800702B40003BA000E
UDP recv 0xFF880702B40003BA000E
UDP send 0xFF800702B40004BA000E
UDP recv 0xFF880702B40004BA000E
UDP send 0xFF800702B40005BA000E
UDP recv 0xFF880702B40005BA000E
UDP send 0xFF800702B40006BA000E
UDP recv 0xFF880702B40006BA000E

UDP send 0xFF800702B40007BA000E
UDP recv 0xFF880702B40007BA000E
UDP send 0xFF800702B40008BA000E
UDP recv 0xFF880702B40008BA000E

// MiddleGain0 WriteValue
UDP send 0xFF800702B40001BC0062
UDP recv 0xFF880702B40001BC0062
UDP send 0xFF800702B40002BC0089
UDP recv 0xFF880702B40002BC0089
UDP send 0xFF800702B40003BC00A3
UDP recv 0xFF880702B40003BC00A3
UDP send 0xFF800702B40004BC007E
UDP recv 0xFF880702B40004BC007E
UDP send 0xFF800702B40005BC008D
UDP recv 0xFF880702B40005BC008D
UDP send 0xFF800702B40006BC0080
UDP recv 0xFF880702B40006BC0080
UDP send 0xFF800702B40007BC006E
UDP recv 0xFF880702B40007BC006E
UDP send 0xFF800702B40008BC0069
UDP recv 0xFF880702B40008BC0069

// MiddleGain1 WriteValue
UDP send 0xFF800702B40001BE0093
UDP recv 0xFF880702B40001BE0093
UDP send 0xFF800702B40002BE0073
UDP recv 0xFF880702B40002BE0073
UDP send 0xFF800702B40003BE0079
UDP recv 0xFF880702B40003BE0079
UDP send 0xFF800702B40004BE0089
UDP recv 0xFF880702B40004BE0089
UDP send 0xFF800702B40005BE0087
UDP recv 0xFF880702B40005BE0087
UDP send 0xFF800702B40006BE0081
UDP recv 0xFF880702B40006BE0081
UDP send 0xFF800702B40007BE0070
UDP recv 0xFF880702B40007BE0070
UDP send 0xFF800702B40008BE007C
UDP recv 0xFF880702B40008BE007C

//ACS#1
UDP send 0xFF800702B400002A0000
UDP recv 0xFF880702B400002A0000

//ACS#2
UDP send 0xFF800702B400002A0001
UDP recv 0xFF880702B400002A0001

//ACS#3
UDP send 0xFF800702B400002A0000
UDP recv 0xFF880702B400002A0000

UDP Close

// Commands of Configuration
// This command is different every module.
// Configur only one time when module power up
// Board #4 only(IP:192.168.10.131)

UDP socket

// CoarseOffset0 WriteValue
UDP send 0xFF800702B40001B4007A
UDP recv 0xFF880702B40001B4007A
UDP send 0xFF800702B40002B40076
UDP recv 0xFF880702B40002B40076
UDP send 0xFF800702B40003B40080
UDP recv 0xFF880702B40003B40080
UDP send 0xFF800702B40004B40072
UDP recv 0xFF880702B40004B40072
UDP send 0xFF800702B40005B40072
UDP recv 0xFF880702B40005B40072
UDP send 0xFF800702B40006B4007A
UDP recv 0xFF880702B40006B4007A
UDP send 0xFF800702B40007B40077
UDP recv 0xFF880702B40007B40077
UDP send 0xFF800702B40008B40076
UDP recv 0xFF880702B40008B40076

// CoarseOffset1 WriteValue
UDP send 0xFF800702B40001B60076
UDP recv 0xFF880702B40001B60076
UDP send 0xFF800702B40002B60070
UDP recv 0xFF880702B40002B60070
UDP send 0xFF800702B40003B60076
UDP recv 0xFF880702B40003B60076
UDP send 0xFF800702B40004B6007A
UDP recv 0xFF880702B40004B6007A
UDP send 0xFF800702B40005B60073
UDP recv 0xFF880702B40005B60073
UDP send 0xFF800702B40006B60078
UDP recv 0xFF880702B40006B60078
UDP send 0xFF800702B40007B60070
UDP recv 0xFF880702B40007B60070
UDP send 0xFF800702B40008B60072
UDP recv 0xFF880702B40008B60072

// FineOffset0 WriteValue
UDP send 0xFF800702B40001CC008A
UDP recv 0xFF880702B40001CC008A
UDP send 0xFF800702B40002CC0055
UDP recv 0xFF880702B40002CC0055
UDP send 0xFF800702B40003CC0050
UDP recv 0xFF880702B40003CC0050
UDP send 0xFF800702B40004CC00F5
UDP recv 0xFF880702B40004CC00F5
UDP send 0xFF800702B40005CC0048
UDP recv 0xFF880702B40005CC0048

UDP send 0xFF800702B40006CC006B
UDP recv 0xFF880702B40006CC006B
UDP send 0xFF800702B40007CC0040
UDP recv 0xFF880702B40007CC0040
UDP send 0xFF800702B40008CC008C
UDP recv 0xFF880702B40008CC008C

// FineOffset1 WriteValue
UDP send 0xFF800702B40001CE0046
UDP recv 0xFF880702B40001CE0046
UDP send 0xFF800702B40002CE000C
UDP recv 0xFF880702B40002CE000C
UDP send 0xFF800702B40003CE003A
UDP recv 0xFF880702B40003CE003A
UDP send 0xFF800702B40004CE0082
UDP recv 0xFF880702B40004CE0082
UDP send 0xFF800702B40005CE0042
UDP recv 0xFF880702B40005CE0042
UDP send 0xFF800702B40006CE0090
UDP recv 0xFF880702B40006CE0090
UDP send 0xFF800702B40007CE00CB
UDP recv 0xFF880702B40007CE00CB
UDP send 0xFF800702B40008CE0081
UDP recv 0xFF880702B40008CE0081

// CoarseGain0 WriteValue
UDP send 0xFF800702B40001B8000E
UDP recv 0xFF880702B40001B8000E
UDP send 0xFF800702B40002B8000E
UDP recv 0xFF880702B40002B8000E
UDP send 0xFF800702B40003B8000E
UDP recv 0xFF880702B40003B8000E
UDP send 0xFF800702B40004B8000E
UDP recv 0xFF880702B40004B8000E
UDP send 0xFF800702B40005B8000E
UDP recv 0xFF880702B40005B8000E
UDP send 0xFF800702B40006B8000E
UDP recv 0xFF880702B40006B8000E
UDP send 0xFF800702B40007B8000E
UDP recv 0xFF880702B40007B8000E
UDP send 0xFF800702B40008B8000E
UDP recv 0xFF880702B40008B8000E

// CoarseGain1 WriteValue
UDP send 0xFF800702B40001BA000E
UDP recv 0xFF880702B40001BA000E
UDP send 0xFF800702B40002BA000E
UDP recv 0xFF880702B40002BA000E
UDP send 0xFF800702B40003BA000E
UDP recv 0xFF880702B40003BA000E
UDP send 0xFF800702B40004BA000E
UDP recv 0xFF880702B40004BA000E
UDP send 0xFF800702B40005BA000E
UDP recv 0xFF880702B40005BA000E

UDP send 0xFF800702B40006BA000E
UDP recv 0xFF880702B40006BA000E
UDP send 0xFF800702B40007BA000E
UDP recv 0xFF880702B40007BA000E
UDP send 0xFF800702B40008BA000E
UDP recv 0xFF880702B40008BA000E

// MiddleGain0 WriteValue
UDP send 0xFF800702B40001BC0082
UDP recv 0xFF880702B40001BC0082
UDP send 0xFF800702B40002BC0076
UDP recv 0xFF880702B40002BC0076
UDP send 0xFF800702B40003BC00A5
UDP recv 0xFF880702B40003BC00A5
UDP send 0xFF800702B40004BC005A
UDP recv 0xFF880702B40004BC005A
UDP send 0xFF800702B40005BC0091
UDP recv 0xFF880702B40005BC0091
UDP send 0xFF800702B40006BC007F
UDP recv 0xFF880702B40006BC007F
UDP send 0xFF800702B40007BC0077
UDP recv 0xFF880702B40007BC0077
UDP send 0xFF800702B40008BC0080
UDP recv 0xFF880702B40008BC0080

// MiddleGain1 WriteValue
UDP send 0xFF800702B40001BE0079
UDP recv 0xFF880702B40001BE0079
UDP send 0xFF800702B40002BE006F
UDP recv 0xFF880702B40002BE006F
UDP send 0xFF800702B40003BE0072
UDP recv 0xFF880702B40003BE0072
UDP send 0xFF800702B40004BE0080
UDP recv 0xFF880702B40004BE0080
UDP send 0xFF800702B40005BE0086
UDP recv 0xFF880702B40005BE0086
UDP send 0xFF800702B40006BE0079
UDP recv 0xFF880702B40006BE0079
UDP send 0xFF800702B40007BE0087
UDP recv 0xFF880702B40007BE0087
UDP send 0xFF800702B40008BE007D
UDP recv 0xFF880702B40008BE007D

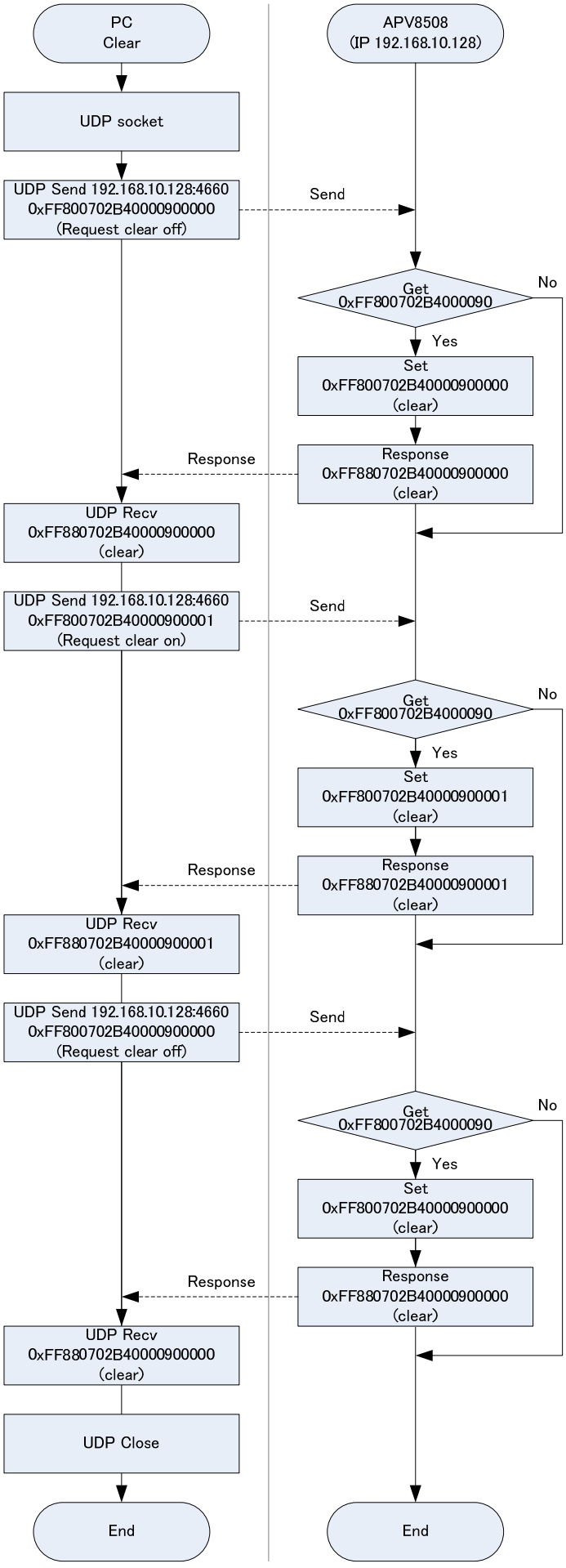
//ACS#1
UDP send 0xFF800702B400002A0000
UDP recv 0xFF880702B400002A0000

//ACS#2
UDP send 0xFF800702B400002A0001
UDP recv 0xFF880702B400002A0001

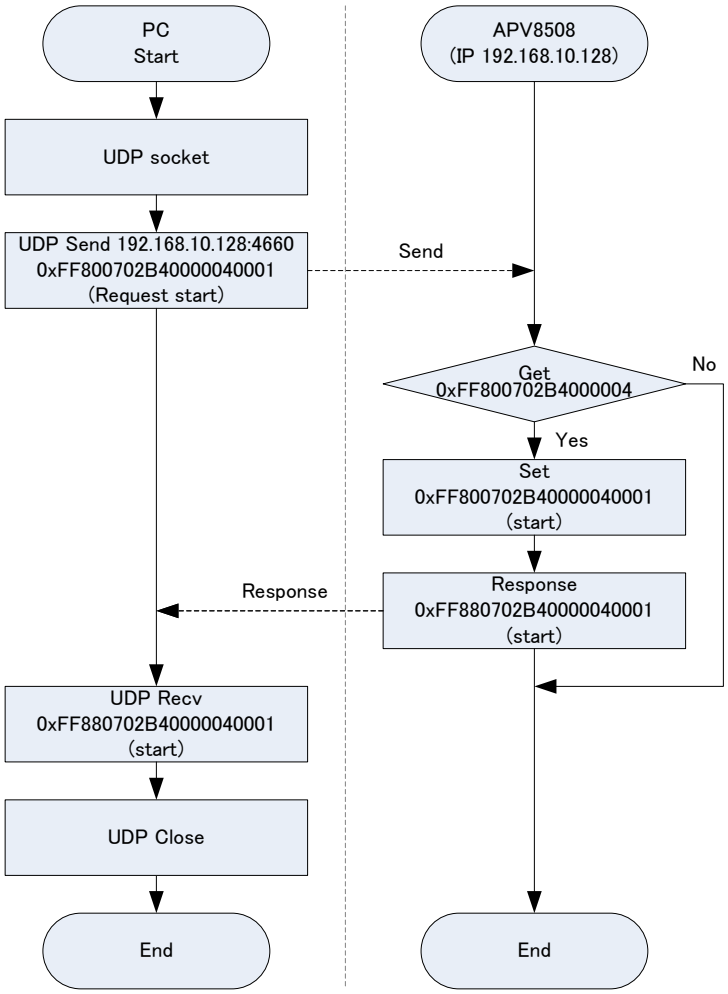
//ACS#3
UDP send 0xFF800702B400002A0000
UDP recv 0xFF880702B400002A0000

UDP Close

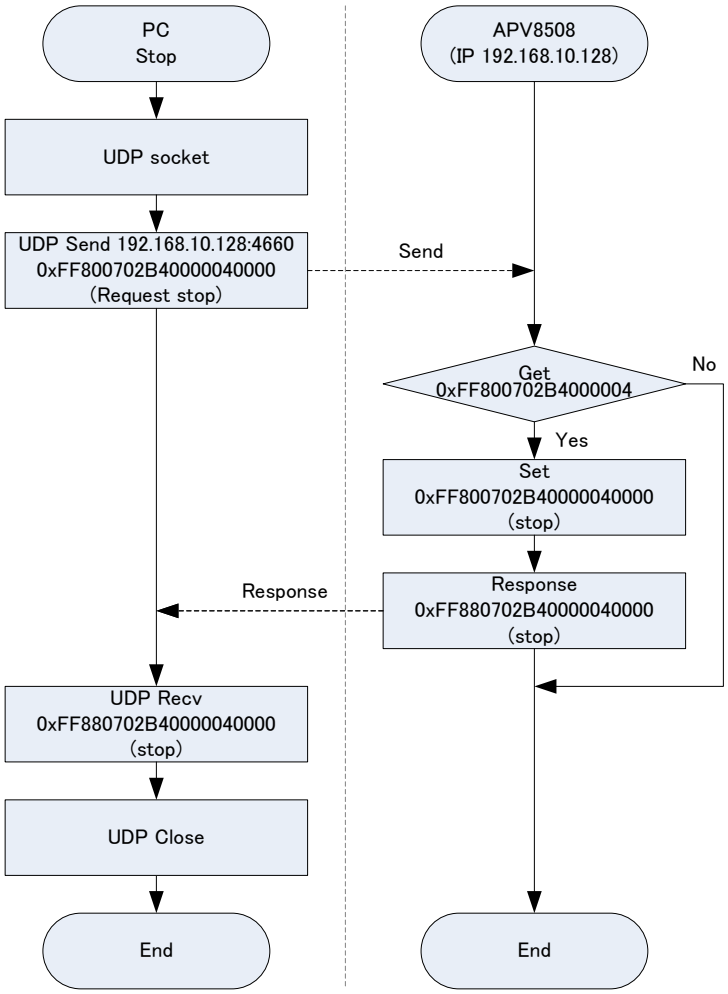
(2) clear


PC
Clear
APV8508
(IP 192.168.10.128)
UDP socket
UDP Send 192.168.10.128:4660
0xFF800702B40000900000
(Request clear off)
Send
Get
0xFF800702B4000090
No
Yes
Set
0xFF800702B40000900000
(clear)
Response
0xFF880702B40000900000
(clear)
Response
UDP Recv
0xFF880702B40000900000
(clear)
UDP Send 192.168.10.128:4660
0xFF800702B40000900001
(Request clear on)
Send
Get
0xFF800702B4000090
No
Yes
Set
0xFF800702B40000900001
(clear)
Response
0xFF880702B40000900001
(clear)
Response
UDP Recv
0xFF880702B40000900001
(clear)
UDP Send 192.168.10.128:4660
0xFF800702B40000900000
(Request clear off)
Send
Get
0xFF800702B4000090
No
Yes
Set
0xFF800702B40000900000
(clear)
Response
0xFF880702B40000900000
(clear)
Response
UDP Recv
0xFF880702B40000900000
(clear)
UDP Close
End
End

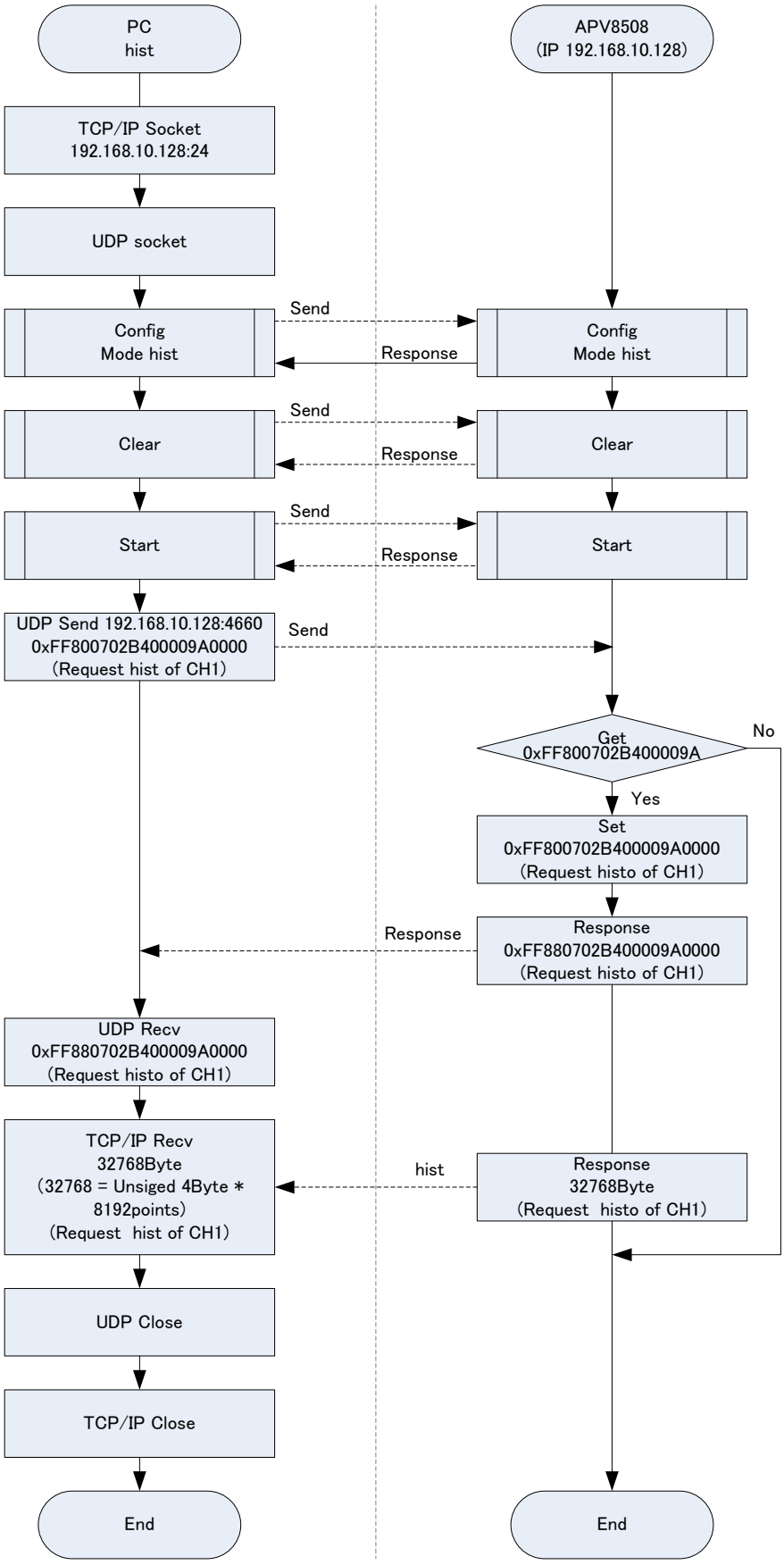
(3) start


PC
Start
APV8508
(IP 192.168.10.128)
UDP socket
UDP Send 192.168.10.128:4660
0xFF800702B40000040001
(Request start)
Send
Get
0xFF800702B4000004
No
Yes
Set
0xFF800702B40000040001
(start)
Response
0xFF880702B40000040001
(start)
Response
UDP Recv
0xFF880702B40000040001
(start)
UDP Close
End
End

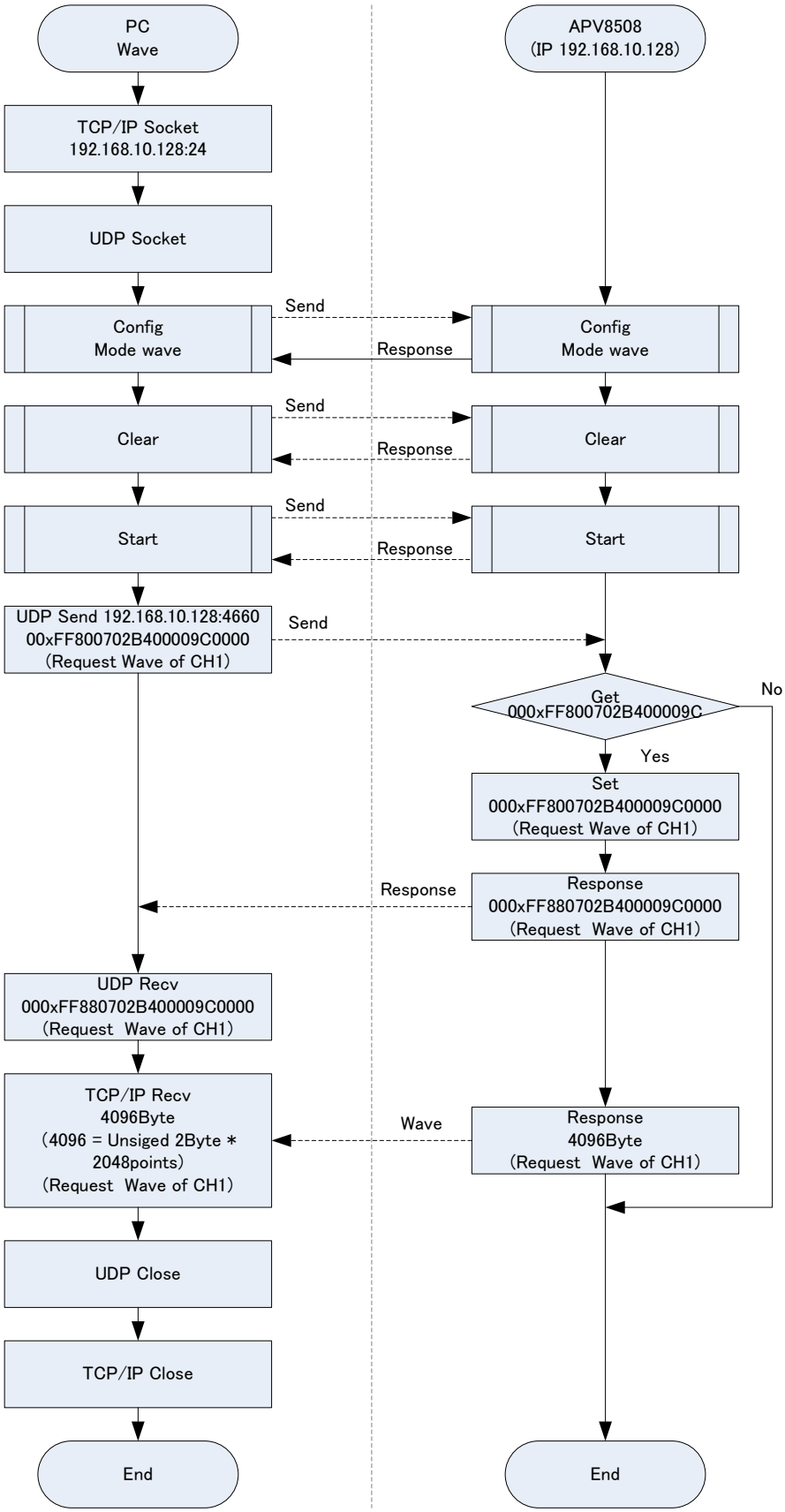
(4) stop


PC
Stop
APV8508
(IP 192.168.10.128)
UDP socket
UDP Send 192.168.10.128:4660
0xFF800702B40000040000
(Request stop)
Send
Get
0xFF800702B4000004
No
Yes
Set
0xFF800702B40000040000
(stop)
Response
0xFF880702B40000040000
(stop)
Response
UDP Recv
0xFF880702B40000040000
(stop)
UDP Close
End
End

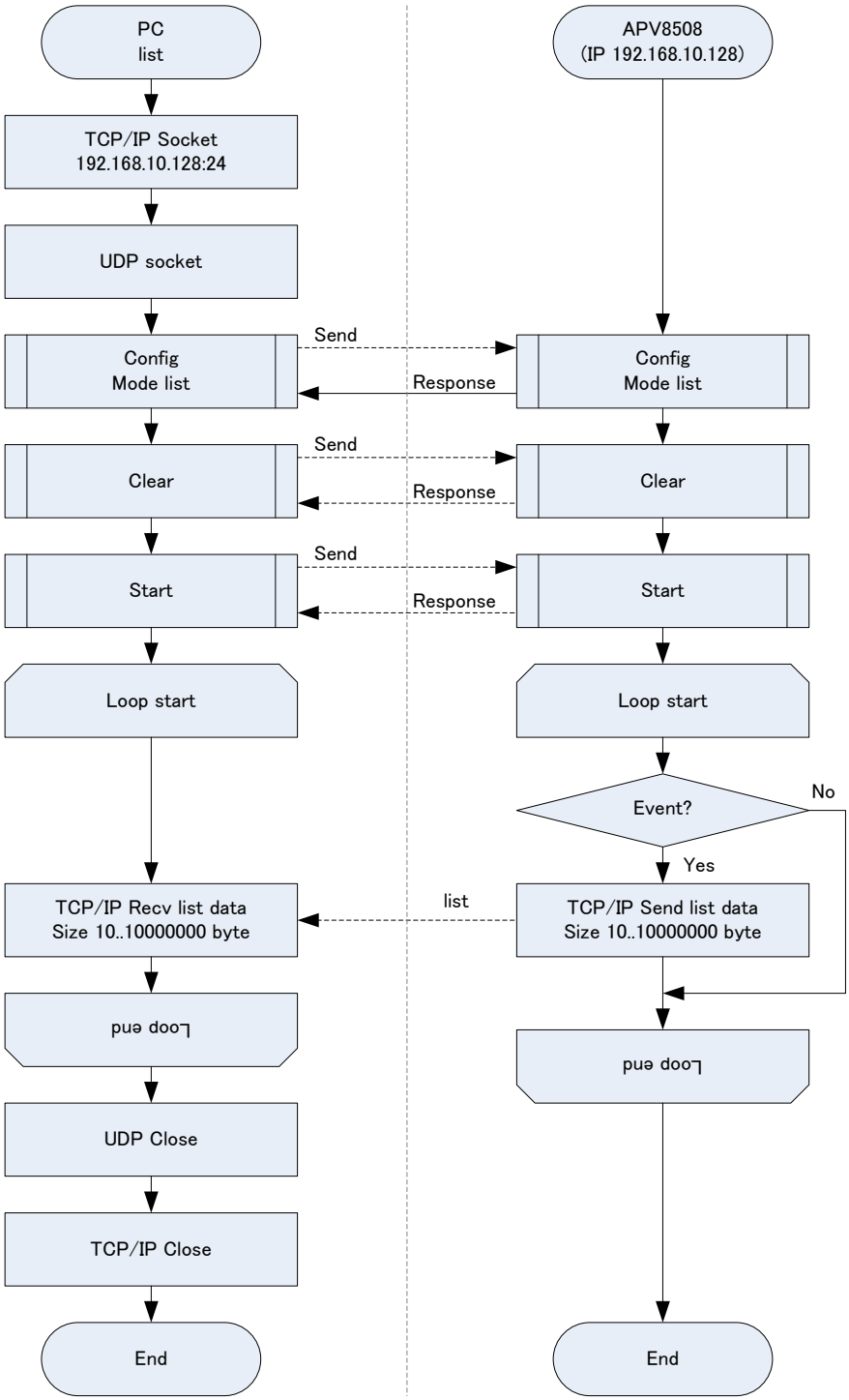
(5) hist


PC
hist
APV8508
(IP 192.168.10.128)
TCP/IP Socket
192.168.10.128:24
UDP socket
Config
Mode hist
Send
Response
Config
Mode hist
Clear
Send
Response
Clear
Start
Send
Response
Start
UDP Send 192.168.10.128:4660
0xFF800702B400009A0000
(Request hist of CH1)
Send
Get
0xFF800702B400009A
No
Yes
Set
0xFF800702B400009A0000
(Request histo of CH1)
Response
0xFF880702B400009A0000
(Request histo of CH1)
Response
UDP Recv
0xFF880702B400009A0000
(Request histo of CH1)
TCP/IP Recv
32768Byte
(32768 = Unsiged 4Byte * 8192points)
(Request hist of CH1)
hist
Response
32768Byte
(Request histo of CH1)
UDP Close
TCP/IP Close
End
End

(6) wave data


PC
Wave
APV8508
(IP 192.168.10.128)
TCP/IP Socket
192.168.10.128:24
UDP Socket
Config
Mode wave
Send
Response
Config
Mode wave
Clear
Send
Response
Clear
Start
Send
Response
Start
UDP Send 192.168.10.128:4660
00xFF800702B400009C0000
(Request Wave of CH1)
Send
Get
000xFF800702B400009C
No
Yes
Set
000xFF800702B400009C0000
(Request Wave of CH1)
Response
Response
000xFF880702B400009C0000
(Request Wave of CH1)
UDP Recv
000xFF880702B400009C0000
(Request Wave of CH1)
TCP/IP Recv
4096Byte
(4096 = Unsiged 2Byte *
2048points)
(Request Wave of CH1)
Wave
Response
4096Byte
(Request Wave of CH1)
UDP Close
TCP/IP Close
End
End

(7) list data



End