

LINEEYE

OPTIONAL KIT
FOR MULTI PROTOCOL ANALYZER LE-8200/LE-8200A

Firmware for High-speed Communication
OP-FW12GA / OP-FW12G

Instruction Manual

The 2nd Edition

Instruction

Thank you for your purchase of OP-FW12GA / OP-FW12G.

To use this product correctly, you are advised to read and understand this instruction manual thoroughly.

Keep this together with the warranty. If you encounter any problems, you will find helpful information in this manual.

NOTICE

- It is prohibited to reprint or duplicate any part of the whole of this instruction manual without prior permission from LINEEYE.
- The content of this instruction manual and specifications of the products are subject to change without any notice.
- This instruction manual has been designed and edited with great care to give you all necessary information. If you have any questions, feel free to direct your inquiries to LINEEYE.
- LINEEYE makes no warranty or guarantee, either expressed or implied with respect to its quality, performance, merchantability, or fitness for a particular purpose. LINEEYE shall not be liable for direct, in-direct, special, incidental, or consequential damages resulting from any defect in the product. The warranty and remedies set forth above are exclusive and in lieu of all others.

USER LIMITATION

This product has been developed for the purpose of using as an analyzer only.

When you use this product with the following devices that are required to function with a high degree of reliability, safety and accuracy, use it under considering the safe design of the system in order to maintain reliability and safety for that system;

*Devices that are directly related to transportation such as airplanes, trains, cars etc.

*Devices for crime prevention and disaster privension.

*Each kind of safety devices and so on.


This product has not been developed for the use that needs exclusively high reliability and safety: aerospace apparatus, trunk communication apparatus, nuclear control apparatus, medical apparatus related with life maintenance etc. Therefore, do no use for those purposes.







Firmware



Firmware OP-FW12GA / OP-FW12G is contained in the CD-ROM.

Safety Information

Read this first !!

Here, for users of the object products, the important contents to the way which previously prevents hazard to the human and damage of the property and teaches safely use has been described. Before using, please read the main contents after you understand the following contents (symbols & marks).  :Prohibition

	Warning - Should the device be used without followings, there is a possibility of accidents, such as a death or a serious injury, occurring.
	<ul style="list-style-type: none">• Stop using the analyzer immediately when smoke or smells emanate from itself. Continuous use may result in an electric shock, a burn and/ or fire.
	<ul style="list-style-type: none">• Stop using the analyzer when a liquid or foreign substance get into the analyzer. This may result in an electric shock or fire. <p>→ Immediately switch off the analyzer and unplug it.</p>
	<ul style="list-style-type: none">• Do not disassemble, modify or repair analyzer. This may result in a injury, an electric shock, fire, explosion and/or a breakdown due to overheating.
	<ul style="list-style-type: none">• Do not put the analyzer in fire or heat them. This may result in a injury and fire due to overheating or explosion.
	<ul style="list-style-type: none">• Never plug or unplug the AC adapter in wet hands.• Do not subject the analyzer to extreme conditions.

	Caution - Should the device be used without followings, there is a possibility of accidents, such as a injury , and material damage occurring.
	<ul style="list-style-type: none">• Do not leave the analyzer in the following conditions. Strong magnetic field, static electricity or dusty place. Temperature and humidity above the specification. Condenscendingly place. Not flat, or shaking place. Place with leaking water or electricity. Place affected by direct sun or near the fire . Please do not leave the analyzer in a car during a heat summer.

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Chapter 1 Before Using the Product

1.1 Unpacking

When you unpack the product, make sure of the following:

- The product has not been damaged during the transit.
- You have received all the standard accessories listed below.

<input checked="" type="checkbox"/>	Firmware (CD-ROM)	1
<input checked="" type="checkbox"/>	Instruction Manual (This book)	1
<input checked="" type="checkbox"/>	Registration Card / Warranty	1 each

 Please keep the CD-ROM at the safe place. You will need it when upgrading.

 Please let us know if you find any damage to the product caused by the transit, or if there are any accessories lacking.

1.2 Introduction

OP-FW12G is the firmware to monitor and simulate the bit-sync communications (HDLC/SDLC/X.25/CC-Link) or SPI communication at high speed. With OP-FW12GA, you can test Profibus-DP (which is characterized by high-speed communication) or UART (asynchronous communication) in addition to the protocol supported by OP-FW12G. The interface supports RS-422/RS-485/RS-530/TTL.

Functions

■ On-line Monitor Function

Can monitor high-speed communication at online.

With time stamp display and trigger function, you can efficiently execute an analysis.

When the protocol is HDLC, using ID filters, you can sort half-duplex data to SD and RD for easy-to-understand display.

Speed Range

ASYNC: 115.2Kbps to 6Mbps (full duplex) / 115.2Kbps to 12Mbps (half duplex)
(only OP-FW12GA)

Profibus-DP: 187.5Kbps, 500Kbps, 1.5Mbps, 3Mbps, 6Mbps, 12Mbps (only OP-FW12GA)

HDLC: 115.2Kbps to 6Mbps (full duplex) / 115.2Kbps to 12Mbps (half duplex)

SPI : 115.2Kbps to 20Mbps

■ Simulation Function

MANUAL mode can transmit the user defined data at max. 12Mbps with one press of a key.

PULSGEN mode can have the wave form measured by logic analyzer function. (LE-8200A only)

Chapter 2 Basic Operation

2.1 Preparation Before Measuring

Installation of Firmware

Install OP-FW12GA / OP-FW12G firmware to measure high-speed communications.

- Connect analyzer to a PC

Connect an AUX port of analyzer and a COM port of PC, or connect USB ports of analyzer and PC.

<Attention>

To use a USB port of analyzer, you need to install a USB driver.

USB driver is contained in the utility CD of analyzer.

Select "Search for the best driver in these locations" and follow the wizard message.

Refer to the LE-8200 manual about how to install it.

- Setting of analyzer

If using an AUX port as connection, set AUX (RS-232C) condition of analyzer as follows.

Speed: 115200/23040, Data bit: 8, Parity: None, X-control: Off

(Set the same speed as PC setting. <transfer software: le8firm>)

Turn off the power of analyzer and then turn on the power while pressing [Shift]+[File]

Firmware loader of analyzer will start.

- Execute the transferring software "le8firm.exe".

Click "le8firm.exe" in CD-ROM attached to the analyzer twice.

- Transfer the firmware

1). Select a connection method from "USB" or "Serial."

2). Click [Next].

3). Click [Select] and select the firmware file "OPFW12GA.FW2" or "OPFW12G.FW2".

4). Click [Start] to start transmission. "Complete" will appear when completing the transmission.

5). Click [Close] to close the transferring software.

- Reboot the analyzer

"Firmware write succeeded" will appear when completing the transmission of firmware.

Reboot the analyzer to use OP-FW12GA / OP-FW12G firmware.

<Note>

Cannot install OP-FW12G and OP-FW12GA to the analyzer at the same time. When OP-FW12G has been installed, if you install the OP-FW12GA to the analyzer, OP-FW12G will be deleted, and vice versa.

Choosing the Appropriate Firmware

After installing the firmware, you can choose ordinary measurement mode (standard firmware for analyzer), or high-speed measurement mode (OP-FW12GA / OP-FW12G).

- Ordinary measurement mode: Turn on the analyzer, while pushing [Shift]+[0].
- High-speed measurement mode: Turn on the analyzer, while pushing [Shift]+[3].

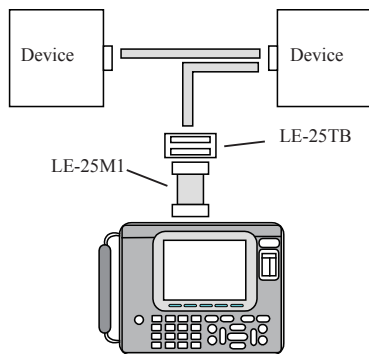
Save your important data to CF cards before changing the firmware mode. It will initialize the analyzer and erase all data.

Connection to the Target Devices

<RS-232C>

Connect the target devices to RS-232C port of LE-8200/LE-8200A through the monitoring cable LE-25M1, that is attached to LE-8200/LE-8200A package.

<RS-422/RS-485>

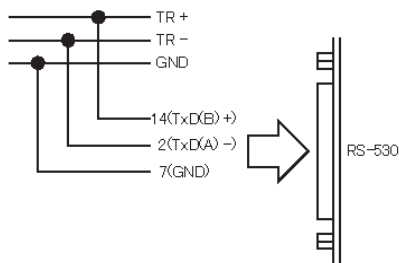


Connect to the target devices, using Dsub 25pin terminal block (LE-25TB or LE-530TB).

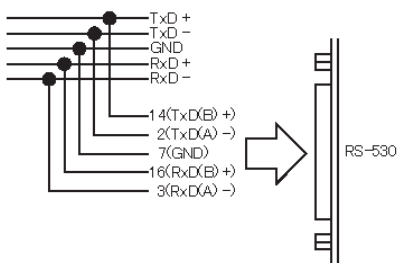
Half-duplex	Connection: 2(TxD_A), 14(TxD_B), 7(GND)
Full-duplex	Connection: 2(TxD_A), 14(TxD_B), 3(RxD_A), 16(RxD_B), 7(GND)

If you need the terminal control, make the DIP switch to be ON on the interface board.

<Half duplex Monitor>



<Full duplex Monitor>

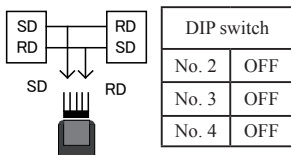


When simulating at half duplex, set "Driver control" to "A" in the "Interface" setting.

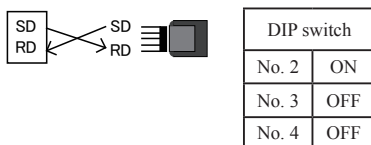
<TTL> (On using OP-SB85/OP-SB85L)

■ ASYNC / HDLC

On monitoring

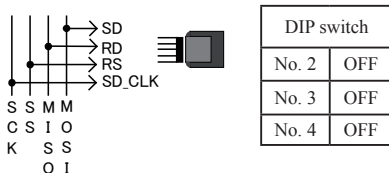


On simulating



■ SPI

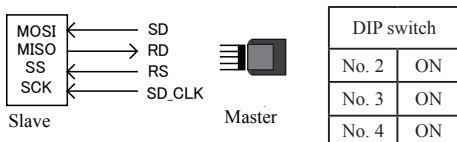
On monitoring



On simulating

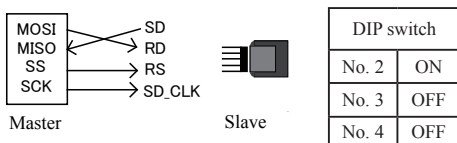
□ Master mode

Connect SDO (SD) to MOSI, SDI (RD) to MISO, SS(RTS) to SS and SCK(TXC) to SCK.



□ Slave mode

Connect SDO(SD) to MISO, SDI(RD) to MOSI, SS(RTS) to SS, SCK(TXC) to SCK.

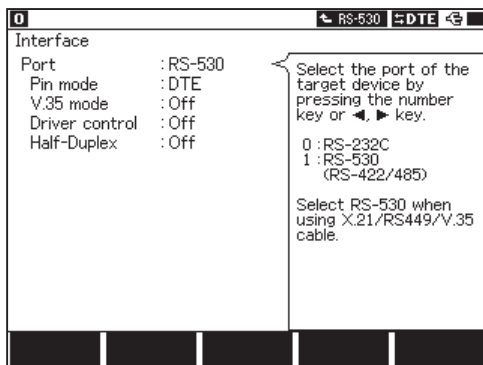


2.2 Analyzer Setting

2.2.1 Interface Port Setting

Set the interface port from top menu and then press [1].

<Standard Board>



■ Port:

Select the port from RS-232C or RS-530 (RS-422/485).

In general, select RS-530 for high-speed communication.

■ Pin mode:

Select the data line for output when simulating.

■ V.35 mode:

Set On when measuring V.35.

■ Driver control:

Select driver control when simulating.

Setting	Driver Control
Off	Always become active when simulation starts.
Manual	Become non-active right after simulation starts. Become active only ER (DTR) signal (Pin mode:DTE) or CD signal (Pin mode:DCE) is active.
Auto	Become non-active when simulation starts. Become active when transmitting data and become non-active after finishing data transmission.

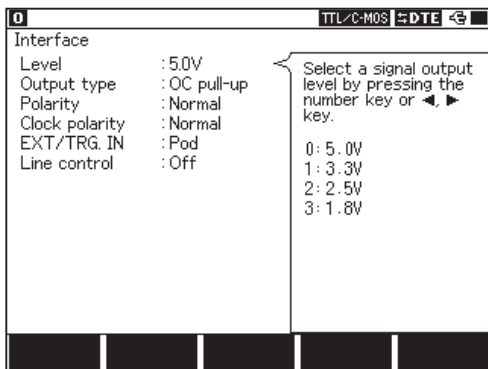
■ Half duplex

When it is “Off”, display it to SD side and RD side depending on the entered data line.

When it is “On”, it takes in only following data line depending on the protocol.

Function	Pin mode	Data lines to be taken
ONLINE (Monitoring)	DTE	TxD
	DCE	TxD
MANUAL (Simulation)	DTE	TxD
	DCE	RxD

When the protocol is HDLC and it is “On” (half-duplex), TxD and RxD are connected internally. In combination with an ID filter, it can display the data to SD side and RD side.



- Level
Select the signal voltage level(the power supply system).
Depending on the hardware to measure, select 5.0V, 3.3V, 2.5V, or 1.8V.

- Output type
Select the type of output circuit (Pull-up,No Pull-up,CMOS) according to the target device on simulating.
Pull-up is the output of open collector with the pull-up resistor.
No Pull-up is the output of open collector with no pull-up resistor.
CMOS is the CMOS push-pull output.

- Polarity
Set the polarity of all signals.
Normal is selected generally. On Invert, polarities of all signals will be inverted.

- Clock Polarity
Set the polarity for clock.
On Invert, the polarity of clock signal only will be inverted.

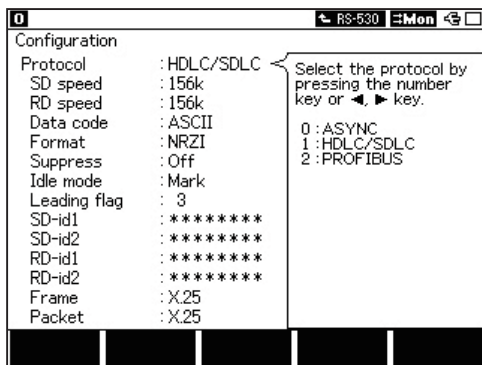
- EXT / TRG.IN
Set the input terminal of the external trigger.
Select “Pod” on using the TRG.IN terminal of the probe pod, or “Panel” on using the TRG.IN terminal of the sub board.

- When using OP-SB85, the following terms are invalid.
Level : 2.5V,1.8V
Output type : CMOS

2.2.2 Setting of Communication Conditions

Set appropriate communication conditions of analyzer, such as speed and so on. Press [1] from the top screen.

<HDLC>



- Protocol
Select “HDLC”.
- SD speed
Set the communication speed in the SD(TxD) side. (RD will be automatically set)
- RD speed
Set the communication speed in the RD(RxD)side. (only different from SD side)
- Data code
Set the display code to display in the LCD.
- Format
Select the format either from NRZ/NRZI.

■ Idle mode

Select the output state of idle signal between frames when simulating.
Select “Mark” or “Flag”.

■ Suppress

When On, a frame less than 2 bytes which end with abort is not to be recorded.
When Off, all of the data is captured. (Select “Off” under normal conditions)

■ Leading flag

Set numbers of leading flag when simulating.

■ SD-id1

Set the ID Filter for the first receiving data in the SD side in bit (0, 1, *(don't care).
ID Filter can be set 2 sequential data by SD-id1 and SD-id2.

■ SD-id2

Set the ID Filter for the second receiving data in the SD side in bit (0, 1, *(don't care).

■ RD-id1

Set the ID Filter for the first receiving data in the RD side in bit (0, 1, *(don't care).
ID Filter can be set 2 sequential data by RD-id1 and RD-id2.

■ RD-id2

Set the ID Filter for the second receiving data in the RD side in bit (0, 1, *(don't care).

<ID Filter>

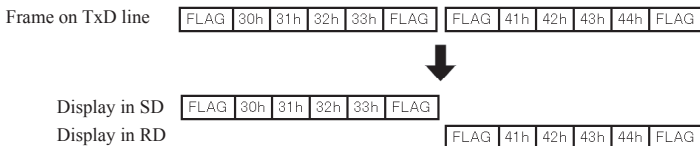
- ☰ Monitor every single frame if you set *(don't care) in all settings.
- ☰ Cannot monitor any frames if data don't match with ID Filter when On-line Monitoring.
- ☰ It will monitor every frame if HALF-DUP is OFF (ID Filter setting will not affect). If HALF-DUP is ON, it will monitor only frames matched with ID Filter. If "don't care" was set in either of SD or RD side, it will display data in both SD and RD side. (This function can be used only with Standard board.)

Half duplex	ID Filter	LCD
Off	Don't care setting in both SD-id & RD-id	Display TxD in the SD side, and RxD in the RD side
	All don't care setting in RD-id. Set except don't care in SD-id.	Display TxD matched with ID Filter in the SD. Display all RxD in the RD.
	All don't care setting in SD-id. Set except don't care in RD-id.	Display RxD matched with ID Filter in the RD. Display all TxD in the SD.
	Set except don't care in both SD-id & RD-id.	Display TxD matched with ID Filter in the SD. Display RxD matched with ID Filter in the RD.
On	Don't care setting in both SD-id & RD-id	Display everything in the SD.
	All don't care setting in RD-id. Set except don't care in SD-id.	Display TxD matched with ID Filter in the SD. Display everything else in the RD.
	All don't care setting in SD-id. Set except don't care in RD-id.	Display TxD matched with ID Filter in the RD. Display everything else in the SD.
	Set except don't care in both SD-id & RD-id.	Display TxD matched with ID Filter in the SD and RD.

e.g.) SD/RD monitor display when half duplex is On and ID Filter is as follows.

SD-id1: 00110000 (30h) RD-id1 : ***** (don't care)

SD-id2: 00110001 (31h) RD-id2 : ***** (don't care)



e.g.) SD/RD monitor display when half duplex is Off (full duplex) and ID Filter is as follows.

SD-id1: 00110000 (30h) RD-id1 : 0100****

SD-id2: 00110001 (31h) RD-id2 : ***** (don't care)



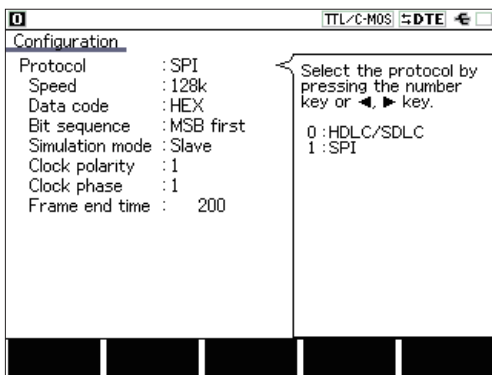
■ Frame:

Set the specification of the frame translation.
Select from SDLC, SDLCE, X.25, X.25E or LAPD.

■ Packet:

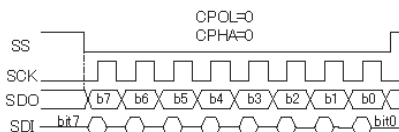
Set the specification of packet translation. Select from X.25 or LAPD.

<SPI> (When using OP-SB85/OP-SB85L)



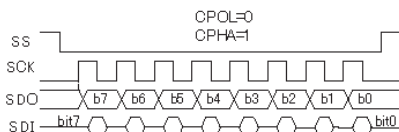
- Protocol
Set to "SPI".
- Speed
Set speed.
This setting is required for the simulation master mode.
(No need to set for monitoring.)
- Data Code
Set the display code.
Select ASCII, EBCDIC, EBCDIK, JIS 7, JIS 8 or HEX.

- Bit sequence
Select the bit transmitting sequence. For normal SPI, select MSB first.
- Simulation Mode
Select Master or Slave for simulation.

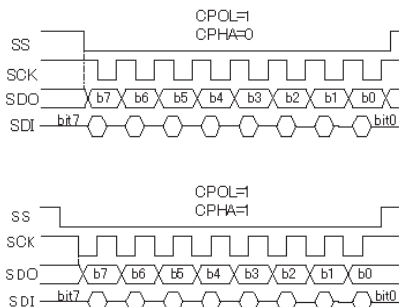


- Clock polarity(CPOL)
Set the clock polarity.
- Clock phase(CPHA)
Set the clock phase.

By setting of CPOL and CPHA, the clock and the data operate in the timing of the left figure.

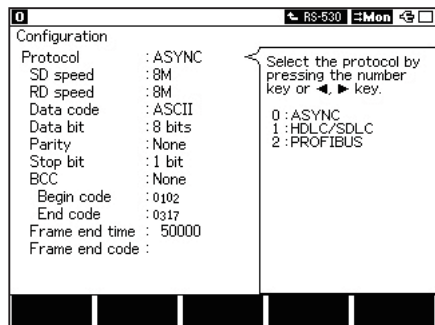


- Frame end time
Set the time as an articulation of the frame in 0.1 us.
This is used in the case in which SS signal does not change per one frame.
At the moment when the clock signal does not change for the time set here, Time stamp will be added the data.



But when "0" is set here, this function will not work.

<ASYNC> (Only OP-FW12GA)



Protocol

Select "ASYNC".

SD speed

SD speed: Set the communication speed in the SD(TxD) side. (RD will be automatically set.)

RD speed

RD speed: Set the communication speed in the RD(RxD)side. (when RD speed is different from that of SD side)

Data code

Set the display code to display on the LCD.

Select from ASCII / EBCDIC / EBCDIK / JIS7 / JIS8 / HEX / EBCD / Transcode / Ipar/Baudot.

Data bit

Set the character data bit length. The length varies depending on the "Data code".

Parity

Set the parity bit. Select from None / Odd / Even.

Stop bit

Set the stop bit. It add the stop bit set here to a sending data at simulation.

(On receiving data, it checks with 1 bit regardless of this value.)

BCC

Set the block check code. When set "None", it does not execute the block check.

Begin code

Set the calculation starting character for block check. Bits higher than the bit length set at "Data bit" will be ignored.

End code

Set the calculation ending character for block check. Bits higher than the bit length set at "Data bit" will be ignored.

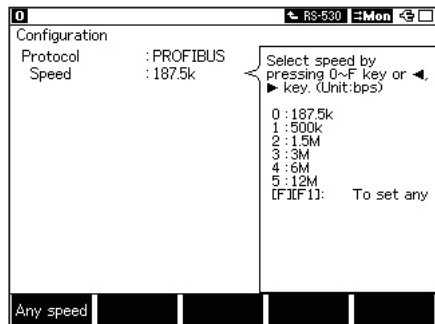
Frame end time

Set the non-communication time (idle time) to judge the dividing point of frames from 1 to 100000 (0.1us units)

Frame end code

Set the character to judge the dividing point of frames.

<Profibus-DP> (Only OP-FW12GA)



□ Protocol

Select "Profibus".

□ Speed

Set the communication speed from

187.5Kbps, 500Kbps, 1.5Mbps, 3Mbps,

6Mbps, 12Mbps. Arbitrary speed also can be set.

<Note>

When measuring Profibus-DP, please turn off the terminal resistor of RS-530 port (120Ω) of LE-8200 / LE-8200A, because it is different from that of Profibus. However, when the speed is 12Mbps, garbled characters can occur because of the high-speed communication. In this case, confirm that it will not affect the bus, and turn on the terminal resistor of RS-530 port (120Ω).

Chapter 3 Starting Measurement

3.1 Start/Stop

From top menu, select a function and press [Run]. To stop measuring, press[Stop].

- ONLINE : Online Monitor Function.
- MANUAL: Simulation Function.

3.2 Register Transmission Data for Simulating

Select “MANUAL” from top menu and press [9] to register data table.

Select the table number where you wish to register data.

☰ For more details, please read the instruction manual of analyzer.

3.3 Simulation

■ MANUAL mode

Transmit data registered in transmission table, which corresponds to the "0" to "F" keys. The data can be sent with one press of a key. Able to test the communication, checking the response from the device by Monitor function.

Set the numbers of transmission and idle time from [A] key (MANUAL option).

Repeat :ON (transmit repeatedly), OFF (transmit one time)

Idle Time :Set the idle time from 0 to 9999ms.

- ☰ Cannot set the idle time to "0". (Cannot send data without idle time)The analyzer may need some time to process data and consume more idle time set in the configuration. (depending on the volume of data)
- ☰ Transmission speed has to be between 115.2kbps and 12Mbps for repeat-transmission. SPI slave-simulation has to be within 6Mbps for repeat-transmission.

■ PULSGEN mode (LE-8200A only)

Outputs digital waveform measured by logic analyzer function. This function helps to have various tests, such as outputting at different timing by editing the measured data. Set the repeat mode, clock and edit data by [F] key (PULSGEN option).

Clock :Set the clock of timing waveform.

Repeat :ON (transmit repeatedly), OFF (transmit one time)

- ☰ For more details of editing digital waveform, refer to the instruction manual of analyzer.

3.4 Trigger

Trigger Summary		
	-- Factor --	-- Action --
▶ 0 : Trigger0	<input type="checkbox"/> SD Character	--> Stop
1 : Trigger1	<input type="checkbox"/> RD Character	--> Stop
2 : Trigger2	<input type="checkbox"/> Error	--> Stop
3 : Trigger3	<input type="checkbox"/> TRG IN	--> Stop

Select the trigger by ▲ or ▼key. Enable and Disable the trigger by [F1],[F2]key. Detailed setting can be set by the number key or [Enter] key.

Enable Disable

When the analyzer finds a specific factor, it can stop measurement or output a pulse to the trigger port (Action). Select the trigger from the top menu and press [2]. When you want to change the Factor and Action, press the numerical key where trigger is assigned. Pressing [F1] or [F2] makes the trigger valid or invalid.

indicates the trigger valid

Factor Setting

4 kinds of Factors can be set in OR condition.

- Trigger0 : match character line in SD(TxD)
- Trigger1 : match character line in RD(RxD)
- Trigger2 : find errors in SD and RD
- Trigger3 : find level "0" in external trigger input (TRG IN).

< TRIGGER 0, 1 >

Trigger0	
Factor	: SD Character
Mode	: Single
Char.	D1 : D2 :
Bit mask	W0 : ***** W1 : ***** W2 : *****
Action	: Stop
Stop	: Quick

Select the data string D1 and D2 formation conditions to trigger by pressing the number key or ◀, ▶ key.

0 : Single(D1 or D2)
1 : Sequential(D1 and D2)

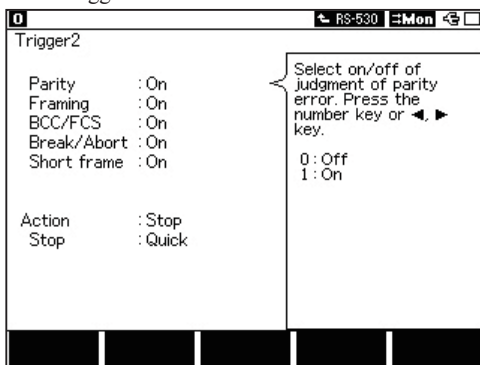
■ Mode

Select Single or sequential actions. Single action means when CHAR D1 or D2 happens, the trigger will work. Sequential action means when D2 happens after D1 happened, the trigger will work.

■ Char.

Set character lines. Up to 8 characters can be set each in D1 and D2. Also *(don't care) or bit masks (don't care in a bit, W0/W1/W2) can be set.

< Trigger 2 >



Trigger Factor:

Set the trigger factor to error detection. Errors to be detected are set by On (with judgement) or OFF (without judgement).

Parity: Parity error (only OP-FW12GA)

Framing: Framing error (The position of stop bit is "0") (only OP-FW12GA)

BCC/FCS: Frame check sequence / Block check code

Break/Abort: Abort (continuing 7 or more bits of "1" / Brake (all the bits are "0"))

Short frame: Short frame (frame of 3 or less characters)

< Trigger3 >

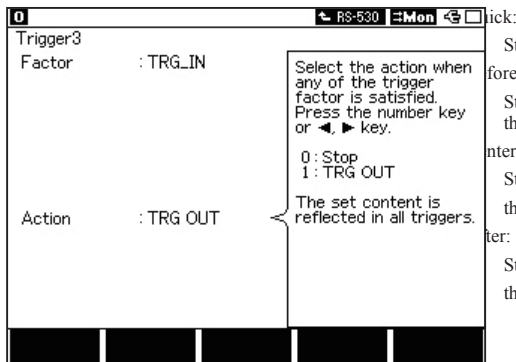
Detecting low level of TRG IN will be the trigger factor on using the external trigger input.

Detecting high level of TRG IN will be the trigger factor on using the probe pod (OP-SB85 / OP-SB85L).

Action Setting

Select the action after the trigger factor has been met from "Stop" and "TRG OUT".

- TRG OUT: Outputs a Low pulse (1us) to the trigger port.
- Stop: Stops the measurement. You can select how much data to be captured before stop measuring from following four options.



- Stop after capturing 16 data.
- Stop after capturing 10% of the capture memory.
- Stop after capturing 50% of the capture memory.
- Stop after capturing 90% of the capture memory.

Setting of Action is for all triggers (Trigger 0-3).

Chapter 4 Data Use

4.1 Change the Screen Display

<HDLC>

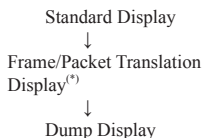
■ Standard Display

0		0 ASCII		RS-530		DCE			
SD	TMSP								
RD	000012.054							000015.554	
SD	FA 80								
RD	000018.054							000021.054	
SD	5H N0 N0 U AA U AA								
RD	000024.054							000030	
SD	p 5H U AA U AA								
RD	000027.654							000030	
SD									
RD	180							000033.554	
SD	TMSP								
RD	000036.054							000038.600	
SD	TMSP								
RD	000041.054							000044.054	
SD	5H Fd ET 8C PL N0 @ p 5H U AA U AA								
RD	000047.154								
SD	5H								
RD	000049.154							000052.554	
Change		HEX				Find			
data code		display				setup			

Measured data will be displayed in the LCD with the time stamp information.

It is possible to switch the display to translation display or dump display.

Press [Data] to switch display.



* : Press [F2] to display Frame Translation, and press [F3] to display Packet Frame Translation.

■ Frame Translation Display

0		0 X.25 (Mod8)		RS-530		DCE			
	Time	Ad	Type	NS	PF	NR	FC	Data	
SD	000012.054	Fd	INFO	0	0	4	G	00 00 55 AA 55 AA	
SD	000015.554	FA	INFO	0	0	4	G		
SD	000018.054	FA	INFO	0	0	4	G		
SD	000021.054	Fd	RR	0	0	0	G	00 00 55 AA 55 AA	
SD	000024.054	01	Fd			7	G	04 20 8C 10 00 40 70 01	
SD	000027.654	Fc	INFO	1	0	0	G		
SD	000030.180	Fd	SARM	0	0	0	G		
SD	000033.554	Fd	INFO	0	0	4	G	00 00 55 AA 55 AA	
SD	000036.054	FA	INFO	0	0	4	G		
SD	000038.600	FA	INFO	0	0	4	G		
SD	000041.054	Fd	RR	0	0	0	G	00 00 55 AA 55 AA	
SD	000044.054	01	Fd			7	G	04 20 8C 10 00 40 70 01	
SD	000047.154	Fc	INFO	1	0	0	G		
SD	000049.154	Fd	SARM	0	0	0	G		
Change		Frame		Packet		Change			
protocol		translate		translate		time display			

It is possible to switch the time stamp information of elapsed time (Time) and time between two positions (Data).

Press [F5] to display elapsed time.

Press [F4] to display time between two positions.

■ Packet Translation Display

0		0 X.25 (Packet)										RS-530	DCE	
	Time	GN	LCN	P-Type	PS	PR	M	D	FC	Data				
SD	000012.054		0	0	55				2	AA 55 AA				
SD	000015.554									AA 55 AA				
SD	000018.054									AA 55 AA				
SD	000021.054			[RR]						AA 55 AA				
SD	000024.054			[Fd]						AA 55 AA				
SD	000027.654									AA 55 AA				
SD	000030.180			[SARM]						AA 55 AA				
SD	000033.554		0	0	55				2	AA 55 AA				
SD	000036.054									AA 55 AA				
SD	000038.600									AA 55 AA				
SD	000041.054			[RR]						AA 55 AA				
SD	000044.054			[Fd]						AA 55 AA				
SD	000047.154									AA 55 AA				
SD	000049.154			[SARM]						AA 55 AA				

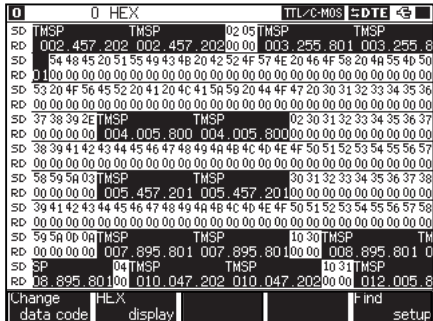
Change protocol | Frame translate | Packet translate | Change time display

■ Dump Display

0		0 Dump										RS-530	DCE	
	Time	FC	Data											
SD	000012.054	Fd 80 00 00 55 AA 55 AA												
SD	000015.554	FA 80												
SD	000018.054	FA 80												
SD	000021.054	Fd 01 00 00 55 AA 55 AA												
SD	000024.054	01 Fd 04 20 8c 10 00 40 70 01 55 AA 55 AA												
SD	000027.654	Fc 02												
SD	000030.180	Fd 0f												
SD	000033.554	Fd 80 00 00 55 AA 55 AA												
SD	000036.054	FA 80												
SD	000038.600	FA 80												
SD	000041.054	Fd 01 00 00 55 AA 55 AA												
SD	000044.054	01 Fd 04 20 8c 10 00 40 70 01 55 AA 55 AA												
SD	000047.154	Fc 02												
SD	000049.154	Fd 0f												

Change time display

■ Standard Display



The measured data is displayed with Time stamp.

And the display can be changed to the translation display or the dump display to analyze the data.

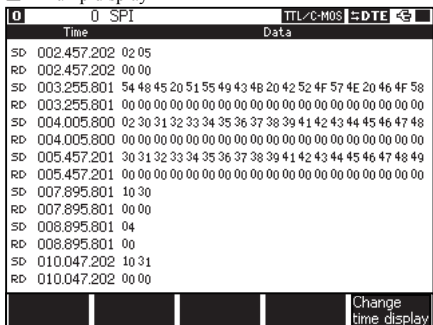
Press [Data] to change the display.

Standard display



Dump display

■ Dump display



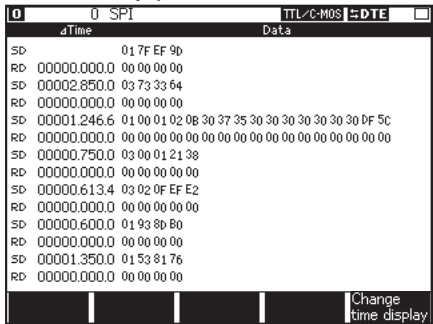
On the dump display, two kinds of time stamp are available to display by pressing [F5].

One is elapsed time stamp ("Time"), and the other is time difference compared to the one before ("□time").

The meanings of the displayed terms are in the following table.

Display	Meaning
Time/ Δ Time	Display the time when data is received./ Display the time difference compared to the one before. (Press [F5])
Data	Display the data in HEX.

The difference display of time is as follows.



<ASYN< (only OP-FW-12GA)

□ Standard display

```

0 0 ASCII TTL/C-MOS DTE
SD TMSPLINEEYE TMSPL
RD 00000.855.7 OP-FW12GA 00001.355.7
RD -FW12GALE-8200A
SD TMSPTHEQUICKBROWNAFOX
RD 00004.655.7 00002.009.1
SD XAJUMPSADOVERADLAZYADOGAD
RD 123456789.01234567
SD 89ABCDEFGHIJKLMNOPQRSTUVWXYZ
RD 00005.805.7 0123456789ABCD
SD XYZLINEEYE TMSPL
RD 00006.705.7 0123456789ABCDEF
SD EFGHIJKLMNOPQRSTUVWXYZ
RD 0008.355.7 00008.759.1
SD SP LINEEYE TMSPL
RD 0008.355.7 00008.759.1
Change HEX Find
data code display setup
    
```

Captured data is displayed with a time stamp. You can change the display to ASYNC horizontal display for analysis by pressing [Data] key.

Standard display



ASYN< horizontal display

When it is ASYN< horizontal display, you can change the display of timestamp to passed time display (Time) and difference time display (/ Δ time).

□ ASYN< horizontal display

```

0 0 ASCII TTL/C-MOS DTE
Time Data
SD 00000.855.7 L I N E E Y E
SD 00001.355.7 O P - F W 1 2 G A
SD 00002.009.1 L E - 8 2 0 0 A
SD 00004.655.7 T H E Δ Q U I C K Δ B R O W N Δ F O X
SD 00005.805.7 0 1 2 3 4 5 6 7 8 9 A B C D E F G H
SD 00006.705.7 0 1 2 3 4 5 6 7 8 9 A B C D E F G H I
SD 00008.355.7 L I N E E Y E
SD 00008.759.1 L E - 8 2 0 0 A
SD 00009.155.7 O P - F W 1 2 G A
SD 00011.555.7 T H E Δ Q U I C K Δ B R O W N Δ F O X
SD 00012.405.7 0 1 2 3 4 5 6 7 8 9 A B C D E F G H
SD 00013.205.7 0 1 2 3 4 5 6 7 8 9 A B C D E F G H I
SD 00015.209.1 L E - 8 2 0 0 A
SD 00015.855.7 O P - F W 1 2 G A
Change HEX Find
data code display setup
    
```

The meanings are as follows.

Display	Meaning
Time / Δ Time	Displays the time when it received the data / Displays the difference time of the data and the previous data.
Data	Displays the data in hex.

The difference display of time is as follows.

```

0 0 ASCII TTL/C-MOS DTE
ΔTime Data
SD L I N E E Y E
SD 00000.500.0 OP-FW12GA
SD 00000.653.4 LE-8200A
SD 00002.646.6 THEΔQUICKΔBROWNAFOX
SD 00001.150.0 0123456789ABCDEFGHI
SD 00000.900.0 0123456789ABCDEFGHI
SD 00001.650.0 LINEEYE
SD 00000.403.4 LE-8200A
SD 00000.396.6 OP-FW12GA
SD 00002.400.0 THEΔQUICKΔBROWNAFOX
SD 00000.850.0 0123456789ABCDEFGHI
SD 00000.800.0 0123456789ABCDEFGHI
SD 00002.003.4 LE-8200A
SD 00000.646.6 OP-FW12GA
Change HEX Find
data code display setup
    
```

<Profibus-DP> (only OP-FW-12GA)

□ Standard display

0		0 HEX		RS-530	Mon
SD	16TMS	DC 0101	16TMS	10 09 01 49	16TMS
RD	000_000_109	000_000_157		000_000	
SD	DC 0101	16TMS	10 09 01 49	16TMS	DC 01
RD	403	000_000_451		000_000_698	
SD	011TMS	10 08 01 49	16TMS	DC 0101	16TMS
RD	000_000_746	000_000_993		000_0	
SD	10 0C 01 49	16TMS	DC 0101	16TMS	10
RD	01_041	000_001_287		000_001_335	
SD	00 01 49	16TMS	DC 0101	16TMS	10 0E 01 49
RD	000_001_877	000_001_925		000_0	
SD	DC 0101	16TMS	10 10 01 49	16TMS	DC
RD	02_171	000_002_219		000_002_466	
SD	0101TMS	10 11 01 49	16TMS	DC 0101	16TMS
RD	000_002_514	000_002_761		000	
SD	10 12 01 49	16TMS	DC 0101	16TMS	10 00
RD	002_809	000_003_055		000_003_103	
Change		HEX		Find	
data code		display		setup	

□ Translation display

0		0 PROFIBUS		RS-530	Mon		
Time	DA	DSAP	SA	SSAP	Frm/Func	FCS	Data
SD	000.000.109	1	1		[TOKEN]		
SD	000.000.157	9	1		REQ_FDL		ES
SD	000.000.403	1	1		[TOKEN]		
SD	000.000.451	10	1		REQ_FDL		ES
SD	000.000.698	1	1		[TOKEN]		
SD	000.000.746	11	1		REQ_FDL		ES
SD	000.000.993	1	1		[TOKEN]		
SD	000.001.041	12	1		REQ_FDL		ES
SD	000.001.287	1	1		[TOKEN]		
SD	000.001.335	13	1		REQ_FDL		ES
SD	000.001.582	1	1		[TOKEN]		
SD	000.001.630	14	1		REQ_FDL		ES
SD	000.001.877	1	1		[TOKEN]		
SD	000.001.925	15	1		REQ_FDL		ES
Change					Dump view		Change time display

□ Dump display

0		0 PROFIBUS		RS-530	Mon
Time	FCS	Data			
SD	000.000.109	DC 0101			
SD	000.000.157	10 09 01 49			
SD	000.000.403	DC 0101			
SD	000.000.451	10 09 01 49			
SD	000.000.698	DC 0101			
SD	000.000.746	10 08 01 49			
SD	000.000.993	DC 0101			
SD	000.001.041	10 0C 01 49			
SD	000.001.287	DC 0101			
SD	000.001.335	10 00 01 49			
SD	000.001.582	DC 0101			
SD	000.001.630	10 0E 01 49			
SD	000.001.877	DC 0101			
SD	000.001.925	10 0F 01 49			
Translate					Change time display
view					

Captured data is displayed with a time stamp.
You can change the display to translation display or dump display for analysis by pressing [Data] key.

Standard display



[F2]: Translation display

[F3]: Dump display

When it is translation display or dump display, you can change the display of timestamp to passed time display (Time) and difference time display (Δ time).

4.2 Data Search

Search the specific data from recorded data.

< Search Condition >

- Trigger: Search data matched Trigger Factor.
- Error: Search parity error, framing error, brake, block check error, FCS error, abort, and short frame on data line (select from both, only SD, or only RD).
(You can set ON/OFF individually.)
- Character: Search matched character lines *(don't care), bit masks)

< Action >

- Display: Display matched data on the top of LCD
- Count: Display the numbers of time matched with search conditions on the pop-up screen.

4.3 Print

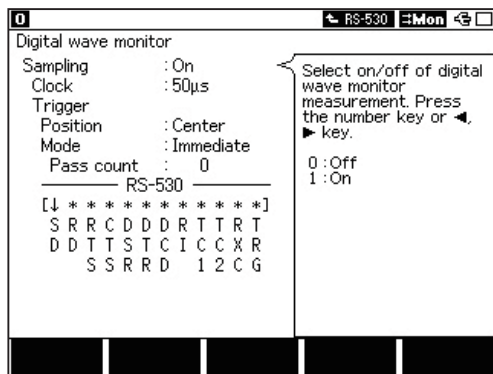
Print recorded data and settings in appropriate format with variety displays.

Display data that you wish to print and press [Print]. Type how many pages to print and press [Enter].

Chapter 5 Logic Analyzer Function

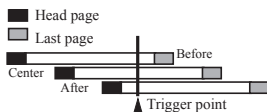
5.1 Setting

From top menu, press [4] and go to "Digital wave monitor" screen.



Select on/off of digital wave monitor measurement.

- Clock
Set Sampling Clock.
- Position
Set the position of trigger in the sampling memory



Before : Stops the measurement after capturing some data following the trigger.

Center : Stops the measurement so that the same amount of data is captured in before and after the trigger.

After : Stops the measurement after capturing in a large amount of data after the trigger.

Mode

Select a trigger mode.

Immediate : Trigger can be satisfied soon after measurement starts.

Full : Trigger can be satisfied after measuring data for the size of sampling memory.

Trigger condition

Define trigger condition by a signal line of the measurement port.

Select a signal line and condition.

[0] : Logic 0

[1] : Logic 1

[END/ x] : * (Don't care)

[F1] : Rising edge

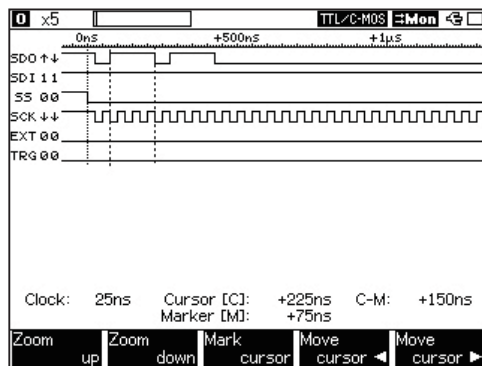
[F2] : Falling edge

5.2 Operation

Press [Run] to start monitoring and waveform measurement. Press [Stop] to stop.

5.3 Display

Press [Data] key for several times to display logic analyzer screen.



Scroll by [◀] or [▶] key.

Move next page or previous page by [Page/Up] or [Page/Down] key.

In the left bottom of the screen, clock value will be displayed.

■ Function keys

Key (function)	Description
[F1] (zoom in)	Time unit becomes short. 1 ×2 ×5 ×10
[F2] (zoom out)	Time unit becomes long. 1 ×1/2 ×1/4 ×1/8 ×1/16 ×1/32 ×1/64
[F3] (mark cursor)	Mark a cursor line.
[F4], [F5] (move cursor)	Move the cursor. (to move faster, press for a while)
[Shift] + [F1], [F2] (move line)	Move to other data line.
[Shift] + [F5] (search)	Search data.

Chapter 6 Specification

6.1 Analyzer Specification

Item	Specification	
Interface	RS-422/485 (RS-530)* ¹ TTL* ² SPI* ²	
Adaptation Protocol	HDLC, SDLC, X.25, CC-Link (NRZ/NRZI format, AR clock), SPI, ASYNC* ⁵ , Profibus-DP* ⁵	
Speed	HDLC, CC-Link	115.2kbps to 12Mbps* ³
	SPI	115.2kbps to 20Mbps* ³ * ⁴ On simulation : upto 12Mbps Max. 12Mbps(as Master), 6Mbps(as Slave)
	ASYNC	115.2kbps - 12Mbps* ⁵
	Profibus-DP	115.2kbps - 12Mbps* ⁵
	Setting steps	User-set: 4 effective digits
Data Format	NRZ/NRZI	
Error Check	FCS Error (CRC-ITU-T) , Abort , short frame	
On-line Monitor	Time stamps	9 digits , 0 to 134217727 Selectable in 1mS, 100μS, 10μS or 1μS
	ID Filter	Able to set 2 characters (don't care, bit masks available)
Simulation	Transmission data table	16K data (can be divided to 16 tables)
	MANUAL mode	Data table corresponding to the numerical keys can be sent The data can be sent continuously and the transfer interval can be set.
	PULSGEN mode * ⁶	Able to have the data measured by logic analyzer function. Able to edit waveform.
Trigger	Set up to 8 characters (don't care and bit masks available). When 2 individual or sequential actions, errors or the external trigger input(low level) are found, the analyzer automatically stops monitoring.	
Data Search	Search any trigger data, error data and character lines	
Auto Run/Stop	Measurement starts and stops in appointed time	
Logic analyzer function	Sampling clock	1KHz to 40MHz, 100MHz
	Sampling memory	4,000 sampling

*1 : On using the Standard Board.

*2 : OP-SB85L or OP-SB85 is required.

*3 : OP-SB85L is required on high speed simulation in TTL or SPI.

*4 : When the data size transferred continuously is over 16 K bytes, the communication speed may be limited to 6 Mbps.

*5 : Only OP-FW12GA supports it.

*6 : Only LE-8200A supports it.

6.2 RS-530 Port Specification

Pin No.	Signal	Signal name	Input/Output		
			ONLINE	MANUAL	
				DTE	DCE
1	FG	Frame ground	-	-	-
2	TxD(A)	Transmission data (-)	I	O	I
3	RxD(A)	Receiving data (-)	I	I	O
4	RTS(A)	Request of transmission(-)	I	O	I
5	CTS(A)	Capable of transmission(-)	I	I	O
6	DSR(A)	Data set ready(-)	I	I	O
7	SG	Signal ground	(I)	(I)	(I)
8	DCD(A)	Data/Channel receiving carrier detect (-)	I	I	O
9	RXC(B)	Receiving signal element/timing	I	I	O
10	DCD(B)	Data/Channel receiving carrier detect (+)	I	I	O
11	TXC1(B)	Transmission signal element/timing (+)	I	O	I
12	TXC2(B)	Transmission signal element/timing (+)	I	I	O
13	CTS(B)	Capable of transmission (+)	I	I	O
14	TxD(B)	Transmission data (+)	I	O	I
15	TXC2(A)	Transmission signal element/timing (-)	I	I	O
16	RxD(B)	Receiving data (+)	I	I	O
17	RXC(A)	Receiving signal element/timing	I	I	O
18	None		-	-	-
19	RTS(B)	Request of transmission (+)	I	O	I
20	DTR(A)	Data terminal ready (-)	I	O	I
21	None		-	-	-
22	DSR(B)	Data set ready (+)	I	I	O
23	DTR(B)	Data terminal ready (+)	I	O	I
24	TXC1(A)	Transmission signal element/timing (-)	I	O	I
25	None		-	-	-

I: Input to analyzer, O: Output from analyzer

6.3 Probe pod (OP-SB85/OP-SB85L)

Color of Probe Unit Cable	Signal Name	Difinition/Meaning
Black	GND	Signal Ground
Brown	SDA/SDO/SD	Monitor input for SD data, Output on simulating (*1) SDO(MOSI) input/ output for SPI(*2)
Red	SDI/RD	Input of RD data SDI(MISO) input/ output for SPI (*2)
Orange	SS/RTS	SS Input/ output of for SPI
Yellow	CTS	Not connected
Green	EXIN	Input of an external signal
Blue	SCL/SCK/TXC	SCK Input/ output for SPI (*2)
Purple	RXC	Not connected
Gray	TRG.IN	Input of an external trigger signal
Black	GND	Signal ground
White	TRG.OT	Not connected

*1 This is output terminal on simulation.

Do not connect to the power supply of the target device directly.

Doing so may result in unit malfunction.

*2 This is used on SPI communication.

There is a registration page on our web site.

(<http://www.lineeye.com>)

Please register your product for further support. We will provide you the firmware update information and sales information etc.

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