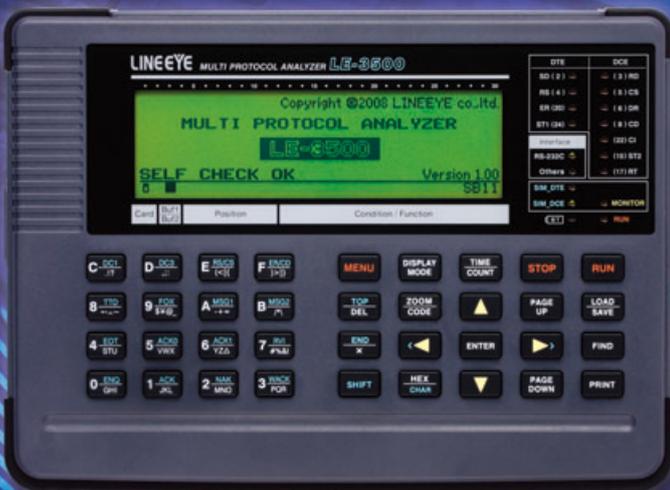


# LINEEYE®

## Multi Protocol Analyzer

# LE-3500 LE-2500

**Battery-powered portable communications analyzer in a newly designed compact frame.**

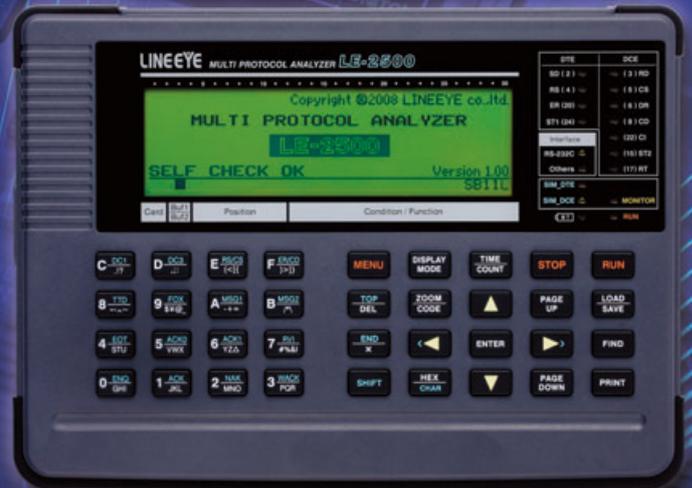


MULTI PROTOCOL ANALYZER  
**LE-3500**

● 210(W)×154(D)×38(H)mm,  
Approx. 790 g



Modbus  
Supported



MULTI PROTOCOL ANALYZER  
**LE-2500**

● 210(W)×154(D)×38(H)mm,  
Approx. 760 g



Standard  
communications >>>

RS-232C

RS-422/485 (RS-530)

Expanded  
communications >>>

TTL/I<sup>2</sup>C/SPI

IrDA/ASK

Current Loop

CC-Link

CAN/LIN

LINEEYE®

# Battery-powered Portable Communications Analyzer



A product incorporating features for the protection of the global environment, such as the elimination of toxic substances, and a power-saving design.

## MULTI PROTOCOL ANALYZER **LE-3500 / LE-2500**

LINEEYE released the first LE-series model in 1986. Since then, LINEEYE has been developing the LE Series in response to the requirements of a large number of customers, and now come to the fruition of the LE-3500 and LE-2500, the newly designed latest models realizing great downsizing with a sharp reduction in weight. The LE-3500 and LE-2500 incorporate versatile analysis functions and excellent portability, thus fully supporting the trouble analysis of communications systems, industrial equipment, and a variety of in-vehicle networks as well as development tests and after-sale services.



Special data items are expressed in individual signs.

(Example of display signs)	
	HDLC/SDLC flag
	Short frame
	Block check OK
	Block check NG
	Parity error
	Framing error
	PE and FE simultaneous error
	Break

Idle time (frame interval time)

Time stamp (frame arrival time)

Menu key

Measurement start key

Line state LED

Continuously displays the state of communications line with a 2-color LED.

In RS-232C communications	Red: ON space state
	Green: OFF mark state
	OFF: Not in use or not wired

### SPEED In half-duplex mode

- 4M bps
- 2M bps
- 1M bps
- 500Kbps



#### COMPACT PROTOCOL ANALYZER **LE-1500**

Design for Async communication equipped with sufficient measuring functions.

\*See the LE-1500 catalog for details.

Async only (Async, PPP)

- Max speed 500Kbps
- 2.4MB Memory
- 8GB CF card support



#### MULTI PROTOCOL ANALYZER **LE-2500**

A high cost-performance multi-protocol model with expandability.

- Max speed 1Mbps
- 2.4MB Memory
- 8GB CF card support



#### MULTI PROTOCOL ANALYZER **LE-3500**

A perfect model incorporating statistical analysis and program simulation functions.

- Max speed 2Mbps
- 6.4MB Memory
- 16GB CF card support



- Max speed 4Mbps
- 100MB Memory
- 64GB CF card support
- USB Flash Drive (LE-8200A)

#### MULTI PROTOCOL ANALYZER **LE-8200A LE-8200**

The high-end model boasting plentiful performance with a large-sized color display and versatile functions.

\*See the LE-8200 catalog for details.

Multi Protocol (Async, Sync, BSC, SDLC, HDLC, X25, PPP, I<sup>2</sup>C, IrDA, CAN, LIN ...)

A measurement tool inevitable to on-site tests as well as analysis of communications line trouble.

# A lightweight unit in A5 size that can be battery driven for 8 hours continuously.

● Great downsizing with a sharp reduction in weight. ●

**Conventional model**

**LE-3200**

**B5 size**

240(W)×180(D)×39(H)mm

**NEW**

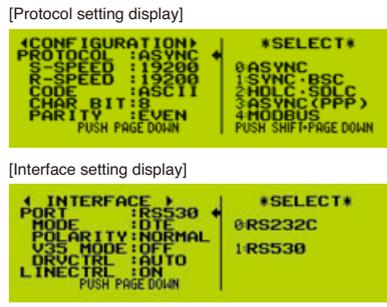
**LE-3500**

**A5 size**

210(W)×154(D)×38(H)mm

## Multi-protocol support

Incorporates RS-232C and RS-422/485 measurement interfaces as standard features and supports a variety of communications protocols. A DSUB 25-pin terminal block and a variety of dedicated cables, such as X.25, RS-449, and V.35 (\*) cables, are available.



\* LE-2500 does not support Modbus and V.35 control signals.

## Expansion Kits support TTL, I<sup>2</sup>C, SPI, IrDA, CAN, and LIN

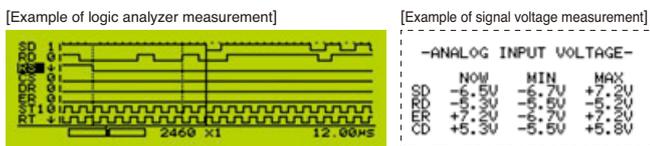
Protocols of differing hardware specifications are supported by simply changing the measurement boards.



See pages 8 and 9 for details.

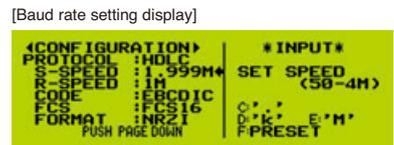
## Logic Analyzer and Signal Voltage Measurement

Communication line timing is analyzed and displayed as a logic analyzer display to a time resolution of max. 50 ns. The new function of signal voltage measurement ensures ease of the voltage measurement of RS-232C signals in places where tester probes cannot reach smoothly.



## Mega Speed Measurement

Analysis is possible at any baud rate(\*) from low speed to high speed. Margin tests on communication speed deviation are simple.



\* Using high precision DPPLL technology for open baud rate support, transmission and reception speeds can be separately set to an effective 4 digits.

## Auto Save/Long Recording Time

You can record communications data endlessly or stop recording it automatically when the memory is full. Furthermore, an auto save function makes it possible to save the monitored content of captured memory on a CF card. Auto Save continuously saves data into the measurement log of a user-specified file size, using ring recording as long as the card has space. It is useful for identifying rare communication failures of unknown cause.

Target line speed (bps)	Continuous recording time reference (LE-3500)	
	Main memory only	When using CF-16GX
9600	Approx. 22 min	Approx. 960 hrs
115.2K	Approx. 110 sec	Approx. 80 hrs
1M	Approx. 14 sec	Approx. 10 hrs

\* Calculated for full-duplex transmission of 1,000 byte data frames per second. Both transmission and reception data consume 4 byte of memory with each capture.

## PC Link

Text conversion software and capturing software for printout data (\*), makes it possible to utilize measurement data on the user's PC. Furthermore, the use of the optional PC Link Software will widen the application range.

See pages 7 for details.

\* These software can be downloaded from LINEEYE's website for free.



# A monitor function to visualize communications data.

## Supports multi-protocols

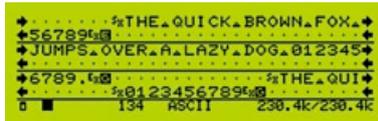
The online monitor feature records communications data in the capture memory and provides an easy-to-understand display for the type of protocol, without affecting the communications line. As a standard feature, LINEEYE protocol analyzers support various communications standards from asynchronous to packet communication. Depending on the test, you can select bit transfer sequence and polarity, as well as modulation format from NRZ, NRZI, FMO, FM1, and 4PPM. The feature allows to support effective analysis by omitting SYN codes and using SDLC/HDLC address filter.

### Line state LED

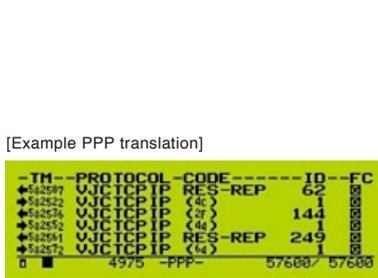


Communications line state is indicated in real time using 2-color LEDs

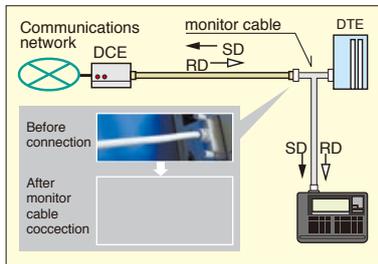
[Data display]



[Example X.25 protocol translation]



[Example of connection for online monitoring]



## Trigger Feature for Catching User-specified Events

The trigger feature allows you to specify a communications event as the trigger condition and have measurement operations executed automatically when that condition is satisfied. Up to four pairs of conditions and operations can be set, which is helpful towards identifying frequent intermittent faults that occurs with communications systems. And, the operation of a trigger condition can be specified as the condition for another trigger, making it possible to analyze complicated operations based on sequential triggers.

[Trigger setup summary display]



[Example trigger condition setup]



[Example trigger action setup]



## Monitor Condition Auto Setting

LINEEYE protocol analyzers can analyze communications data and automatically set basic measuring conditions, such as communications speed, character framing, data code, synchronization character, BCC/FCS, etc. This is effective for monitoring lines of unknown communications conditions.

[Monitor condition auto setting - Search display]



[Monitor condition auto setting - Determination display]



\*The auto setting is not accurate with small volumes of communications data or data that contains many errors.

## Records Time Data with Communication Data

LINEEYE protocol analyzers record not only communications data but the time (time stamp) of transmissions and receptions as well as idle time; therefore failure time and timeout status can be checked. It is also possible to record the information of changes in control lines at the same time. For ASYNC/BURST communications, setting the idle time to be the frame end is available in the range of 1 to 100ms.

[Example record data selection]



[Time stamp / idle time display]



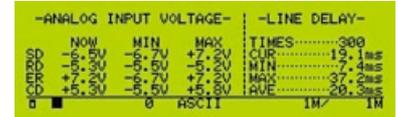
[Timing data display]



## Delay time function added with a voltage measurement feature

A feature to measure the voltage of four RS-232C signal lines has been added to the conventional delay time function used to analyze the delay time of control line changes (e.g., RTS to CTS changes) at a resolution of 0.1 ms.

[Example delay time measurement]



## Statistical Analysis Capabilities

Only for LE-3500

Statistics can be compiled for transmission and reception data sets, frames and the number of established trigger events, and subsequently displayed as a graph (Unit: 1-240 min.). This helps to understand communications traffic and error frequency for a specific time period.

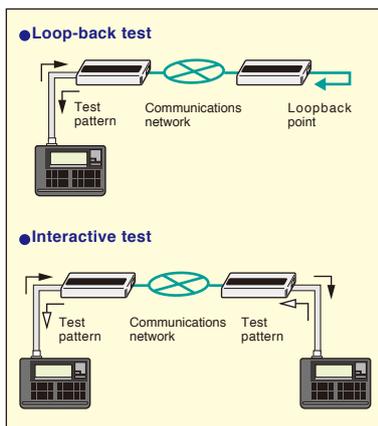
[Graph of statistically analyzed data]



# BERT function to measure the occurrence rate of communications errors.

BERT function enables you to measure transmission quality of communications lines by a loop-back or interactive connection. It is possible to measure evaluation parameters (bit error count, block error count) conforming to ITU-T G.821 Notification, hence enabling bit error rate evaluations and fault point identification. Elaborate test patterns and functions such as bit error forced interrupt are comparable to dedicated equipment.

[Example connection for BERT]



Evaluation is possible in ASYNC or SYNC mode, by specifying measurement period (continuous, received bits, specified time, repeat) or test pattern.

[BERT setting display]



Once started, the results of measured line quality are displayed and updated in real time. When finding the error bit, LINEEYE analyzers can output the external trigger to inform other equipments. Repeat mode allows you to know the error rate for the specific time range in the communication lines.

[Example BERT measurement]



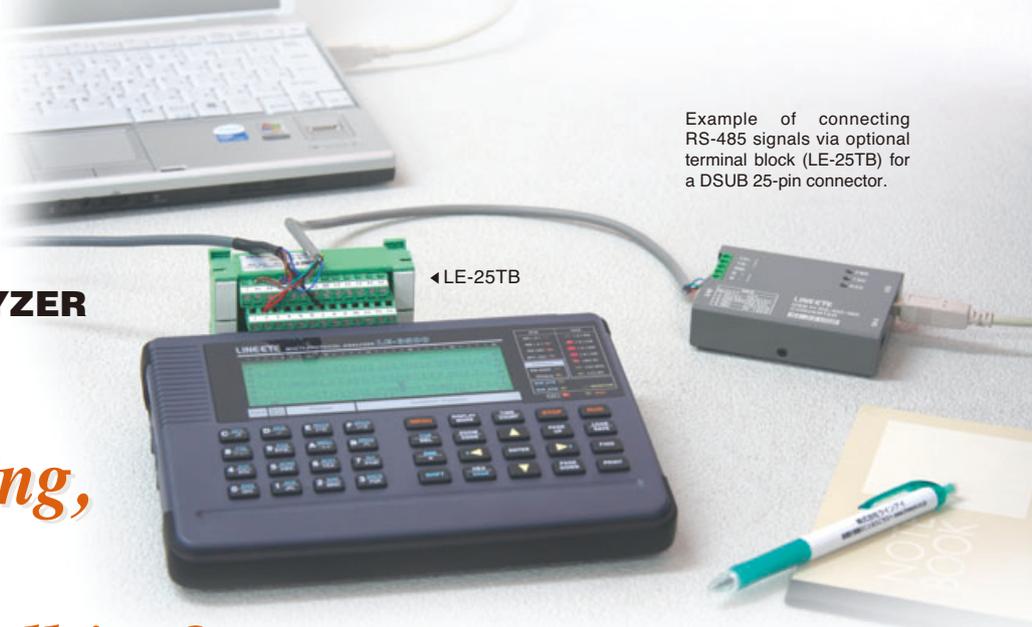
[Contents of BERT measurement]

Savail	Available measurement in seconds	0~9999999	Loss	SYNC loss count	0~9999
R-Bit	Effective bits received	0~9999999~9.99E9	R-Blk	Effective blocks received	0~9999999~9.99E9
E-Bit	Error bit count	0~9999999~9.99E9	E-Blk	Block error count	0~9999999~9.99E9
Bit-ER	Bit error rate	0~9.99E-9~1	Blk-ER	Block error rate	0~9.99E-9~1
E-Sec	Error in seconds	0~9999	%E.F.S	Normal operation rate	0.000~100.000%

Example of connecting RS-485 signals via optional terminal block (LE-25TB) for a DSUB 25-pin connector.

## MULTI PROTOCOL ANALYZER LE-3500 / LE-2500

# Online Monitoring, Simulation and BERT Support All-in-One



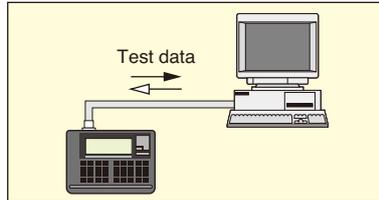
### Simulation function to conduct transmission and reception tests in place of target equipment under test.

With the simulation feature, the LINEEYE protocol analyzers act as the counterpart to the target device and perform transmission and reception tests according to protocol. Even in the early stages of development when matching devices are not available, tests can be run at near to actual operating status. After checking the communications protocol step by step in LINEEYE analyzer's own original MANUAL mode, a developer can create a simple program to branch conditions using menu selection and test more complicated communications protocols. Communications speed can be freely set; therefore margins can be evaluated by intentionally shifting communications speed, and error response processing can be checked using test data that mixes in data with parity errors. In addition, data transmission can be linked with the changes in the signal lines such as RTS and CTS at the preset timing.

[Control lines and data transmission timing]



[Example of connection for simulation]



### MANUAL mode

The MANUAL mode allows you to send the data registered in transmission table which corresponds to the "0" to "F" keys. The data can be sent with one press of a key. While checking replies from a unit under development with the monitoring feature, you can easily and simply test the communications process. You can also send fixed data by registering it under a key combination of the SHIFT and "0" to "D" keys, as well as turn RTS/CTS and DTR/DCD signal lines on/off with the SHIFT and "E"/"F" key combinations.

[Transmission table setup display]



### FLOW mode

Flow control can be simulated on the transmission and reception-lines using X-on/off flow control or the control line handshake. In the transmission mode, up to 16 cycles of data from transmission start until a generated interrupt request can be displayed. In the reception mode, you can set the number of received data cycles until a transmission interrupt request is generated, as well as the time until the transmission resume request is generated.

[Flow control test setup display]



### ECHO mode

In the ECHO mode, LINEEYE protocol analyzers internally return received data. Buffer echo to send back data by a reception frame, character echo to send back data by a character and loop back echo that simply loops back data can be selected. It is used to test display terminals and communications terminals.

[ECHO mode setup display]



### POLLING mode

The POLLING mode simulates the slave and master units in multidrop (1:N connection) polling protocols. In the slave mode, the LINEEYE protocol analyzers check the number of received frames that are assigned their address and whether errors occur or not, replying with user-set data. In the master mode, they send polling messages to 32 slave units, and check and display replies from each slave.

[Polling setup display]

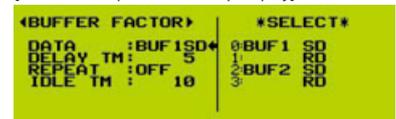


Only for LE-3500

### BUFFER mode

In the BUFFER mode, you can select between transmission and reception, and send transmitted or received data that has been captured in the buffer using the unit's monitoring feature, as simulation data without requiring further manipulation. This mode is effective in conducting reproducibility tests using the same data as that monitored under actual communications conditions.

[Buffer data reproduction setup display]

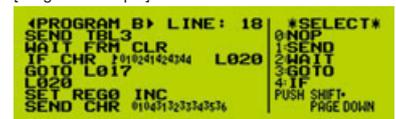


Only for LE-3500

### PROGRAM mode

By creating a purpose-specific command program, the communications protocol can be flexibly simulated alongside condition monitoring. The program is created using the menu selection, so it is easy to master.

[Program example]



[PROGRAM mode commands]

Command	Operation
SEND CHR <input type="checkbox"/>	Sends max. 8 data sets.
SEND REG <input type="checkbox"/>	Sends data registered in transmission table under specified REG No.
SEND BRK	Sends break signals (ASYNCR only).
WAIT CHR <input type="checkbox"/>	Waits until receiving specified data (max. 8 data sets).
WAIT FRM	Waits until receiving 1 frame.
WAIT TM <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Waits for specified amount of time.
GOTO L <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Jumps to specified label No.
CALL L <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Jumps to subroutine of specified label No.
IF CHR <input type="checkbox"/> L <input type="checkbox"/> <input type="checkbox"/>	Branches if specified data in reception buffer.
IF LN <input type="checkbox"/> = <input type="checkbox"/> L <input type="checkbox"/> <input type="checkbox"/>	Branches if interface line is specified logic.
SET REG <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Sets or increases/decreases value of specified REG No.
SET TM <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Controls specified timer and sets to specified value.
INT TRG 0 L <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Interrupts specified label when trigger 0 condition is satisfied.

# Easy-to-Use Handy Functions Continue to Evolve

## Firmware That Evolves

The latest firmware with additional functions and improvements can be found on our website. If you download it with your PC, you can then update to the latest version via a serial/ USB cable.

## Menu-based Simple Operation

Anyone can easily use LINEEYE protocol analyzers owing to the easy menu selection system handed down from earlier models.

[Top menu display (LE-3500)]



[Top menu display (LE-2500)]



A backlit LCD makes it easy to view measurement data at night and in dark places.

## Offline Analysis and Data Searches

Measurement data displays can be freely scrolled and paged. A powerful search feature allows you to locate specific data and perform counting.

Search key	Communications error (individual error type can be specified), communications data string of max. 8 characters (don't care and bit mask can also be specified), idle time beyond a specified duration, specific time stamp (don't care can also be specified), external trigger matching data
Search operations	Find and display, counting

[Example search key setting]



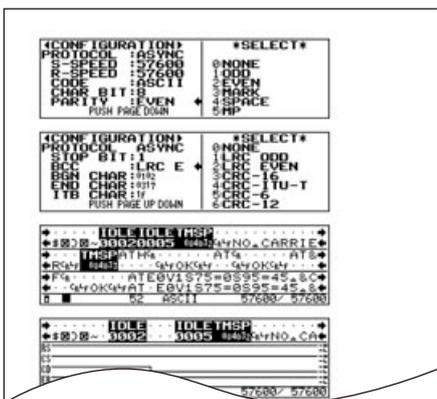
Using "don't care (\*)", you can search for time stamp data from 10:30:00 to 10:39:59 as in this example.

## Various Print Formats

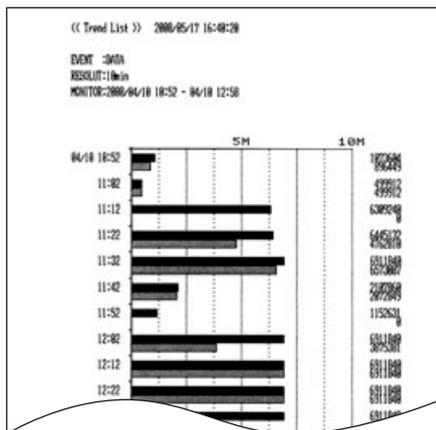
Measurement data of a user-specified range can be printed out continuously from any printer, in the text format that corresponds to the display mode. Print data output from the AUX (RS-232C) port can be saved as a text file in the PC using the utility software or HyperTerminal.

And, with a dedicated printer, you can print hardcopy of display images, continuous image of logic analyzer waveforms, and results of statistical analysis.

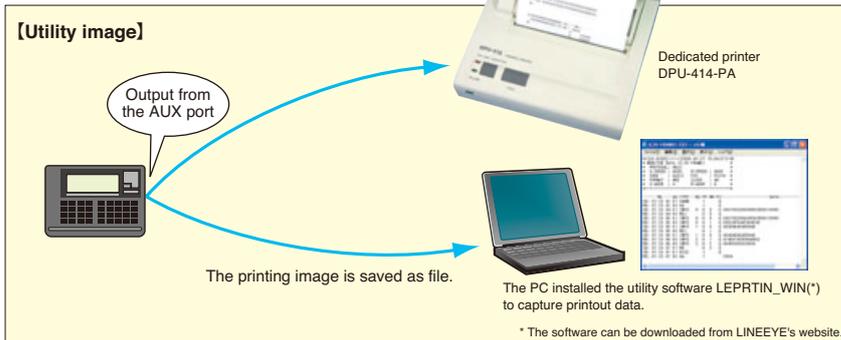
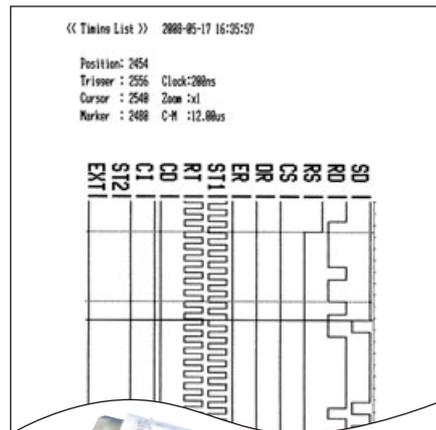
[Example print hard copy of display image]



[Example statistical analysis printout]



[Example logic analyzer waveform printout]



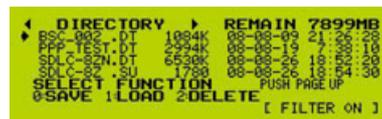
## PC-compatible File Management Specification

Test conditions and results such as measured data can be saved on optional CF cards in the files management format compatible with your PC. Of course, files can be interchangeably used (\*) between models. Therefore, measurement data can be saved on-site with the LE-2500, and analyzed or manipulated in greater detail using the LE-3500 back in the office.

\* The LE-8200(A)/3500/2500/1500/7200/3200/2200/1200 are compatible in measurement data file. Part of files or data saved in higher hierarchy models or new models, however, may not be available to lower hierarchy models or conventional models.

Types, names, sizes and the date/time of files saved in the memory card can be checked.

[Example file operation display]



When many files have been saved, the file filter feature allows you to specify the type of file to be displayed.

[File filter setup display]



## Auto RUN/STOP for Unmanned Measurement

By setting time and a date of measurement start and end, measurement can be done automatically during the specified time period. For example, measurement only for 3 hours from 18:00 to 21:00 every day is possible. Besides, if the power ON auto run function is used, unmanned measurement can be started automatically without pressing the RUN key after turning power ON.

[Example auto run display]



# LE-PC300G Enhances the Link between Analyzers and your PC

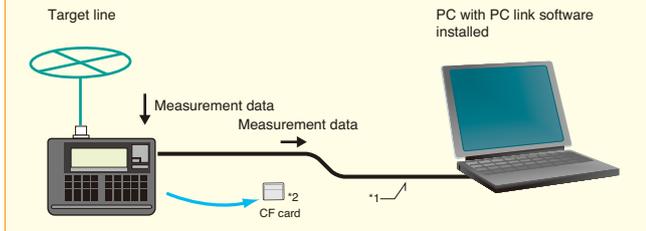
## PC Link Software **LE-PC300G**



### Enables simultaneous control of multiple analyzers from a PC

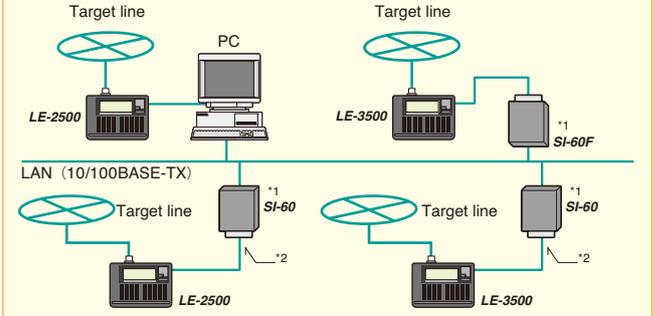
The LE-PC300G supports serial connections through the COM port, USB connections, and LAN connections via LINEEYE LAN-Serial converter, thus enabling remote measurement by multiple analyzers connected at the same time. It also allows you to browse measurement data saved in memory cards and convert data.

#### [Serial connections and memory card]



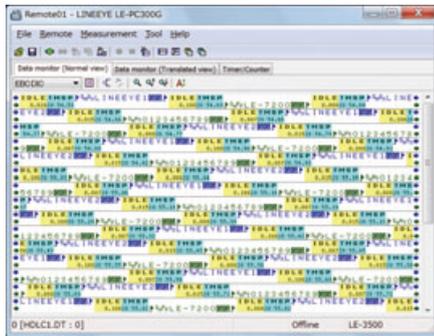
\*1: The PC Link software is not provided with a USB cable. Prepare a USB cable if you intend to use USB connection. The LE-2V AUX cable provided to the analyzer is available in the case of serial connection.  
\*2: An interface to read the CF card is required on the PC side.

#### [Linking multiple analyzers by serial and LAN connections]

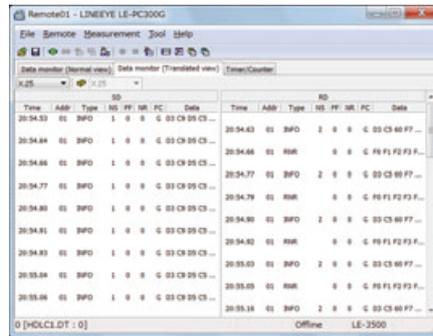


\*1: SI-60/SI-60F is a LAN-serial converter supported by LE-PC300G. Target analyzer is identified by specifying IP address of SI-60/SI-60F on the remote setting window of LE-PC300G.  
\*2: Optional AUX cable for DSUB 25-pin (LE-2-8C). Set the DTE/DCE switch of SI-60 to DTE.

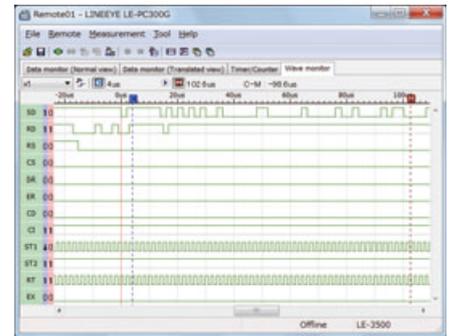
### Allows the measurement data to be checked on your large PC screen.



▲ Normal display



▲ HDLC translation display



▲ Logic analyzer display

### Records communication logs continuously on PC up to a maximum of 16GB

The remote monitor function allows to record the data measured by an analyzer on the hard disk of PC. The fixed buffer mode and ring buffer mode are available. The former stops recording when the specified data size is reached, and the latter records data endlessly within the limit of the specified size.

[Standard time for continuous recording on hard disk \*1]

Target line speed *2	When 1 GB is specified : (e.g.: 1 MB x 1,000 files)	When 16 GB is specified : (e.g.: 8 MB x 2,000 files)
9600 bps	Approx. 60 hrs	Approx. 960 hrs
19200 bps	Approx. 30 hrs	Approx. 480 hrs
38400 bps	Approx. 15 hrs	Approx. 240 hrs

\*1: In case of full-duplex communications line for transmission at 1 ms interval per 1 KB.  
\*2: Maximum communications speed that ensures recording of measurement data without failure will be about 1/5 of serial transfer speed between analyzer and PC.

### Converts the recorded data to text format or CSV format all at once

Multiple files of communications logs can be converted to text or CSV format for use on word processor or spreadsheet. Conversion to text is based on the print format of the analyzer. In consideration of analysis on general search tool, it is possible to delete decorative guides or time data, and to specify conversion of sender or receiver data only.

### Changes the System Language Automatically

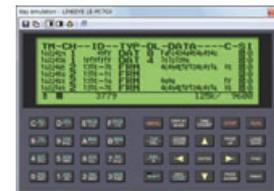
The system language alternates automatically between English and Japanese according to that of OS. This facilitates introduction of the software to development bases outside Japan.

## LE-PC300G Specifications

Applicable analyzers	LE-3500, LE-2500, LE-1500, LE-7200, LE-3200, LE-2200, LE-1200	
Analyzer connection	Serial, USB (for full-speed transfer), and LAN (with SI-60/SI-60F unit sold separately)	
No. of analyzers to be connected	Multiple analyzers can be connected and controlled simultaneously. (No. of connectable analyzers depends on the performance of PC.)	
Key emulation function	Presents the analyzer's display on the PC screen to enable control in a manner as if operating the analyzer.	
Measurement condition setting	Measurement conditions (communications parameters, trigger and simulation data) can be input and edited on the dedicated window on PC screen.	
Remote monitor function	Starts/stops measurement with analyzer, displays the measurement data on PC screen, and records data continuously.	
	Recording modes	Fixed buffer mode (Records data up to the specified size) or ring buffer mode (Records data endlessly while leaving the latest data of the specified size) can be selected.
Recording capacity	Max. 16 GB can be specified up to 2,000 files in the unit of 1/2/4/8 MB data file.	
Display modes	Selectable among raw data, protocol translation and logic analyzer waveform.	
	Raw data	Displays communications data accompanied by idle time, time stamp and line status. Character code (10 kinds) and character size (small/medium/large) can be changed.
	Protocol translation	Translates and displays SDLC, X.25 and LAPD protocols. (Target protocols planned to be increased.)
Display area	Logic analyzer waveform	
Display area	Enlarges and reduces waveform, measures time between cursors, and rearranges signals.	
Display area	Display window size can be changed.	
Character codes	ASCII, EBDCIC, JIS7, JIS8, Baudot, Transcode, IPARS, EBDC, EBDCIK, HEX (in hexadecimal including error codes)	
Search function	Finds and displays the data that matches the search key.	
	Search key	Specified data string of max. 8 characters (don't care and bit mask can also be specified), idle time beyond a specified duration, specific time stamp (don't care can also be specified), error (parity, framing, BCC, break/abort, short frame: individual error type can be specified) external trigger matching data
Text-CSV conversion function	Specified number of recorded files can be converted to text or CSV format all together.	
Bitmap conversion function	Analyzer's display shown by key emulation can be saved to bitmap files.	
System requirements	PC	PC / AT compatible CPU: Pentium3 1GHz or faster RAM: 256 MB or more (recommended) HDD: 5 MB + free bytes on the measurement data area
	OS	Windows® 2000 / Vista® / 7 / 8
Composition	CD (Software) x 1, instruction manual x 1, user registration card x 1	

## PC Link Software for CAN/LIN

### For OP-SB7GX **LE-PC7GX**



This software links your PC and LE-3500/2500 equipped with CAN/LIN communications expansion kit OP-SB7GX. It enables to analyze collected CAN/LIN data on your PC.

- USB, Serial and LAN connection to the PC
- Key emulation function for remote control
- Recode CAN/LIN data into the PC at maximum 16GB
- Display the specific ID frame at real time
- Data and timestamp search, text/CSV conversion
- Set the analyzer conditions from the software
- Read the measured file on the CF card
- OS: Windows® / Vista® / 7 / 8

## Expanded communications

TTL/I<sup>2</sup>C/SPI IrDA/ASK CAN/LIN CC-Link

Optional measurement boards along with a variety of measurement cables expand the application range of the LE Series.



▲New communications standards different in hardware specification are supported with the replacement of the measurement board.

▲Cables and terminal adapters in a wide variety are available to meet the shapes of the connectors of measurement targets.

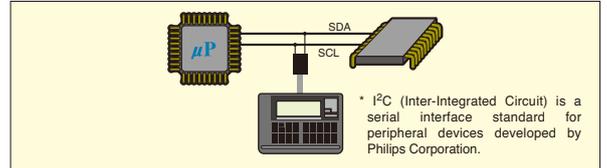
### TTL/I<sup>2</sup>C/SPI Communications Expansion Kit SB5GL

This interface expansion kit can measure RS-232C (V.24) and TTL/C-MOS signal levels used between LSI chips on printed circuit boards (PCB). TTL/C-MOS port supports monitoring and simulating the I<sup>2</sup>C/SPI (\*) communications besides UART/HDLC communications at 1.8V to 5V. Furthermore, it supports BURST mode, which captures all data synchronizing clock signals.

[I<sup>2</sup>C protocol setting screen]



[Example of I<sup>2</sup>C monitor display]



\* I<sup>2</sup>C (Inter-Integrated Circuit) is a serial interface standard for peripheral devices developed by Philips Corporation.

Applicable analyzers	LE-3500, LE-2500, LE-1500 (*)
Interface	RS-232C, TTL / CMOS (for I <sup>2</sup> C and SPI (**))
Probe signal	SD (SDA/SDO), RD (SDI), RS (SS), CS, EX IN, SD CLK (SCL/SCK), RD CLK, Trigger IN, Trigger OUT [Lead length: 170mm]
Protocol	I <sup>2</sup> C, SPI (**), BURST
Test function	Monitor / Simulation / BERT (**)
Baud Rate	SPI : 50bps to 2.048Mbps <sup>(*)</sup> , 115.2Kbps to 10Mbps on using OP-FW10G <sup>(*)</sup> I <sup>2</sup> C : max. 1Mbps (On simulation 50K, 100K, 200K, 384K, 417K, 1Mbps)
TTL/CMOS signal level	5.0V / 3.3V / 2.5V / 1.8V signal level (selectable)
Input Level	5.0V setting: High: Min 3.5V, Low: Max 1.5V 3.3V setting: High: Min 2.0V, Low: Max 0.8V 2.5V setting: High: Min 1.7V, Low: Max 0.7V 1.8V setting: High: Min 1.2V, Low: Max 0.6V
Composition	Dedicated expansion board, relay cable, probe pod, probe unit

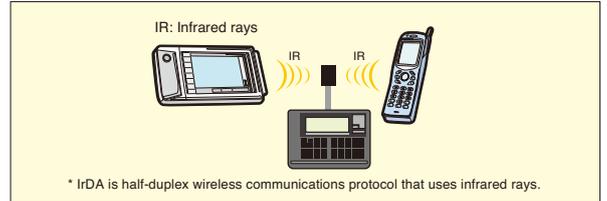
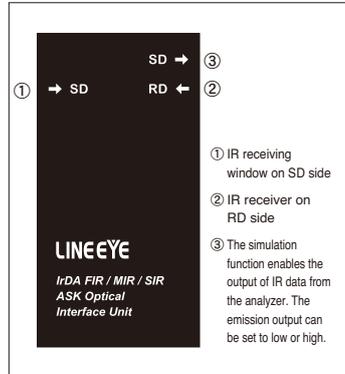
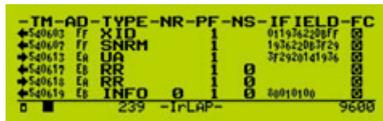
\*1 : SPI is only available with LE-3500.  
\*2 : LE-1500 does not support I<sup>2</sup>C/SPI  
\*3 : BURST monitoring only. BERT for I<sup>2</sup>C/SPI are not supported.  
\*4 : When the continuous transfer is less than 1Kb, Max 5Mbps at monitoring and Max 2.048Mbps at simulation.  
\*5 : Applied in monitor mode. Max 5Mbps at simulation mode.

### Infrared Communications Expansion Kit OP-SB6G

This expansion kit is provided with a probe pod for monitoring IrDA and ASK infrared communications. The kit has an IrDA monitor function that makes it possible to change communications speed automatically according to the IrLAP protocol and allows the seamless monitoring of infrared data, the mode of which changes from SIR (9600 bps) to FIR (4Mbps). The kit has two optical emission levels (high and low levels), either one of which is selectable.



[Example of IrDA monitor display]



\* IrDA is half-duplex wireless communications protocol that uses infrared rays.

Applicable analyzers	LE-3500, LE-2500
Interface	RS-232C, IR (IrDA/ASK) Photodiode / LED : HSDL-3602 or equivalent
Measurement signal	SD, RD
Protocol	IrDA1.1 (SIR/MIR/FIR <sup>(*)</sup> ), ASK
Function	Monitor/Simulation/BERT <sup>(**)</sup>
Baud rate (bps)	2400, 9600, 19.2K, 38.4K, 57.6K, 115.2K, 0.576M, 1.152M <sup>(**)</sup> Automatically detects and follows IrLAP protocol. <sup>(**)</sup>
Output emission level	High/low interchangeable
Composition	Dedicated expansion board, relay cable, probe pod

\*1 : The Expansion Kit is in automatic tracking control of MIR (at 576 kbps or 1.152 Mbps) or FIR (at 4 Mbps) while the expansion kit is in monitoring. Due to the performance of the analyzer, however, continuous data may not be correctly captured midway. \*2 : IR bit error rate testing (BERT) is not possible.  
\*3 : Settings are not possible in the LE-2500.

### Current Loop Adapter and Expansion Board OP-1C + SB-25L

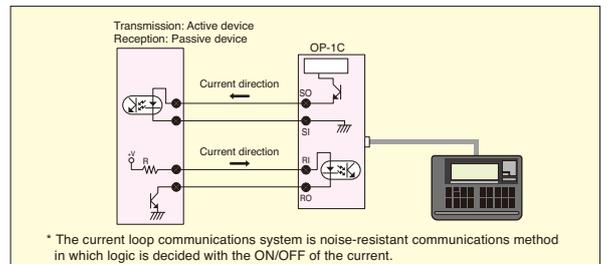
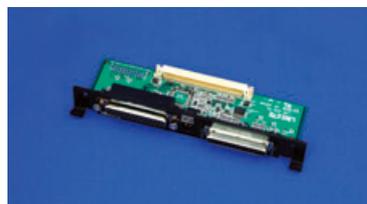
The OP-1C used in combination with the SB-25L (\*) supports current loop communications presently used in the FA field. The kit incorporates a communications circuit with photocoupler built in OP-1C insulation and constant-current power supply of insulated type, thus realizing not only monitoring but also easy communications testing with passive or active current loop devices.

Note 1: The dedicated expansion board provided to the OP-SB5G/OP-SB5GL or OP-SB6G can be used in place of the SB-25L. The purchase of the SB-25L is unnecessary if the dedicated expansion board is on hand.

[OP-1C Current Loop Adapter]



[SB-25L Expansion Board]



\* The current loop communications system is noise-resistant communications method in which logic is decided with the ON/OFF of the current.

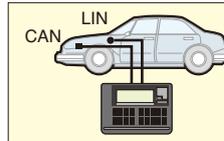
Applicable analyzers	LE-3500, LE-2500, LE-1500
Interface	RS-232C, Current loop communications (4-pole terminal block)
Measurement signal	SD, RD
Baud rate (bps)	19.2 kbps max. (*)
Function	Monitor/Simulation
Monitor current level	10~60mA
Signal polarity	Normal/inversion (**)
Simulation mode	Passive test and active test Active current: 20/40 mA (selectable with DIP switch)
OP-1C dimensions and mass	60(W) × 100(D) × 20(H)mm, Approx. 180g
OP-1C accessories	Dedicated adapter and relay cable

\*1: The baud rate is restricted by the cable length and current value. \*2: The signal polarity is set in the analyzer. OP-1C is not provided with DIP switches for polarity switching equivalent to that of the conventional model OP-1B.

# Increases in the efficiency of developing and testing in-vehicle networks.

## CAN/LIN Communications Expansion Kit OP-SB7GX

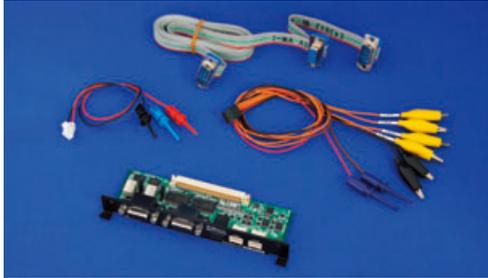
This expansion kit makes the measurement of up to 2 channels simultaneously by using Controller Area Network (CAN) communications used widely in FA systems and in-vehicle communications, and Local Interconnect Network (LIN) communications data in flexible connection. This expansion kit allows the simultaneous logic measurement and analog measurement of four-line external signals.



\*CAN is the communications protocol for in-vehicle network developed by Robert Bosch GmbH. LIN is communications protocol for in-vehicle network proposed by automobile manufacturers in Europe.

### CAN/LIN Simultaneous Monitoring

The OP-SB7GX enables the simultaneous measurement of CAN communications data and LIN communications data along with time stamp, thus contributing to the development of bridge units connecting the CAN and LIN. Furthermore, the ID filter can be used for highly efficient analysis.



[Example of CAN/LIN monitor display]

TM	CH	ID	TYP	DL	DATA	C	S	I
5:27:53.2	1	0016	DAT	8	01 31 32 33 34 35 36 37	00	00	00
5:27:54.2	2	1355-35	FRM	8	40 40 40 41 53 40 41 54	85	00	00
5:27:54.1	1	0016	DAT	8	01 31 32 33 34 35 36 37	00	00	00
5:27:54.2	2	1355-11	FRM	8	01 31 32 33 34 35 36 37	00	00	00
5:27:54.1	1	0016	DAT	8	02 31 32 33 34 35 36 37	00	00	00
5:27:54.2	2	1355-16	FRM	8	00 00	00	00	00

TM	Displays the time of frame reception completion in millisecond units (Example: 4216898 → Reception at 42 minutes 16.898 seconds) The [ZOOM/CODE] key can be used to select the display of the difference in time (ΔT) from the moment the previous frame is received.
CH	Reception channels (1: CH1 and 2: CH2)
ID	CAN: ID of received frame, LIN: Displays the following items in sequence. SynchBreak bit width, SynchField, "r" and ID (Example: 1355-35, SynchBreak width=13 bits, SynchField=55h, and ID=35h)
TYP	Types of reception frames DAT: CAN data frame REM: CAN remote frame ERR: CAN error frame FRM: LIN frame ILL: Illegal frames beyond LIN standards
DL	CAN: Contents of data length code (number of data bytes) LIN: Data length set for CONFIG for each ID
DATA	Contents of data field
C	Contents of LIN checksum (hexadecimal)
S	Displays whether or not the frame was normal.
I	Displays the logic of external signal IN1. All the external signals will be displayed with the [DISPLAY MODE] key.

### CAN Simulation Function

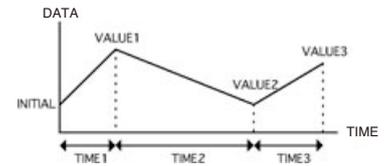
A frame registered in the CAN data table is transmitted. A part of the data in the frame can be specified as sweep data that can be transmitted with the value of the data automatically changed from the initial value to the third target value, which makes it easy to check the response of the equipment according to the change of communications data.

[Settings for CAN data table]

DATA TABLE 1	*SELECT*
TYPE : DATA	0 DATA
ID : 234	1 EX-DATA
DATA : 00000000FF	2 REMOTE
REPEAT : 10	3 EX-REMOTE
INTERVAL : 11	
SWEEP : ON	

Sixteen frames specified with the number of repeating times and transmission intervals can be registered in advance.

[Image of sweep data settings]



### LIN Simulation Function

The OP-SB7GX in master mode can transmit the contents of the LIN data table in the order set in the schedule table repeatedly or according to key manipulation. A parity error, any number of break bits, and any SYNC data can be set to conduct confirmation tests for error data with ease. While in slave mode, the contents of the data table set with an ID conforming to the request of the master will be transmitted. Furthermore, the WakeUp signal (80h) can be transmitted at any time.

[Example of master mode settings]

LIN SIMULATE	*INPUT*
MODE : MASTER	SET
SYNCHIDSP : 0	INTER-
RESPONSP : 15	BYTE-
BYTE SP : 5	SPACE
	(0~99BIT)
	(DECIMAL)

A 15-bit response space (the space between the header block and response block) and 5-bit inter-byte space (the space between adjacent response data items) are set.

[Example of schedule table settings]

LIN SIMULATE	SCHEDULE TABLE			
No	TBL	PARITY	BREAK	SYNC
0	0	-	-	-
1	1	*	-	-
2	1	-	-	-
3	1	-	-	-
00-FF	: (HEX)			

Data table numbers 0, F, 1, and 2 are transmitted in sequence with a parity error set for an 18-bit-length BREAK followed by table F data.

Applicable analyzer	LE-3500, LE-2500
Interface	CAN: Conforms to ISO11898/ISO11519-2 standards (*) (DSUB9-pin connectors x 2) LIN: Conforms to ISO9141 standards (header 3-pin connector x 2)
Transceiver	CAN: Equivalent to TJA1050/1054 LIN: Equivalent to TJA1021
No. of measurement channels	2 channels in total with CAN, LIN or CAN / LIN in combination
Protocol	CAN2.0B, device net, LIN (Rev 1.1, 1.2, 1.3, and 2.0, 2.1)
Baud rate (bps)	CAN: 1 Mbps max. LIN: 26 kbps max. Arbitrary baud rate settings possible
Monitor function	ID filter possible and time stamp (1 ms min.) recordable CAN: Standard/Expansion format supported and possible to make bit timing settings LIN: Frame breaking possible according to the data length of each ID or specified idle time
Trigger function	Conditions: Specified communications data string (8 characters max.), specified remote frame (CAN), frame error (LIN), timer and counter coincidence, and external signal logic Operation: Measurement stop, saving in a memory card, timer control, counter control, specified data transmission, buzzer, and validation of trigger conditions
Simulation function	Pre-registered data is selected by key operation and transmitted (sweep transmission available) and Master and slave simulation (LIN only).
External signal input	Real-time display of 4-channel external signal state with LED possible. Signal logic recordable in synchronization with data continuous measurement of voltage possible. (Measurement range: ±15 V)
Composition	Dedicated expansion board, DB9 monitor cable x 2, 3-wire probe cable x 2, and 8-wire probe cable

\*1: Settings in the Analyzer selectable with a relay.

## High-speed HDLC/SPI Communications Firmware OP-FW10G

This expansion firmware increases the baud rates of bit synchronous communications (e.g., HDLC/SDLC/X.25, and CC-Link communications) and SPI communications up to 10 Mbps. The firmware processes main measurement items completely with a field programmable gate array (FPGA), thus precisely capturing communications data along with time stamps in 1-μs units. It is useful to measure the high-speed HDLC communication at CC-LINK of RS-485 multi-drop type, and the high-speed SPI/HDLC communications at TTL signal level on the PCB boards.



[Screen for HDLC settings]

CONFIGURATION	*SELECT*
PROTOCOL : HDLC	156K
BAUD-SPEED : 10M	4 1M
STOP-SPEED : 10M	5 5M
CODE : HEX	6 5H
FORMAT : NRZI	7 10H
	USER

Applicable analyzer	LE-3500
Interface	RS-422/RS-485 (RS-530) (*1), TTL(*2), SPI(*2)
Protocol	HDLC, SDLC, X.25, CC-Link (NRZ/NRZI format, AR clock), SPI
Baud rate (bps)	Half-duplex 115.2 kbps ~ 10 Mbps (*3) Full duplex 115.2 kbps ~ 5 Mbps (*3)
Error check	FCS error (CRC-ITU-T), abort, short frame
Monitor function	Time stamp 6 digits (0 to 524287) Resolution: 1 ms, 100 μs, 10 μs, or 1 μs (selectable) ID filter (HDLC) Specify 2 characters (don't care and bit mask available) Data table 16 kinds up to 16k in total
Simulation function	MANUAL mode Data can be transmitted by key operations. Able to set repeat mode and idle time.
Trigger function	When 2 individual or sequential characters, errors or the external trigger input (low level) are found, the analyzer automatically stops monitoring.
Data search	Search trigger data, error data or any data strings.
Composition	Firmware CD, instruction manual.

\*1: LE-25TB and LE-530TB are useful to connect to the target device.  
\*2: OP-S85GL is required.  
\*3: OP-S85GL is required for high-speed simulation of TTL/SPI.

# LE-3500 / LE-2500 Specifications

Model		LE-3500	LE-2500
Interface	RS-232C (V. 24) <sup>(1)</sup>	○	○
	RS-422/485 (RS-530) <sup>(1)</sup>	○	○
Expansion measurement interface.	X. 20/21	○ [ LE-25Y15 ]	○ [ LE-25Y15 ]
	RS-449	○ [ LE-25Y37 ]	○ [ LE-25Y37 ]
	V. 35	○ [ LE-25M34 ]	○ [ LE-25M34 ] <sup>(2)</sup>
	TTL/I <sup>2</sup> C/SPI <sup>(3)</sup>	○ [ OP-SB5GL ]	○ [ OP-SB5GL ]
	Infrared communications IrDA/ASK	○ [ OP-SB6G ]	○ [ OP-SB6G ]
	Current loop	○ [ OP-1C + SB-25L ]	○ [ OP-1C + SB-25L ]
CAN/LIN	○ [ OP-SB7GX ]	○ [ OP-SB7GX ]	
Expansion firmware	High-speed HDLC/CC-Link	○ [ OP-FW10G ]	—
Standard Protocol	ASYN (Asynchronous), ASYN-PPP	○	○
	Character synchronous SYNC/BSC	○	○
	Bit synchronous HDLC/SDLC/X.25	○	○
	Modbus	○	Not supported
Optional Protocol	I <sup>2</sup> C	○	○
	SPI	○	Not supported
	BURST <sup>(4)</sup>	○	○
	IrDA(IrLAP)	○	○
	CC-Link	○	Not supported
	CAN	○	○
	Devicenet	○	○
	LIN	○	○
Synchronous clock	ST1 (DTE transmission clock), ST2 (DCE transmission clock), RT (DCE reception clock), AR (The synchronous clock extracted from the edge of the transmission and reception data)		
Capture memory	Memory capacity <sup>(5)</sup>	6.4 MB	2.4 MB
	Battery backup	Approximately 5 years with built-in lithium battery	
	Added function with memory used	Two divided areas, data protection, and selection between fixed-size buffer and ring buffer.	
Baud rate	Max. speed (full-duplex)	1.544Mbps	1.000Mbps
	Max. speed (half-duplex)	2.048Mbps	1.000Mbps
	Speed setting range	50bps~2.048Mbps	50bps~1.000Mbps
	Speed setting step, accuracy	Freely set to four effective digits, separately for transmission and reception.(Margin of error: ±0.01% or less)	
Data format	NRZ, NRZI, FM0, FM1, 4PPM, ASK		
Data code	ASCII, EBCDIC, JIS7, JIS8, Baudot, Transcode, IPARS, EBCD, EBCDIK, HEX		
Character Framing	Asynchronous	Data bit (5, 6, 7, 8) + parity bit (0, 1) + stop bit (1, 2)	
	Character synchronous	Data bit + parity bit (6 or 8 bits in total)	
	Bit-oriented synchronous	Data bit (8 bits)	
Parity bit	NONE, ODD, EVEN, MARK, SPACE		
Multi-processor bit	MP (multiprocessor) bit is shown with a special mark.		
Bit transmission order	LSB first or MSB first (switchable)		
Polarity inversion	Normal or Inverted (switchable)		
Error check	For all protocols	Parity (ODD, EVEN, MARK, SPACE), Framing, Break, BCC (LRC, CRC-6, CRC-12, CRC-16, CRC-32, CRC-ITU-T), BCC permeation mode.	
	For bit-oriented synchronous protocol	Abort, short frame	
Online monitor functions	Specification	Communication log is recorded continuously and displayed in the LCD without affecting the communication lines.	
	Idle time display	OFF (no recording); Resolution: 100ms, 10ms, 1ms; Max 999.9 sec	
	Time stamp display	Date time stamp: Unit selectable among "Day/Hr/Min," "Hr/Min/Sec," "Min/Sec/10ms," or OFF (no recording)	
	Line status display	Records and displays the wave form of 4 signals (chosen from RS(RTS), CS(CTS), ER(DTR), DR(DSR), CD(DCD), CI(RI), EXIN(external trigger input) along with the transmission/ reception data.	
	Address filter	Records only frames of the specified address. (only when HDLC/SDLC/X.25)	
	Data display and operations	Pause in capture, scroll, paging, jump to the specified screen.	
	Bit shift display	Entire frame can be shifted to the right or left in 1 bit increments.	
Protocol translation display	SDLC (modulo 8/128), ITU-T X.25 (modulo 8/128), LAPD, PPP, BSC, IrLAP, I <sup>2</sup> C		
Line status LED	Target signals	Two color LEDs of SD, RD, RS(RTS), CS(CTS), ER(DTR), DR(DSR), CD(DCD), CI(RI), ST1(TXC1), ST2(TXC2), RT(RXC).	
	RS-232C	Logic ON (red) , logic OFF (green) , no connection NC (light off)	
	Other interface	Logic ON (red) , logic OFF or no connection NC (light off)	
Interval timer	2kinds; Max. count: 999999 (Resolution: 1ms ,10ms ,100ms)		
General-purpose counter	2kinds; Max. count: 999999		
Data counter	For SD and RD (1 each): Max. count: 4294967295		
Trigger function	Simultaneous detection conditions	Up to 4 pairs of trigger condition and action can be specified. Sequential actions, which validate another condition after one condition is satisfied, is also possible.	
	Trigger condition	Communication error (Parity, MP, framing, BCC, break, abort, short frame can be specified individually.), communication data string up to 8 characters (don't care and bit mask available), idle time more than the specified duration, match time/counter value, logic status of interface signal line and external trigger input	
	Trigger action	Stops measurement/test (offset can be set), validates trigger condition, controls timer (start/stop/restart), controls counter (count/clear), activates buzzer, saves monitor data on a memory card, sends the specified character string (during manual simulation), and sends pulse output to external trigger terminal OT2.	
	External trigger output	Sends pulse to external trigger terminal OT1 when all conditions are satisfied. Sends pulse to external trigger terminal OT2 according to the trigger output specification.	
Data search function	Specification	Retrieves the data with specific condition from capture memory.	
	Search condition	Communication error (parity, MP, framing, BCC, break, abort, short frame), communication data string up to 8 characters (don't care and bit mask available), idle time more than the specified duration, specified timestamp, and trigger matching data.	
	Search action	Shows the match data at the top or enumeration display (selectable)	
Monitor conditions auto setting	Measurement conditions such as protocol, transmission speed, (max. 115.2Kbps), data code, synchronous character and BCC check can be set.		
Auto run/stop function	Enables measurement to start and end at the specified time at the selected repeating cycle (monthly, daily, hourly).		
Power ON auto run function	Enables measurement to start automatically after power is turned ON.		
Auto save function	Specification	Automatically saves the monitored data in the capture memory and saves as communications log file in the CF card.	
	File size	BUF (capture memory size) , 1MB , 2MB , 4MB , 8MB , 16MB	
	Max. files	1024	

Model	LE-3500	LE-2500
Delay time function	Measures and displays the interval of change in the interface signal line. (current/min/max/average, resolution: 0.1ms)	
Signal voltage measuring function	Measures and displays the value of voltage amplitude: SD, RD, ER (DTR), and CD (DCD) over RS-232C (current/min/max, range ±15V, resolution 0.1V).	
Statistical analysis function	Takes statistics and displays graphs of transmission/reception data count, number of frames, and satisfied trigger condition count.	Not available
Logic analyzer function	Specification	Measures the logical change of the interface signal in the sampling clock period, and displays its wave.
	Sampling clock	1KHz to 20MHz (14 steps)
	Sampling memory	Min 2,000
	Trigger condition	Trigger conditions in the ONLINE monitor functions match. Logical status of interface signal or external signal match.
	Trigger position	Before, center, after
	Zoom in/out	×8, ×4, ×2, ×1, ×1/2, ×1/4, ×1/8, ×1/16, ×1/32, ×1/64
	Other functions	Time measurement by cursor, signal line exchange, signal status search
BERT (bit error rate test)	Specification	At DTE or DCE mode (selectable), line quality measurement test such as error rates can be done by loop back test or interactive test.
	Communication mode	Synchronous (SYNC), Asynchronous (ASYN)
	Measuring speed	50bps~2.048Mbps, freely set to four effective digits
	Measurement mode	Continuous measurement, specifies the number of receiving bit, specifies the time to measure, repeatedly measurement at the unit of 1 - 1440minutes
	Test pattern	2 <sup>n</sup> -1, 2 <sup>n</sup> -1, 2 <sup>n</sup> -1, MARK, SPACE, ALT, DBL-ALT, 3in24, 1in16, 1in8, 1in4
	Error bit insertion	Inserts 1-bit or 5-bit error in test pattern by key operation.
	Measurement range	It is able to measure the parameter of the ITU-T advice G.821. It is able to output the external trigger by detecting the error bit. Effective received bit (0~9999999), bit errors (0 to 9999999 to 9.99E9), bit error rate(0 to 9.99E-9 to 1), block errors (0 to 9999999 to 9.99E9), block error rate (0 to 9.99E-9 to 1), Savail(available measurement time: 0 to 9999999sec), loss count (synch loss: 0 to 9999), error duration (0 to 9999999sec), %EFS (normal operation rate: 0.000 to 100.000%)
Simulation function	Specification	Enables transmission/reception test of any given data in DTE or DCE mode (selectable).
	Transmission data entry	Can be registered in 16 types of transmission data tables (Total of 16K data).
	Error data entry	A part of transmission data can be registered as error data such as parity error.
	Line control mode	Auto Controls transmission timing with RS(RTS), CS(CTS), ER(DTR), CD(DCD) signal lines automatically in 1 ms increments or manual (key operation) can be selected.
	Transmission driver control	Auto control turning ON driver only during data transmission or manual mode linking with ER (DTR) or CD (DCD) key operation can be selected during simulation of RS-485.
MANUAL mode (Manual test)	Sends the data assigned to operation keys each time a key is pressed, while checking communications status on the display. Can be used together with the trigger function.	
FLOW mode (Flow control test)	Simulates the X-on /X-off control data and flow control procedures of RTS/CTS control line. (Sender and receiver selectable).	
ECHO mode (Echo test)	Sends the received data frame by frame (buffer echo), by data (character echo) or by loop back.	
POLLING mode (Multi-polling test)	Simulates multi-polling communications procedures. (Slave and master selectable)	
BUFFER mode (Buffer transmission test)	Reproduces transmission of selected data (SD or RD) captured in memory by monitor function.	Not available
PROGRAM mode (Program simulation)	Creates a simulation program (Max. type: 4, Max steps: 512) using the dedicated commands (37 types) to test the communication procedure.	Not available
File management function	Specification	Measurement data and condition can be saved in the CF card. And the format of the data/condition can be used in the PC.
	File types	Measurement data (.DT), all measurement conditions (.SU), trigger save data (TG SAVEnn.DT), and auto save data (#nnnnnnn.DT)
	File operations	Normal file display, file display by specified type/created date basis, save, load, delete, delete all, and format
	Max. capacity (*)	16 GB
Printout function	Specified range of measurement data can be continuously printed in format corresponding to the display mode. Displayed images can be printed to make hard copies.	
LCD	Monochrome 240 x 64 dots with backlight	Monochrome 240 x 64 dots with backlight
AUX(RS-232C) port	Mini DIN8 pin connector. Communication speed: 9600bps to 230.4Kbps (6 steps) Print out data, Can be used with PC [LE-PC300G], Can be used to upgrade the firmware.	
USB2.0 port	B-connector in device side. Transfer data in full-speed. Can be used with PC [LE-PC300G], Can be used to upgrade the firmware.	
External power supply (*)	Provided AC adapter Input: 100 to 240 VAC at 50/60Hz	
Built-in battery	Nickel hydrogen battery (Model: P-19S), Battery operating time(*9) : About 8 hours, Battery Charging time: About 2.5hours	
Temperature range	In operation : 0 to 40 degrees, In storage : -10 to 50 degrees	
Humidity range	85% (RH) max.	
Standard	CE(class A), EMC(EN61326-1 : 2006)	
Dimensions	210 ( W ) x 154 ( D ) x 38 ( H ) mm	
Mass	About 790g	About 760g
Accessories	Monitor cable for DSUB 25-pin (LE-25M1), AUX cable for DSUB 9-pin (LE2-8V), external signal I/O cable(LE-4TG), AC adapter(3A-183WP09), carrying bag(LEB-01), Utility CD, instruction manual and warranty	

◎: Standard support. ○: Supported with option product in [ ].

\*1: An optional monitor cable (LE-259MI) and terminal block (LE-25TB/LE-530TB) are required in the case of monitoring over RS-232C with a D-sub 9-pin connector or RS-422/485 with a unique terminal arrangement.  
\*2: V.35 control signal lines are not supported. \*3: SPI is only supported by LE-3500. \*4: Mode in which all data is imported in synch with clock edge. \*5: Transmission/reception data, idle time, time stamp, and line status consume 4 bytes of memory at each capture. \*6: Correct auto settings are impossible if the amount of communications data is small or communications data includes a large number of errors. \*7: Operation is not guaranteed with memory cards not specified by LINEEYE. \*8: The provided AC adapter (3A-183WP09 with a positive center plug) or the conventional AC adapter (FRA018-S09-U with a negative center plug) can be used. \*9: When LCD back-light is OFF.

## Order Information

- LE-3500/LE-2500 ..... (Comes with Japanese manual.)
- LE-3500-E/LE-2500-E ..... (Comes with English manual.)

## Standard Set



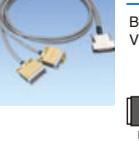
- Portable communication analyzer ..... 1
- DSUB 25-pin monitor cable (LE-25M1) ..... 1
- DSUB 9-pin AUX cable (LE2-8V) ..... 1
- External signal I/O cable (LE-4TG) ..... 1
- AC adapter (3A-183WP09) ..... 1
- Carrying bag (LEB-01) ..... 1
- Utility CD ..... 1
- Instruction manual..... 1
- Warranty..... 1



An easy-to-transport carrying bag is provided.

# Options for LE-3500 LE-2500

## Cables / Terminal blocks / Converter

 <p><b>Monitor cable for DSUB 25-pin LE-25M1</b> Branch cable for monitoring communication lines over general DSUB 25-pin.</p> <p>1.5m 0.1m DB25(Male) DB25(Male) DB25(Female)</p> <p>*Same as the cable packed with analyzer.</p>	 <p><b>Monitor cable for DSUB 9-pin LE-259M1</b> Branch cable for measuring RS-232C over DSUB 9-pin of PC, etc.</p> <p>1.5m 0.2m DB25(Male) DB9(Female) DB9(Male)</p>	 <p><b>Terminal block for DSUB 25-pin LE-25TB</b> Converts analyzer's RS-485/422 port (DSUB 25-pin specification) to terminal block specification.</p> <p>DB25 Terminal block 1 1 2 2 3 3 ... 25 25</p>	
 <p><b>X.21 Monitor cable LE-25Y15</b> Branch cable for measuring X.20/21 over DSUB 15-pin. (Shield type)</p> <p>1.2m DB25(Male) DB15(Male) DB15(Female)</p>	 <p><b>RS-449 Monitor cable LE-25Y37</b> Branch cable for measuring RS-449 over DSUB 37-pin. (Shield type)</p> <p>1.2m DB25(Male) DB37(Male) DB37(Female)</p>	 <p><b>Terminal block for RS-530 LE-530TB</b> Converts TXD/RXD/GND signals on RS-530 port into terminals.</p> <p>RS-530 Terminal block RXD- 3 1 RXD+ 16 2 GND 7 3 TXD- 2 4 TXD+ 14 5</p>	
 <p><b>V.35 Monitor cable LE-25M34</b> Branch cable for measuring V.35 over M34-pin.</p> <p>1.5m DB25(Male) M34(Male) M34(Female)</p>	 <p><b>RS-530 cable LE-25S530</b> A twisted pair cable for RS-530(shield type)</p> <p>1.5m DB25(Male) DB25(Male)</p>	 <p><b>AUX cable for DSUB 9-pin LE-28V</b> Cable for connection AUX (RS-232C) port of an analyzer with PC (DSUB 9-pin DTE specification). • Length:2.5m *Same as the cable packed with analyzer.</p>	 <p><b>External signal cable LE-4TG</b> Probe cable for inputting/ outputting external signal. *Same as the cable packed with analyzer.</p>

## Memory card

 <p><b>16G byte CF card CF-16GX</b> 16G byte compact flash card, the operation of which has been confirmed on LINEEYE's Analyzers. Applicable model: LE-8200(A) and LE-3500</p>	 <p><b>8G byte CF card CF-8GX</b> 8G byte compact flash card, the operation of which has been confirmed on LINEEYE's Analyzers. Applicable model: LE-8200(A), LE-3500, LE-2500, LE-1500</p>
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## Carrying bag



**Carrying bag LEB-01**  
Bag with pockets for storing and carrying accessories such as AC adapter, cables, etc.  
\*Same as the carrying bag packed with analyzer.

## AC Adapter



**Wide input AC adapter 3A-183WP09**  
Input: AC100-240V, 50/60Hz  
Output: DC9V, 2A  
Plug: center ⊕  
\*Same as the AC adapter packed with analyzer.

## Battery pack



**NiMH battery pack for replacement P-19S**  
Rating: 4.8V, 1900mAh  
Applicable model: LE-3500, LE-2500, LE-1500, LE-7200, LE-3200, LE-2200, LE-1200  
\*An auxiliary and replacement battery equivalent to the Analyzer built-in battery.

## Compact thermal Printer

**Compact thermal printer DPU-414-41B-E**  
Built-in battery, dedicated roll paper (x1) included.  
\*AC adapter and cable are not prepared. Provide them separately.

**Compact Thermal Printer Set DPU-414-PA**  
Includes printer (DPU-414-41B-E), roll paper x1, AC adapter, and printer cable (LE2-8P).

### Handy thermal printer for on-site printout of measurements

- Prints 40 digits per line in normal mode and 80 digits in reduced mode.
- High-speed printing at 52.5 characters per second.
- Incorporates eco-friendly NiMH battery.
- Supports Centronics parallel and RS-232C ports.
- Dimensions: 160(W)x 170(D)x 67(H)mm
- Weight: Approx. 690g (including built-in NiMH battery)



**Options**  
AC adapter for DPU-414  
**PW-C0725-W1-U**  
Input: AC100V~240V  
Output: DC7.0V, 2.5A(center ⊕)  
Roll paper  
**TP-411L**  
Thermal roll paper for DPU-414. 10 rolls per carton.  
Width: 112mm Length per roll: Approx. 28m  
Battery pack for DPU-414  
**BP-4005-E**  
Same as NiMH battery built-in DPU-414-41B-E.  
4.8V, 1100mAh  
AUX cable for DPU-414  
**LE2-8P**  
Cable for connection AUX(RS-232C)port of analyzer and serial port of DPU-414  
Length:1.5m

## MULTI PROTOCOL ANALYZER LE-8200A/LE-8200

Sister Product



240 (W) x 190 (D) x 48 (H) mm, about 1.1kg

The top-level model of battery-powered portable communications analyzer with wide color display.

- Measurement at Low to Mega Speed up to 4Mbps.
- 100 Mbytes capture memory.
- Supports to TTL, I<sup>2</sup>C, SPI, IrDA, CAN, LIN, FlexRay, LAN and USB.
- A long recording time of communications logs on 64GB CF card or USB flash drive (\*).
- Logic analyzer function and analog waveform analysis (\*).
- A compact and lightweight model in B5 size operating continuously for 4 hours.

\*Only LE-8200A supports USB flash drive. \*\*High-speed analog waveform analysis requires an optional device.

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\* LINEEYE CO. LTD. is a venture company founded by electronic equipment development members of the former Sekisui Chemical Co., Ltd. with investment from the Sekisui Venture Fund. The electronic equipment business of Sekisui Electronic Co. Ltd. was transferred to LINEEYE CO. LTD. in October 2000.



Printed in Japan

L-14601/LE©