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

**LE-3500**

- Standard communications: RS-232C
- Expanded communications: RS-422/485 (RS-530), TTL/I²C/SPI, IrDA/ASK, Current Loop, CC-Link, CAN/LIN

**LE-2500**

- Standard communications: RS-232C
- Expanded communications: RS-422/485 (RS-530), TTL/I²C/SPI, IrDA/ASK, Current Loop, CC-Link, CAN/LIN
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.

**Multi Protocol Analyzer LE-3500 / LE-2500**

**Specifications**
- DC input connector (polarity insensitive)
- RS-422/485 (RS-530) measurement port
- External signal I/O terminal
- RS-232C (V.24) measurement port
- Exchangeable measurement board
- AUX (RS-232C) connector
- USB2.0 connector
- CF card slot
- Line state LED
- Measurement start key
- Menu key
- Power supply switch
- Contrast adjustment volume
- Elastic resin

**Features**
- Special data items are expressed in individual signs.
  - Red: ON space state
  - Green: OFF mark state
  - OFF: Not in use or not wired
- In RS-232C communications
  - Idle time (frame interval time)
  - Time stamp (frame arrival time)

**Battery-powered Portable Communications Analyzer**

**LE-3500 / LE-2500**

**SPEED** in half-duplex mode
- 4Mbps
- 2Mbps
- 1Mbps
- 500Kbps

**Compact Protocol Analyzer LE-1500**
- Design for Async communication equipped with sufficient measuring functions.

**Multi Protocol Analyzer LE-2500**
- A high cost-performance multi-protocol model with expandability.

**Multi Protocol Analyzer LE-3500**
- A high-end model boasting plentiful performance with a large-sized color display and versatile functions.

**Multi Protocol Analyzer LE-8200A LE-8200**
- The high-end model boasting plentiful performance with a large-sized color display and versatile functions.

**517 x 768**

**LE-1500**
- Asyc only (Async, PPP)

**LE-2500**
- Multi Protocol (Async, SBC, SDLC, HDLC, X25, PPP, PC, IrDA, CAN, LIN - - -)

**LE-3500**
- Multi Protocol (Async, SBC, SDLC, HDLC, X25, PPP, PC, IrDA, CAN, LIN - - -)

**LE-8200A**
- Multi Protocol (Async, SBC, SDLC, HDLC, X25, PPP, PC, IrDA, CAN, LIN - - -)

**Max speed**
- 64Mbps
- 16Mbps
- 8Mbps
- 4Mbps

**Memory**
- 64GB
- 16GB
- 8GB
- 4GB

**CF card support**
- Yes
- No

**Max speed**
- 4Mbps
- 2Mbps
- 1Mbps
- 500Kbps
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.

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, I²C, SPI, IrDA, CAN, and LIN

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

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 DPLL 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.

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.

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.

Great downsizing with a sharp reduction in weight.
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.

**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.

**Interactive test**
Test pattern Communications network Test pattern
Loop-back test Communications network Loop-back point

**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.

**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.

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

**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.

**Statistical Analysis Capabilities**
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.

**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.

**Loop-back test**
Test pattern Communications network Loop-back point

**Interactive test**
Test pattern Communications network Test pattern

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

**Contents of BERT measurement**
- **Base** Available measurement in seconds 0～9999999
- **Err Rate** Effective bit error count 0～99999999～9.99E9
- **Block Error** Error block count 0～99999999～9.99E9
- **Block Error Rate** Block error rate 0～9.99E-9
- **Loss** Error in seconds 0～9999
- **SYNC Loss** Loss mode 0～9999
- **Loss** SYNC loss count 0～9999
- **Loss** Effective bits received 0～99999999～9.99E9
- **Loss** Effective blocks received 0～99999999～9.99E9
- **Loss** Block error count 0～99999999～9.99E9
- **Loss** Block error rate 0～9.99E-9
- **Loss** Normal operation rate 0.000～100.000%
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.

**MANUAL mode**

The MANUAL mode allows you to send the data registered in transmission table which corresponds to the “O” 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 “E”/”F” key combinations.

**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, they send polling messages to 32 slave units, and check and display replies from each slave.

**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.

**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.

**BUFFER mode**

In the BUFFER mode, you can select between transmission and reception, and send or receive 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.

**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.

**BUFFER data reproduction setup display**

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

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

**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 operations.

<table>
<thead>
<tr>
<th>Search key</th>
<th>Find and display, counting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communications error</td>
<td></td>
</tr>
<tr>
<td>Individual error type</td>
<td></td>
</tr>
<tr>
<td>communications data string</td>
<td></td>
</tr>
<tr>
<td>Max. 8 characters (don’t care)</td>
<td></td>
</tr>
<tr>
<td>and bit mask can also be specified</td>
<td></td>
</tr>
<tr>
<td>Idle time beyond specified duration</td>
<td></td>
</tr>
<tr>
<td>Specific time stamp</td>
<td></td>
</tr>
<tr>
<td>don't care can also be specified</td>
<td></td>
</tr>
<tr>
<td>External trigger matching data</td>
<td></td>
</tr>
</tbody>
</table>

**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-82000(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.

**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.

**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 hard copy of display images, continuous image of logic analyzer waveforms, and results of statistical analysis.

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

* The software can be downloaded from LINEEYE’S website.

* The printing is saved as file.

The PC installed the utility software LEPRTIN_WIN(*) to capture printout data.

* The software can be downloaded from LINEEYE’S website.
LE-PC300G Enhances the Link between Analyzers and your PC

Enables simultaneous control of multiple analyzers from a PC

The LE-PC300G supports serial communications 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.

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.

<table>
<thead>
<tr>
<th>Target line speed</th>
<th>When 1 GB is specified (e.g.: 1 MB x 1,000 files)</th>
<th>When 16 GB is specified (e.g.: 8 MB x 2,000 files)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9600 bps</td>
<td>Approx. 60 hrs</td>
<td>Approx. 960 hrs</td>
</tr>
<tr>
<td>19200 bps</td>
<td>Approx. 30 hrs</td>
<td>Approx. 480 hrs</td>
</tr>
<tr>
<td>38400 bps</td>
<td>Approx. 15 hrs</td>
<td>Approx. 240 hrs</td>
</tr>
</tbody>
</table>

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.

PC Link Software for CAN/LIN

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
- Recall CAN/LIN data into the PC at maximum 16GB
- Displays the specific ID frame at real time
- Data and timestamp search, text/CSV conversion
- Set the analyzer conditions from the software
- Read the measured value on the CF card
- OS: Windows®/Vista®/7/8

LE-PC300G Specifications

- 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.
- Measurement speed: Presents the analyzer's display on the PC screen to enable control in a manner as if operating the analyzer directly.
- Measurement condition setting: Measurement conditions (communications parameters, trigger and simulation data) can be input and edited in 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 mode: 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 display: Records data up to 2,048 files in the unit of 1/2/4/8 MB data file.
- Display mode: Selectable among raw data, protocol translation and logic analyzer waveform.
- Display area: Displays waveform, measures time between cursors, and rearranges signals.
- Character code: ASCII, EBCDIC, JIS7, JIS8, Baudot, Transcode, EBCDIK, HEX (in hexadecimal including error codes).
- Search function: Searches and displays the data that matches the search key.
- System requirements: OS: Windows®/Vista®/7/8
- Composition: CG (Software) x 1, instruction manual x 1, user registration card x 1

Converting 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.
Expanded communications

TTL/FC/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.

TTL/i²C/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 I²C/SPI communications besides UART/HDL com:munications at 1.8V to 5V. Furthermore, it supports BURST mode, which captures all data synchronizing clock signals.

[IPC protocol setting screen]

Example of IPC monitor display

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 the 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]

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

The OP-1C used in combination with the SB-25L (1) 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-SB6G/OP-SBG6L or OP-SBG6 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.

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

**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.

**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 target value. This makes it easy to check the response of the equipment according to the change of communications data.

**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 parnt 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.

**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.
### LE-3500 / LE-2500 Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>LE-3500</th>
<th>LE-2500</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interface</strong></td>
<td>RS-232C (V.24) (*)</td>
<td>○</td>
</tr>
<tr>
<td>Expansion measurement interface</td>
<td>X.25/1</td>
<td>○ [LE-25Y15]</td>
</tr>
<tr>
<td></td>
<td>RS-449</td>
<td>○ [LE-25Y97]</td>
</tr>
<tr>
<td></td>
<td>V.35</td>
<td>○ [LE-25M94]</td>
</tr>
<tr>
<td></td>
<td>TTY/FX/SPI(*)</td>
<td>○ [OP-SB5GL]</td>
</tr>
<tr>
<td></td>
<td>Infrared communications VDA/ASK</td>
<td>○ [OP-SB69]</td>
</tr>
<tr>
<td></td>
<td>Current loop</td>
<td>○ [OP-IC + SB-25L]</td>
</tr>
<tr>
<td></td>
<td>CAN/LIN</td>
<td>○ [OP-SB70G]</td>
</tr>
<tr>
<td><strong>Character Framing</strong></td>
<td>ASCII (Asynchronous), ASCII-PPP</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>Character synchronous SYNC/BSC</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>Bit synchronous HDLC/SDLC/X.2S</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>Modbus</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>SPI</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>BURST(*)</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>I²C/I²C/I²C/I²C</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>CAN</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>DeviceNet</td>
<td>○</td>
</tr>
<tr>
<td><strong>Synchronous clock</strong></td>
<td>ST1 (DTE transmission clock), ST2 (DCE transmission clock), RT (DCE reception clock)</td>
<td>AR (The synchronous clock extracted from the edge of the transmission and reception data)</td>
</tr>
<tr>
<td><strong>Capture memory</strong></td>
<td>Memory capacity(*1)</td>
<td>6.4 MB</td>
</tr>
<tr>
<td></td>
<td>Battery backup</td>
<td>Approximately 5 years with built-in lithium battery</td>
</tr>
<tr>
<td></td>
<td>Added function with memory used</td>
<td>Two divided areas, data protection, and selection between fixed-size buffer and ring buffer</td>
</tr>
<tr>
<td><strong>Baud rate</strong></td>
<td>Max. speed (full-duple)</td>
<td>1.544Mbps</td>
</tr>
<tr>
<td></td>
<td>Max. speed (half-duple)</td>
<td>2.048Mbps</td>
</tr>
<tr>
<td></td>
<td>Speed setting range</td>
<td>50bps–2.048Mbps</td>
</tr>
<tr>
<td></td>
<td>Speed setting step, accuracy</td>
<td>Freely set to four effective digits, separately for transmission and reception (Margin of error: ±0.01% or less)</td>
</tr>
<tr>
<td><strong>Data format</strong></td>
<td>ASCII, EBCDIC, JIS7, JIS8, Baudot, Transcode, IPARS, EBCD, EBCDIK, HEX</td>
<td></td>
</tr>
<tr>
<td><strong>Character Framing</strong></td>
<td>Asynchronous</td>
<td>Data bit (5, 6, 7, 8) + parity bit (0, 1) + stop bit (1, 2)</td>
</tr>
<tr>
<td></td>
<td>Character synchronous</td>
<td>Data bit + parity bit (8 bits in total)</td>
</tr>
<tr>
<td></td>
<td>Bit-oriented synchronous</td>
<td>Data bit (8 bits)</td>
</tr>
<tr>
<td><strong>Parity bit</strong></td>
<td>None</td>
<td>ODD, EVEN, MARK, SPACE</td>
</tr>
<tr>
<td><strong>Binary code</strong></td>
<td>NONE, ODD, EVEN, MARK, SPACE</td>
<td></td>
</tr>
<tr>
<td><strong>Character Framing</strong></td>
<td>Multi-processor bit</td>
<td>MP (multiprocessor) bit is shown with a special mark</td>
</tr>
<tr>
<td><strong>Bit transmission order</strong></td>
<td>Bit transmission order</td>
<td>LSB first or MSB first (switchable)</td>
</tr>
<tr>
<td><strong>Online monitor functions</strong></td>
<td>For all protocols</td>
<td>Parity (ODD, EVEN, MARK, SPACE), Framing, Break, BCC (LIN, CRC-8, CRC-12, CRC-16, CRC-32, CRC-ITU-T), BCC permutation mode</td>
</tr>
<tr>
<td></td>
<td>For bit-oriented synchronous protocols</td>
<td>Abort, short frame</td>
</tr>
<tr>
<td><strong>Protocol translation display</strong></td>
<td>Communication log is recorded continuously and displayed in the LCD without affecting the communication lines</td>
<td></td>
</tr>
<tr>
<td><strong>Character Framing</strong></td>
<td>Idle time display</td>
<td>OFF (no recording): Resolution: 100ms, 10ms, 1ms; Max 9999.9 sec</td>
</tr>
<tr>
<td><strong>Time stamp display</strong></td>
<td>Data time stamp: Unit selectable among “Day/Hr/Min,” “Hr/Min/Sec,” “Min/Sec/10ms” or OFF (no recording)</td>
<td></td>
</tr>
<tr>
<td><strong>Line status display</strong></td>
<td>Records and displays the waveform and frame format of sent signals (shown from RS(RTS), CS(CS(TS), ER(DTR), DR(DSR), CD(DCD), CI(RI), EXIN(external trigger input)) along with the transmission/reception data)</td>
<td></td>
</tr>
<tr>
<td><strong>Address filter</strong></td>
<td>Address filter</td>
<td>Records only frames of the specified address. (only when HDLC/SDLX/X.25)</td>
</tr>
<tr>
<td><strong>Data display and operations</strong></td>
<td>Data display and operations</td>
<td>Pause in capture, scrolling, jumping to the specified screen</td>
</tr>
<tr>
<td><strong>Protocol translation display</strong></td>
<td>Protocol translation display</td>
<td>SSDL (module 8/128), ITU-T X.25 (module 8/128), LAPD, PFC, BSC, BSC, BSC</td>
</tr>
<tr>
<td><strong>Line status display</strong></td>
<td>Target signals</td>
<td>Two color LEDs of SD, RD, RS(RTS), CS(CS(TS), ER(DTR), DR(DSR), CD(DCD), CI(RI), EXIN(external trigger input)) along with the transmission/reception data)</td>
</tr>
<tr>
<td></td>
<td>RS-232C</td>
<td>Logic ON (red), logic OFF (green), no connection NC (light off)</td>
</tr>
<tr>
<td></td>
<td>Other interface</td>
<td>Logic ON (red), logic OFF or no connection NC (light off)</td>
</tr>
<tr>
<td><strong>Interval timer</strong></td>
<td>Interval timer</td>
<td>2kinds; Max. count: 999999 (Resolution: 1ms, 10ms, 100ms)</td>
</tr>
<tr>
<td><strong>General-purpose counter</strong></td>
<td>General-purpose counter</td>
<td>2kinds; Max. count: 999999</td>
</tr>
<tr>
<td><strong>Data counter</strong></td>
<td>Data counter</td>
<td>For SD and RD (1 each): Max. count: 4294967295</td>
</tr>
<tr>
<td><strong>Trigger function</strong></td>
<td>Simultaneous detection condition</td>
<td>Up to 4 pairs of trigger condition and actuator can be specified. Sequential actions, which validate another condition after one condition is satisfied, is also possible.</td>
</tr>
<tr>
<td></td>
<td>Trigger condition</td>
<td>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 mask bit available), idle time more than the specified duration, match time/counter value, logic status of interface signal line and external trigger input</td>
</tr>
<tr>
<td></td>
<td>Trigger action</td>
<td>Stops measurement/halt (offset can be set), validates trigger condition, controls timer (start/stop/start), activates buzzer, saves monitor data on a memory card, sends the specified character string (during manual simulation), and sends pulse output to an external trigger terminal 0T2</td>
</tr>
<tr>
<td><strong>Data search function</strong></td>
<td>Data search function</td>
<td>Retrieves the data with specific condition from capture memory</td>
</tr>
<tr>
<td></td>
<td>Search condition</td>
<td>Communication error (Parity, MP, framing, BCC, break, abort, short frame), communication data string up to 8 characters (don't care and mask bit available), idle time more than the specified duration, specified timestamp, and trigger matching data</td>
</tr>
<tr>
<td><strong>Monitor conditions auto setting</strong></td>
<td>Monitor conditions auto setting</td>
<td>Measurement conditions such as protocol, transmission speed, (max. 115.2Kbps), data code, synchronous character and BCC check can be set</td>
</tr>
<tr>
<td><strong>Auto run/start function</strong></td>
<td>Auto run/start function</td>
<td>Enables measurement to start and end at the specified time at the selected repeating cycle (monthly, daily, hourly)</td>
</tr>
<tr>
<td><strong>Power ON auto run function</strong></td>
<td>Power ON auto run function</td>
<td>Enables measurement to start automatically after power is turned ON</td>
</tr>
<tr>
<td><strong>Auto save function</strong></td>
<td>Auto save function</td>
<td>Automatically saves the monitored data in the capture memory and saves as communications log file in the CF card</td>
</tr>
<tr>
<td><strong>File size</strong></td>
<td>File size</td>
<td>BUF (capture memory size), 1MB, 2MB, 4MB, 8MB, 16MB</td>
</tr>
<tr>
<td><strong>Max. files</strong></td>
<td>Max. files</td>
<td>1024</td>
</tr>
</tbody>
</table>
**Model**

<table>
<thead>
<tr>
<th>LE-3500</th>
<th>LE-2500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay time function</td>
<td>Measures and displays the internal change in the interface signal line. (current/min/max/average, resolution: 0.1ms)</td>
</tr>
<tr>
<td>Signal voltage measuring function</td>
<td>Measures and displays the voltage of transmission voltage: SD, RD, ER (DTR), and CD (DCD) over RS-232C (current/min/max, range ±15V, resolution 0.1V).</td>
</tr>
<tr>
<td>Statistical analysis function</td>
<td>Takes statistics and displays graphs of transmission/reception data count, number of frames, and satisfied trigger condition count.</td>
</tr>
<tr>
<td>Logic analyzer function</td>
<td>*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 synchronization with clock edge.</td>
</tr>
<tr>
<td>Other functions</td>
<td>Transmission/reception data, idle time, time stamp, and line status search.</td>
</tr>
<tr>
<td>Specification</td>
<td>Time measurement by cursor, signal line exchange, signal status search.</td>
</tr>
<tr>
<td>Communication mode</td>
<td>At DTE or DCE mode (selectable), line quality measurement test such as error rates can be done by loop back test or interactive test.</td>
</tr>
<tr>
<td>BERT (bit error rate test)</td>
<td>Test pattern: 2^11, 2^11 - 1, 2^11 - 1, MARK, SPACE, AL, DBL-AL, 3in24, 1in16, 1in8, 1in4.</td>
</tr>
<tr>
<td>Test pattern</td>
<td>Error bit insertion: Inserts 1-bit or 5-bit error in test pattern by key operation.</td>
</tr>
<tr>
<td>Measurement range</td>
<td>It is able to measure the parameter of the ITU-T recommendation G.821. It is able to output the external trigger by detecting the error bit. Effective received bit (0 to 9999999), bit error rate (0 to 0.999 to 1), block error (0 to 99999999), block error rate (0 to 0.999 to 1), bits (clock error) (0 to 99999999), error deviation (0 to 999999999), %FES (normal operation rate: 0 to 100.000%)</td>
</tr>
<tr>
<td>Specification</td>
<td>Enables transmission/reception test of any given data in DTE or DCE mode (selectable).</td>
</tr>
<tr>
<td>Transmission data entry</td>
<td>Can be registered in 16 types of transmission data tables (Total of 16K).</td>
</tr>
<tr>
<td>Error data entry</td>
<td>A part of transmission data can be registered as error data such as parity error.</td>
</tr>
<tr>
<td>Line control mode</td>
<td>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.</td>
</tr>
<tr>
<td>Transmission driver control</td>
<td>Auto control turning ON driving voltage during data transmission or manual mode timing with ER (DTR) or CD (DCD) key operation can be selected during simulation of RS-485.</td>
</tr>
<tr>
<td>PROGRAM mode</td>
<td>(Program simulation)</td>
</tr>
<tr>
<td>File management function</td>
<td>Measurement data and condition can be saved in the CF card. And the format of the data/condition can be used in the PC.</td>
</tr>
<tr>
<td>File types</td>
<td>Measurement data (DT), all measurement conditions (SU), trigger data (TG SAV-END), and auto data (DATA_SAVET), (Max. type: 4, Max steps: 512)</td>
</tr>
<tr>
<td>File operations</td>
<td>Normal file display, file display by specified type/created date basis, save, load, delete, delete all, and format.</td>
</tr>
<tr>
<td>Max. capacity</td>
<td>16 GB</td>
</tr>
<tr>
<td>Printout function</td>
<td>8 GB</td>
</tr>
<tr>
<td>Printout function</td>
<td>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.</td>
</tr>
<tr>
<td>LCD</td>
<td>Monochrome 240 x 64 dots with backlight</td>
</tr>
<tr>
<td>AUX(RS-232C) port</td>
<td>Monochrome 240 x 64 dots with backlight</td>
</tr>
<tr>
<td>USB2.0 port</td>
<td>Min. (DTE pin connector) 9600bps to 230Kbps are supported.</td>
</tr>
<tr>
<td>External power supply</td>
<td>Provided AC adapter Input: 100 to 240 VAC at 50/60Hz</td>
</tr>
<tr>
<td>Standard battery</td>
<td>Nickel hydrogen battery (Model: P-195). Battery operating time: 8 hours, Battery charging time: 2 hours</td>
</tr>
<tr>
<td>Temperature range</td>
<td>In operation: 0 to 40 degrees, In storage: -10 to 50 degrees</td>
</tr>
<tr>
<td>Humidity range</td>
<td>85% (RH) max.</td>
</tr>
<tr>
<td>Standard</td>
<td>CE (Class A), EMC (EN61326-1:2006)</td>
</tr>
<tr>
<td>Dimensions</td>
<td>210 (W) x 154 (D) x 38 (H) mm</td>
</tr>
<tr>
<td>Mass</td>
<td>About 790g</td>
</tr>
<tr>
<td>Accessories</td>
<td>About 760g</td>
</tr>
</tbody>
</table>

**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 (LE-28V) ........................................... 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

*1: An optional monitor cable (LE-25MM) and terminal block (LE-25T5/LE-50TB) are required in the case of monitoring over RS-232C with a 1-d Sub-9 pin connector or RS-422A/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 sync 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 LINEVIE. *8: The provided AC adapter (3A-183WP09 with a positive center pin) or the conventional AC adapter (FA5B2-180-A with a negative center pin) can be used. *9: When LCD backlight is OFF.

An easy-to-transport carrying bag is provided.
Monitor cable for DSUB 25-pin
LE-25M1
Branch cable for monitoring communication lines over general DSUB 25-pin.

Monitor cable for DSUB 9-pin
LE-259M1
Branch cable for measuring RS-232C over DSUB 9-pin of PC, etc.

Terminal block for DSUB 25-pin
LE-25TB
Converts analyzer's RS-485/422 port (DSUB 25-pin specification) to terminal block specification.

X.21 Monitor cable
LE-25Y15
Branch cable for measuring X.20/21 over DSUB 15-pin. (Shield type)

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

Memory card
CF-16GX
16G byte CF card, the operation of which has been confirmed on LINEEYE’s Analyzers. Applicable model: LE-8200(A), LE-3500

Battery pack
BP-4005-E
Same as NiMH battery built-in BP-4005-E

AC Adapter
3A-183WP09
Input: AC100–240V, 50/60Hz
Output: DC9V, 1A

Carrying bag
LEB-01
Bag with pockets for storing and carrying accessories such as AC adapter, cables, etc.

Compact Thermal Printer
DPU-414-41B-E

Handy thermal printer for on-site printout of measurements
- Handy size which fits in a normal males pocket and is a handy tool.
- High-speed printing at 52.5 characters per second.
- Supports Centronics parallel and RS-232C ports.
- Dimensions: 160(W)x 170(D)x 67(H)mm
- Weight: Approx. 650g (including built-in NiMH battery)

AC Adapter
Wide input AC adapter
Input: AC100–240V, 50/60Hz
Output: DC9V, 1A
Plug: center @
*Same as the AC adapter packed with analyzer.

Battery pack
NiMH battery pack for replacement
P-19S
Rating: 4.8V, 1900mAH
*An auxiliary and replacement battery equivalent to the analyzer built-in battery.

Safety Warning
Read the instruction manual provided with the product before use and use the product as explained in that manual. Using the product in ways not explained in the manual, connecting it to systems outside of the specified ranges and remodelling can all cause trouble and damage. LINEEYE CO. LTD. will assume no responsibility whatsoever for trouble or damage arising because of unauthorized ways of use.

Sister Product
SE-3200A
240 (W) x190 (D) x48 (H) mm/about 1.1kg

MULTI PROTOCOL ANALYZER
LE-8200A/LE-8200

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

- Measurement at Low to Mega Speed up to 4Mbps.
- 32MB data memory.
- Supports multiple protocols including Ethernet, CAN, LIN, USB, FlexRay, and more.

Options
AC adapter for DPU-414
PW-C072S-W1-U
Input: AC100V–240V
Output: DC9V, 500mA
Roll paper
TP-411L
Thermal roll paper for DPU-414, 10 rolls per carton.

- Aux cable for DPU-414
LE-2-8P
Auxiliary port of analyzer and serial port of DPU-414

- External cable
LE-4TG
Probe cable for inputting outputing external signal.
*Same as the cable packed with analyzer.

- Cables / Terminal blocks / Converter

- Memory card

- AC Adapter

- Battery pack

LINEEYE CO., LTD.

HEAD OFFICE/Sales Office
Marutoku Bidg 4F, 3F-1 Karahashi, Minami-ku, Kyoto, 601-8468

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