Battery-powered portable communication analyzer with Wi-Fi* for remote measurement.

**Multi Protocol Analyzer**

LE-3500R

LE-2500R

- RS-232C
- RS-422/485
- TTL/UART/I²C/SPI
- CAN/LIN
- CC-Link
- Current Loop
- RS-530/X.20/X.21/V.35

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*Wi-Fi function is available only in Japan, USA, and Canada.*
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-3500R and LE-2500R which support remote measurement by Wi-Fi in the IoT era. The LE-3500R and LE-2500R 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-3500R / LE-2500R**

A perfect model incorporating statistical analysis and program simulation functions.

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

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

**COMPACT PROTOCOL ANALYZER LE-1500**

An entry model dedicated to Async/PPP which has a sufficient measurement function with moderate price.

**MULTI PROTOCOL ANALYZER LE-3500R**

Multi Protocol (Async, Sync, BSC, SDLC, HDLC, X25, PPP, PC, CAN, LIN ····)

**MULTI PROTOCOL ANALYZER LE-8200A**

The highest model featuring splendid performance with a large-sized color display and versatile functions.

**SPECIFICATIONS**

- **Max speed**: 4Mbps
- **128GB CF card support**
- **USB Flash Drive**
- **LE-8200A**

- **Max speed**: 4Mbps
- **32GB CF card support**
- **USB Flash Drive**
- **LE-8200A**

- **Max speed**: 4Mbps
- **64GB CF card support**
- **USB Flash Drive**
- **LE-8200A**

- **Max speed**: 4Mbps
- **128GB CF card support**
- **USB Flash Drive**
- **LE-8200A**

- **Max speed**: 4Mbps
- **256GB CF card support**
- **USB Flash Drive**
- **LE-8200A**

- **Max speed**: 4Mbps
- **512GB CF card support**
- **USB Flash Drive**
- **LE-8200A**

- **Max speed**: 4Mbps
- **1024GB CF card support**
- **USB Flash Drive**
- **LE-8200A**

**LE-1500**

Async, PPP

**LE-2500R**

Multi Protocol (Async, Sync, BSC, SDLC, HDLC, X25, PPP, PC, CAN, LIN ····)
Measures UART/I2C/SPI without using optional board.

It has a measurement port for TTL (1.8V – 5V) as its standard port. Measurement tests for sensor, LAN and wireless modules of PC, SPI, and UART interface, for AD conversion IC, or for memory IC are available without changing the measurement board.

**Supports RS-232C of DSUB 9 pin**

A monitor cable for DSUB25 pin, a monitor cable for DSUB9 pin, and a changer for DSUB25 pin to DSUB9 pin are attached. You can connect devices of DSUB25 pin or DSUB9 pin without any optional cables.

**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 into the 64MB memory 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 into a SD card or a USB flash. 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.

**Detachable terminal for RS-422/485**

RS-422/485 cable can be connected with the analyzer directly. As it is detachable, you do not need to unscrew the cables, when disconnecting the analyzer from the monitoring line.

**Remote Control by Wi-Fi**

You can analyze the log data or convert the data into text file on your PC by connecting the PC in which the PC link software is installed with protocol analyzer(s) by USB or Wi-Fi. You can also capture the screen image of analyzer in the Android smart phone display to send it by email by connecting the smart phone with the analyzer by Wi-Fi.

*1 The light edition of the PC link software for Windows PC “LE-PC300R” is attached. The application for Android smart phone “LE-REMOTE4” can be downloaded from Google Play. Wi-Fi function is available only in USA, Canada, and Japan.

**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. You can measure the voltage level of RS-232C or TTL signals by the signal voltage measurement function.

**Expands measurement targets**

Measurement targets can be expanded by optional measurement boards or connection cables.
A monitor function to visualize communications data.

**Supports multi-protocols**
The online monitor function 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. The feature allows you to support effective analysis by omitting SYN codes and using SDLC/HDLC address filter.

**Records Time Data with Communication Data**
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.

**Trigger Feature for Catching User-specified Events**
The trigger feature allows you to specify a communications event as the trigger condition and has 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 output the external trigger to inform other equipments. The trigger feature allows you to specify a communications event as the trigger condition and has 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.

**Signal voltage measurement feature for RS-232C and TTL**
You can measure the voltage (current value, maximum, minimum) of 4 signal lines of RS-232C or TTL measurement port. You can also measure delay time of control line change (such as the change from RTS to CTS).

**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 force interrupt are comparable to dedicated equipment.

**Evaluation 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 communication lines.

[Contents of BERT measurement]
- BERT Available measurement in seconds 0~999999
- Bit: Effective bits received 0~9999999~9.99E9
- Blk: Block error count 0~9999999~9.99E9
- B-Blk: Block error rate 0~9999999~9.99E9
- B-E: Error in seconds 0~9999
- E-Bit: Effective bits received 0~9.99E9
- E-Blk: Block error count 0~9.99E9
- E-Blk: Block error rate 0~9.99E9
- NBF, S: Normal operation rate 0.000~100.000%

**Example BERT measurement**
MULTI PROTOCOL ANALYZER
LE-3500R / LE-2500R

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

Must-have measurement tool for on-site test or communication trouble analysis.

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 “0” to “F” keys (10 groups, 16 types for each). 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 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.

■ 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.

■ 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 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.

■ 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 example]

<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 L</td>
<td>Jumps to specified label No.</td>
</tr>
<tr>
<td>CALL L</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>
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.

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

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.

<table>
<thead>
<tr>
<th>Search key</th>
<th>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</th>
</tr>
</thead>
<tbody>
<tr>
<td>Search operations</td>
<td>Find and display, counting</td>
</tr>
</tbody>
</table>

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.

PC-compatible File Management Specification
Test conditions and results such as measured data can be saved on optional SD cards or USB flash 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-2500R, and analyzed or manipulated in greater detail using the LE-3500R back in the office.

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

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

Various Print Formats
Measured log data can be printed out in text format by the printer with indicated printing range or can be saved into a SD card or USB flash by the auto save function. The log file saved in a SD card or USB flash can be collectively* converted into a text file or a CSV file by connecting the media with a PC and capture data into the PC using the PC link software.

*The attached software (light edition, not the product version) can convert up to 3 files at the same time.

You can select the output destination of the print data (text data).

According to the environment, you can select the modes for Wi-Fi connection.

You can set the password and radio channel for the AP mode in which the analyzer turns to be an access point.

You can set the SSID and the password to connect the analyzer via an access point such as Wi-Fi router.

Continuous printing of logic analyzer waveform and the result of statistics analysis is available.

Dedicated printer DPU-414-PA

You can control the analyzer remotely from an Android smart phone and capture the monitoring display to email it by the smart phone.

* The LE-8200(A)/3500R/2500R/3500/2500/1500 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.

** The LE-8200(A)/3500R/2500R/3500/2500/1500 are compatible in measurement data file.
LE-PC300R Enhances the Link between Analyzers and your PC

Enables simultaneous control of multiple analyzers from a PC

The software supports the connection by USB, serial, and Ethernet connection by optional converter of Ethernet and serial. For LE-3500R/2500R, it also supports connection by Wi-Fi. It supports connection with multiple analyzers, displays and converts the measured data in the external memory such as SD card.

PC Link Software

LE-PC300R

- Cannot be used with OP-SB7GX
- The light edition of LE-PC300R is attached to LE-3500R/LE-2500R

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

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 HDD or SSD.

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. Measurement time is limited to 10 minutes for the light edition of LE-PC300R.

<table>
<thead>
<tr>
<th>Target line speed</th>
<th>When 1 GB is specified</th>
<th>When 16 GB is specified</th>
</tr>
</thead>
<tbody>
<tr>
<td>9600 bps</td>
<td>Approx. 60 hrs</td>
<td>Approx. 960 hrs</td>
</tr>
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<td>19200 bps</td>
<td>Approx. 30 hrs</td>
<td>Approx. 480 hrs</td>
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<tr>
<td>38400 bps</td>
<td>Approx. 15 hrs</td>
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* When 1 GB is specified:
  * Approx. 30 hrs
  * Approx. 60 hrs
  * Approx. 15 hrs

Target line speed varies according to that of OS. This facilitates introduction of the software to development bases outside Japan.

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-PC300R Specifications

Analyzer connection: USB, Wi-Fi, Serial, and Ethernet (optional unit SI-60/SI-60F is needed.)
Key emulation function: Present the analyzer’s status on the PC screen to enable control in a manner as if operating the analyzer.
Remote monitor function: Remote monitor and displays the measured data on PC screen, and records data continuously.
Display modes: Raw data
Display the communications data accompanied by time interval, time stamp and line status.
Search function: Finds and displays the data that matches the search key.
Test CSV conversion function: Specified number of recorded files can be converted to CSV format all at once

PC Link Software for CAN/LIN

For OP-SB7GX

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

- USB, Serial, Ethernet, and Wi-Fi to the PC
- Key emulation function for remote control
- Recode CAN/LIN data into the PC at maximum 16GB
- Display the specific ID frame in real time
- Data and timestamp search, test/CSV conversion
- Set the analyzer condition from the software
- Read the measured file in the SD card or USB flash
- OS: OS: Windows® 7/8/10

*Version 2.00 or more of LE-PC10X, OP-SB7GX, LE-3500R/25050R, and the Wi-Fi connection environment are needed.

LE-PC300R Target line speed

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*1: A Wi-Fi router of IEEE802.11 b/g/n is available.
*2: A Wi-Fi router of IEEE802.11 b/g/n is supported by LE-PC300R.
*3: SD card is needed for PC.

Remote monitor function:

- USB, Wi-Fi, Serial, and Ethernet (optional unit SI-60/SI-60F is needed.)
- Present the analyzer’s status on the PC screen to enable control in a manner as if operating the analyzer.
- Remote monitor and displays the measured data on PC screen, and records data continuously.
- Display the communications data accompanied by time interval, time stamp and line status.
- Finds and displays the data that matches the search key.
- Specified number of recorded files can be converted to CSV format all at once.

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- Display the specific ID frame in real time
- Data and timestamp search, test/CSV conversion
- Set the analyzer condition from the software
- Read the measured file in the SD card or USB flash
- OS: OS: Windows® 7/8/10

*Version 2.00 or more of LE-PC10X, OP-SB7GX, LE-3500R/25050R, and the Wi-Fi connection environment are needed.
TTL/I2C/SPI Communications Expansion Kit OP-SB5GL

OP-SB5GL is an expansion kit for communication of RS-232C(V.24) and TTL/CMOS signal level (1.8V - 5.0V). The measurement pod processes the signal, and the pod is connected with the analyzer by the relay cable. Thus it has 1 meter or more reach for a probe unit to the target than the TTL measurement port of LE-3500R/LE-2500R. Also it supports send/receive clock of USART communication which is not supported by TTL measurement port of LE-3500R/LE-2500R.

RS-530 Expansion Board OP-SB10N

OP-SB10N is an expansion board to equip LE-3500R / LE-2500R with a RS-530 port (Synchronous balanced communication such as X.21, RS-449, V.35). The RS-422/485 interface of LE-3500R/LE-2500R is a RS-530 port (Synchronous balanced communication such as X.21, RS-232C, Current loop communications (4-pole terminal block)).

Current Loop Communication Expansion Kit OP-SB1C

OP-SB1C is an expansion kit for current loop communications which is presently used in the FA field and resistant to external noise. You can monitor the communication of current loop up to 60mA. You can also output communication data of current loop with passive and active field and resistant to external noise. You can monitor the communication of current loop up to 60mA. You can also output communication data of current loop with passive and active.
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/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 third target value, which 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 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.

**High-speed HDLC/SPI Communications Firmware OP-FW10R**

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-3500R / LE-2500R Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>LE-3500R</th>
<th>LE-2500R</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interface</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RS-232C (V. 24)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RS-422/485(1)</td>
<td></td>
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<tr>
<td>TTL/PC/SPI</td>
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<tr>
<td>Expansion measurement interface.</td>
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<tr>
<td>X. 20/21</td>
<td></td>
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<tr>
<td>RS-449</td>
<td></td>
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<tr>
<td>V. 35</td>
<td></td>
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<tr>
<td>TTLUSART</td>
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<tr>
<td>Current loop</td>
<td></td>
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<tr>
<td>CAN/LIN</td>
<td></td>
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<tr>
<td>Expansion firmware</td>
<td></td>
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<tr>
<td>High-speed HDLC/CC-Link</td>
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<tr>
<td>Standard Protocol</td>
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<tr>
<td>ASYNC (Asynchronous), ASYNC-PPP</td>
<td></td>
<td></td>
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<tr>
<td>Character synchronous SYNCR/NC</td>
<td></td>
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<tr>
<td>Bit synchronous HDLC/SDLC/X.25</td>
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<td>BURST(2)</td>
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<tr>
<td>Modbus</td>
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<tr>
<td>CC-Link</td>
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<tr>
<td>CAN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DeviceNet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synchronous clock</td>
<td>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)</td>
<td></td>
</tr>
<tr>
<td>Capture memory</td>
<td>Memory capacity(1/3)</td>
<td>64 MB</td>
</tr>
<tr>
<td>Added function with memory used</td>
<td>Two divided areas, data protection, and selection between fixed-size buffer and ring buffer. Auto save when finishing measurement.</td>
<td></td>
</tr>
<tr>
<td>Baud rate</td>
<td>Max. speed (full-duplex)</td>
<td>2.048Mbps</td>
</tr>
<tr>
<td>Max. speed (half-duplex)</td>
<td>1.000Mbps</td>
<td></td>
</tr>
<tr>
<td>Speed setting range</td>
<td>50bps &amp; 2.048Mbps</td>
<td></td>
</tr>
<tr>
<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>
<td></td>
</tr>
<tr>
<td>Data format</td>
<td>NRZ, NRZI, FDM, FMI</td>
<td></td>
</tr>
<tr>
<td>Data code</td>
<td>ASCII, EBCDIC, JIS7, JIS8, Baudot, Transcode, IPARS, EBCD, EBCDII, HEX</td>
<td></td>
</tr>
<tr>
<td>Character Framing</td>
<td>Asynchronous Data bit (5, 6, 7, 8) + parity bit (0, 1) + stop bit (1, 2)</td>
<td></td>
</tr>
<tr>
<td>Character synchronous</td>
<td>Data bit + parity bit (6 or 8 bits in total)</td>
<td></td>
</tr>
<tr>
<td>Bit-oriented synchronous</td>
<td>Data bit (8 bits)</td>
<td></td>
</tr>
<tr>
<td>Parity bit</td>
<td>NONE, ODD, EVEN, MARK, SPACE</td>
<td></td>
</tr>
<tr>
<td>Multi-processor bit</td>
<td>MP (multiprocessor) bit is shown with a special mark.</td>
<td></td>
</tr>
<tr>
<td>Bit transmission order</td>
<td>LSB first or MSB first (swichable)</td>
<td></td>
</tr>
<tr>
<td>Polarity inversion</td>
<td>Normal or Inverted (switchable)</td>
<td></td>
</tr>
<tr>
<td>Error check</td>
<td>Parity (ODD, EVEN, MARK, SPACE), Framing, Break, BCC (LRC, CRC-6, CRC-12, CRC-18, FCS-16, CRC-ITU-T, FCS-32), BCC permutation mode.</td>
<td></td>
</tr>
<tr>
<td>Specification</td>
<td>Abort, short frame</td>
<td></td>
</tr>
<tr>
<td>Time display</td>
<td>Communication log is recorded continuously and displayed in the LCD without affecting the communication lines.</td>
<td></td>
</tr>
<tr>
<td>Idle time display</td>
<td>OFF (no recording); Resolution: 100ms, 10ms, 1ms, Max 999.9 sec</td>
<td></td>
</tr>
<tr>
<td>Time stamp display</td>
<td>Data time stamp: Unit selectable among &quot;Day/Hr/Min.&quot; , &quot;Hr/Min/Sec.&quot; , &quot;Min/Sec/10ms.&quot; or OFF (no recording)</td>
<td></td>
</tr>
<tr>
<td>Record and display</td>
<td>Records and displays the waveform of 4 signals (chosen from RS(RTS), CS(CTS), ER(DTR), DR(DSR), CD(DCD), C(RS), ERI(r/external trigger input) along with the transmission/reception data.</td>
<td></td>
</tr>
<tr>
<td>Address filter</td>
<td>Records only frames of the specified address: (only when HDLC/SDLC/X.25)</td>
<td></td>
</tr>
<tr>
<td>Data display and operations</td>
<td>Pause in capture, scroll, paging, jump to the specified screen</td>
<td></td>
</tr>
<tr>
<td>Bit shift display</td>
<td>Entire frame can be shifted to the right or left in 1 bit increments.</td>
<td></td>
</tr>
<tr>
<td>Protocol translation</td>
<td>SDL3 (modulus 8/128), ITU-T X.25 (modulo 8/128), LAPD, PPP, BSC, I'C</td>
<td></td>
</tr>
<tr>
<td>Line status LED</td>
<td>Target signals Two color LEDs of SD, RD, RS(RTS), CS(CTS), ER(DTR), DR(DSR), CD(DCD), C(RS), ERI(r/external trigger input)</td>
<td></td>
</tr>
<tr>
<td>RS-232C</td>
<td>Logic ON (red); logic OFF (green); no connection NC (light off)</td>
<td></td>
</tr>
<tr>
<td>Other interface</td>
<td>Logic ON (red); logic OFF (green); no connection NC (light off)</td>
<td></td>
</tr>
<tr>
<td>Interval timer</td>
<td>2kinds; Max: count: 999999 (Resolution: 1ms, 10ms, 100ms)</td>
<td></td>
</tr>
<tr>
<td>General-purpose counter</td>
<td>2kinds; Max: count: 999999</td>
<td></td>
</tr>
<tr>
<td>Data counter</td>
<td>For SD and RD (1 each): Max: count: 4294967295</td>
<td></td>
</tr>
<tr>
<td>Trigger function</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 bit mask available), idle time more than the specified duration, match time/counter value, logic status of interface signal line and external trigger input.</td>
<td></td>
</tr>
<tr>
<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 bit mask available), idle time more than the specified duration, match time/counter value, logic status of interface signal line and external trigger input.</td>
<td></td>
</tr>
<tr>
<td>Trigger action</td>
<td>Stops measurement/out (offset can be set); validates trigger condition, controls timer (start/stop/reset), starts counter (count/clear), activates buzzer, saves monitor data on a memory card, sends the specimen character string (during manual simulation), and sends pulse output to external trigger terminal OT2.</td>
<td></td>
</tr>
<tr>
<td>External trigger output</td>
<td>Sends pulse to external trigger terminal OT2 when all conditions are satisfied. Sends pulse to external trigger terminal OT2 according to the trigger output specification.</td>
<td></td>
</tr>
<tr>
<td>Data search function</td>
<td>Retrieves the data with specific condition from capture memory.</td>
<td></td>
</tr>
<tr>
<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 bit mask available), idle time more than the specified duration, specified timestamp, and trigger matching data.</td>
<td></td>
</tr>
<tr>
<td>Search action</td>
<td>Shows the match data at the top or enumeration display (selectable)</td>
<td></td>
</tr>
<tr>
<td>Monitor conditions auto setting</td>
<td>Measurement conditions such as protocol, transmission speed, max. 159.920bps, data code, synchronous character and BCC code can be set(3).</td>
<td></td>
</tr>
<tr>
<td>Auto run stop function</td>
<td>Enables measurement to start and end at the specified time at the selected repeating cycle (monthly, daily, hourly).</td>
<td></td>
</tr>
<tr>
<td>Power ON auto run function</td>
<td>Enables measurement to start automatically after power is turned ON.</td>
<td></td>
</tr>
<tr>
<td>Auto save function</td>
<td>Automatically saves the monitored data in the capture memory and saves as communications log file in a SD card or USB flash.</td>
<td></td>
</tr>
<tr>
<td>File size</td>
<td>BUF (capture memory size), 1MB, 2MB, 4MB, 8MB, 16MB, 32MB</td>
<td></td>
</tr>
<tr>
<td>Max. files</td>
<td>1024</td>
<td></td>
</tr>
</tbody>
</table>

---

(1) Not supported
(2) Not supported
(3) Values cannot be set for SD and RD.
### Order Information

#### Standard Set

- **LE-3500R/LE-2500R**
  - Comes with Japanese manual.
- **LE-3500R-E/LE-2500R-E**
  - Comes with English manual.

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<table>
<thead>
<tr>
<th>Model</th>
<th>LE-3500R</th>
<th>LE-2500R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay time function</td>
<td>Measures and displays the interval of change in the interface signal line. (current/min/max/average, resolution: 1 ms)</td>
<td></td>
</tr>
<tr>
<td>Signal voltage measuring function</td>
<td>Measures and displays the value of voltage amplitude: SD, RD, ER (DTR), and CD (DCD) over RS-232C (current/min/max, range ±15 (RS-232C), ±5.5 (TTL)).</td>
<td></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>
<td></td>
</tr>
</tbody>
</table>

#### 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 input**
  - x 8, x 4, x 2, x 1, x 1/2, x 1/4, x 1/8, x 1/16, x 1/32, x 1/64
- **Other functions**
  - Time measurement by cursor, signal line exchange, signal status search

#### BERT (bit error rate test)

- **Specification**
  - Conforming to ITU-T G.821 it measures line quality such bit error rate and block error rate.
- **Communication mode**
  - Synchronous (SYNC), Asynchronous (ASYNC) RTS/CTS flow control is available.
- **Measuring speed**
  - 50bps~2.048Mbps, freely set to 4 effective digits
- **Measurement mode**
  - Continuous measurement, specifies the number of receiving bit, specifies the time to measure, repeatedly measurement at the unit of 1:1440nos
- **Test pattern**
  - 2^−1, 2^−2, 2^−3, 1, MARK, SPACE, ALT, DBL-ALT, 3in24, 1in16, 1in4
- **Error bit insertion**
  - Inserts 1-bit or 5-bit error in test pattern by key operation.

#### Simulation function

- **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 to 9999999 to 9.99E9), block error rate (0 to 9999999 to 9.99E−9 to 1).
- **Transmission data entry**
  - Register 160 kinds of transmission data tables (10 groups x 16, total 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), Cts(CTS), ER(DTR), CD(DCD) signal automatically in 1ms increments or manual (key operation) can be selected.
- **Transmission driver control**
  - Auto control turning ON driving key during data transmission or manual mode timing 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 with the trigger function.
- **FLOW mode**
  - (Flow control test)
    - Sends the X-on /X-off control data and flow control procedures of RTS/CTS control line. (Receiver and sender 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)
    - Sends the data assigned to operation keys each time a key is pressed, while checking communications status on the display. Can be used with the trigger function.
- **BUFFER mode**
  - (Buffer transmission test)
    - Reproduces transmission of selected data (SD or RD) captured in memory by monitor function.
- **PROGRAM mode**
  - (Program simulation)
    - Creates a simulation program (Max. 4, Max. steps: 512) using the dedicated commands (37 types) to test the communication procedure.

#### File management function

- **File type**
  - Measurement data (.DT), all measurement conditions (.SU), trigger save data (TG SAVEnn.DT), and auto save data (#nnnnnnn.DT)
  - Send-save data (.SG), all measurement conditions (.SC), and auto save data (.SGnnnnn)
- **File operations**
  - Normal file display, file display by specified type/created date basis, save, load, delete, delete all, and format
  - Max. capacity 32 GB

#### Printout function

- **Printout**
  - Specified range of measurement data can be continuously printed in format corresponding to the display mode. Displed images can be printed to make hard copies.
- **LCD**
  - Monochrome 240 x 64 dots with backlighting
- **Remote control**
  - PC software (light edition) is attached. The library to control the analyzer is available. Application for Android smartphone “LE-REMOTE4” is available.
- **AX/RS-232C port**
  - Mini DIN8 pin connector. Communication speed: 9600bps to 230,400bps (6 steps)
  - Print out data. Can be used with PC [LE-PC300R], Can be used to upgrade the firmware.
- **USB2.0 device port**
  - B-connector in device side. Transfer data in High speed. Can be used with PC [LE-PC300R]. Can be used to upgrade the firmware.
- **USB2.0 host port**
  - A-connector on the host side for USB flash connection. It transfers data in High speed.
- **Wi-Fi connection**
  - 802.11 b/g/n for PC connection, used for LE-PC300R. STA mode (via an access point) and AP mode (directly with a PC) are selectable.
  - Provided AC adapter input: 100 to 240VAC at 50/60Hz.
- **Built-in battery**
  - Nickel hydrogen battery (Model: P-15S). Battery operating time 1/16 ~ 1/7 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 : 2013)
- **Dimensions**
  - 210 x 154 x 38 (H) mm
- **Mass**
  - About 780g

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

1: To monitor control line, expansion board “OP-SB10N” (which has RS-530 port) is needed. 2: The control signal lines of V.35 are not supported. 3: This mode is used to capture all data in synchronization with clock edges. 4: Transmission/reception data, idle time, time stamp, and line status items consume 4 bytes of memory at each call. 5: This function supports only ASYNC, SYNC/8/5, 5/3/5/3. Correct call settings are impossible if the amount of communications data is small or communications data includes a large number of errors. 6: Only ASYNC mode and SYNC mode are available. 7: Only ASYNC is available. 8: Only the SD cards purchased from LINEEYE are supported. 9: This is the light edition of optional product “LE-PC300R” (with some limitation for its functions). 10: Wi-Fi function is available only in Japan, USA, and Canada. 11: The battery operating time was measured under LINEEYE’s measurement conditions with the LCD backlight turned OFF.
Cables / Terminal blocks / Converter

- AC adapter and cable are not prepared.

**Compact thermal printer**

- Built-in battery, dedicated roll paper
- Supports Centronics parallel and RS-232C ports.
- High-speed printing at 52.5 characters per second.

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

- Built-in battery
- Supports Centronics parallel and RS-232C ports.
- Dimensions: 160(W) x 170(D) x 67(H)mm
- Weight: Approx. 890g (including built-in NiMH battery)

**Options**

- AC adapter for DPU-414
- PW-0725-W2 Input: AC100V-240V Output: DC5V 2.5A/200mA
- Roll paper TP-411L Thermal roll paper for DPU-414, 10 rolls per carton. Width:110mm. Length per roll: Approx. 38m
- Battery pack for DPU-414 BP-4005-E Samed as NiMH battery built-in DPU-414-11B-E and DPU-414-14B-E. 4.8V 1100mAh
- AUX cable for DPU-414 LE2-8P This is a cable to connect AUX (PS-332C) port of the Analyzer with the serial port of DPU-414. The length is 1.5m.

**Memory card**

- 32GB SDHC card SD-32GX
- 16GB SDHC card SD-16GX

**Battery pack**

- NMH battery pack for replacement P-19S

**Compound printer**

- LE-25M1: Branch cable for measuring RS-232C over DPU-9-pin of PC, etc.
- LE-25M15: Branch cable for measuring X.20/21 over DPU-9-pin (Shield type)
- LE-255Y15: Branch cable for measuring V.35 over M34-pin.
- LE-25M34: Branch cable for measuring V.35 over M34-pin (Shield type)
- LE-25SS30: A twisted pair cable for RS-530 (Shield type)
- LE-25Y37: Branch cable for measuring RS-449 over DPU-9-pin (Shield type)
- LE-259M1: Branch cable for measuring RS-449 over DPU-37-pin (Shield type)
- LE-259AD: Conversion adapter for DPU-9-pin to DPU-25B-pin

**AC adapter**

- Wide input AC adapter 6A-181WP09
- Battery pack

**Carrying bag**

- Carrying bag LEB-01

**Options for LE-3500 LE-2500**

- LE-5LS 5 wires TTL probe cable
- LE-009M1 DPU-9-pin monitor cable
- LE-25Y37: Branch cable for measuring RS-449 over DPU-9-pin (Shield type)
- LE-25M15: Branch cable for measuring X.20/21 over DPU-9-pin (Shield type)
- LE-25M34: Branch cable for measuring V.35 over M34-pin (Shield type)
- LE-25SS30: A twisted pair cable for RS-530 (Shield type)
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