Test&Measurement

YOKOGAWA

ScopeCorder

Complete measurements
Complete portability

DL350
ScopeCorder

Precision Making

Bulletin DL350-01EN

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GRUPO ÁLAVA

A stringent measurement condition requires a high performance and flexible solution. This is the design philosophy of the DL350 ScopeCorder. With the ability to use the same 18 types of plug-in module as other ScopeCorders, the battery portable DL350 is easier to carry and easier to use in confined spaces.

Offering channel counts up to 8 analog and 16 digital, sample rates up to 100 MS/s, Isolation up to 1 KV and resolution up to 16-bit, the range of modules enables the DL350 to be configured for a multitude of long and short term measurement applications.

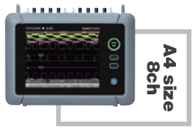
Rechargeable battery operation can be used for testing in remote areas or as a UPS when combined with mains power.

The DL350 delivers:

Portability – The light weight, battery operation and compact size makes the DL350 the all-round instrument-of-choice in the vehicle and in the field.

Functionality – The built-in memory provides long term recording and transient capture. An SD card provides long term storage. Advanced triggering ensures that the data is captured during the most critical of tests.

Operability – Use it like a recorder or an oscilloscope. The touch screen and choice of operating modes mean that the DL350 is as useful for simple maintenance tasks as it is for advanced measurement and analysis needs.



Maximum 8-CH high-speed isolated recording in a battery-operated compact chassis

- A4-sized compact chassis
- Simultaneous isolated inputs maximum 8-ch (1 MS/s) or 4-ch (100 MS/s) Scanning inputs maximum 32-ch (10 kS/s) or 16 channels (20 kS/s)
- AC/DC/Battery operated

Superior noise and vibration-proof Flexible recording in a single portable tool

- Choose from 18 types of input module, which are compatible other ScopeCorders.
- Vibration-resistant design
- Superior immunity
- Secure reliable data recording in harsh environment

High-speed and long-term recording using large memory and direct recording onto an SD card

- Up to 100 Mpoints per module memory
- Up to 50 days continuous recording onto SD card

Ease of use in the field

- Intuitive operation using 8.4-inch touch screen
- A choice of two operating modes provides greater flexibility
- “DL350 assistant software” helps to configure settings and to back-up data on-the-spot

ScopeCorder

DL350

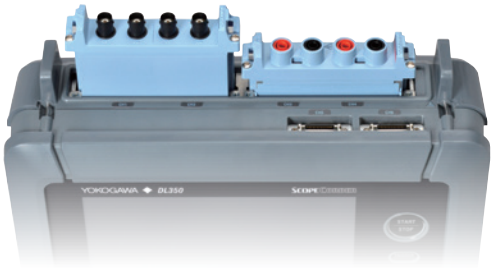
More than a test tool

The DL350 ScopeCorder combines in one compact instrument all the measurement and recording capabilities you need when you are away from your office or lab. High-speed signals or long-term recording, ‘quick and simple’ or sophisticated operation, the DL350 provides the flexibility you need when you need it.

Complete self-contained signal conditioning

Whether it is straightforward high precision voltage measurements or a blend of signals coming from such things as current probes, temperature sensors, strain gauges, accelerometers and serial buses, the DL350 can handle them all without extra boxes or cables.

This extraordinary input capability is achieved by providing 2 slots, which can be populated with any of 18 different types of user swappable input modules. This means, for example, that user-swappable 4 isolated 16-bit voltage inputs can be measured at 1 MS/s, alongside 16 temperatures or 2 separate CAN or LIN buses each containing 30 signals. Swap a module and measure at 100 MS/s with 12-bit and 1 kV of isolation. Meanwhile there are 16 built-in logic inputs; swap in a digital input module to add even more. Make AC measurements like a DMM with an RMS module in real-time or use a math channel after the recording is finished.



Examples of complex measurements

Field	Application purpose	Measurement item		User advantages
		Slot 1	Slot 2	
EV (electric vehicle)	Evaluation of battery voltage fluctuation while driving	Battery voltage	CAN communication data	Small size, battery drive, synchronization with GPS* position and time data
Power tool	Evaluation of practical behavior	Battery voltage, motor rotation pulse	Tool vibration	Small size, battery drive, complex measurement of voltage and vibration
Field device	Maintenance of ultrasonic-type vortex flow meter	Sensor receiving wave, receiving pulse	Gate signal	Small size, 2-way power source, long-term monitoring with long memory
Factory/plant	Power quality monitoring	AC power, voltage, current	Auxiliary power source monitor	Small, portable, window trigger (instantaneous power failure, sag detection)
Steel making Paper making	Rolling process monitoring	Thickness gauge monitor	Temperature	High noise immunity, external clock (roller) synchronization

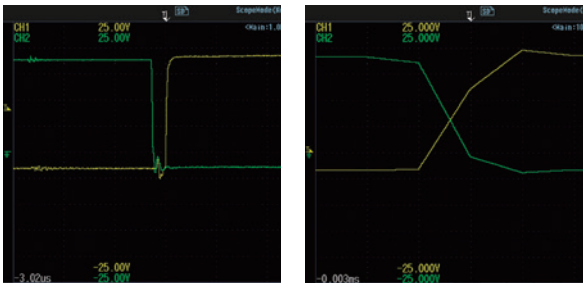
*Release pending in the EU and Korea. Contact your local sales office for further details.

Use it like a data acquisition system or a long memory oscilloscope

Up to 5 Gpoints of data per module can be recorded directly to an SD card. This means that the DL350 can be used for continuous recording for up to 50 days. For high speed signals, up to 100 M points per module of internal memory is available to capture fast transients. This is up to 10000 times more than other portable oscilloscopes or test tools and thus signals can be captured with higher sample rates or for much longer periods.

Accurate measurement of fast-switching waveforms

Unique amongst portable measuring instruments, there is a high-resolution high-speed sampling module available for the DL350. This provides individually isolated 12-bit, 100 MS/s inputs, which can precisely measure and record transient waveforms superimposed on slower signals. For example, transients occuring on inverter outputs, or the edges of control signals, which are beyond the reach of traditional handheld test tools.



Gate signal waveforms of inverter (20 kHz)
The picture on the left shows a waveforms measured with100 MS/s (by 720211 module) that is sufficiently high sample rate to accurately reconstruct the signal, which will result in more accurate measurements than the one on the right that measured with 1 MS/s

Measurement examples to built-in memory

Scope mode

Sample Rate	For 1 ch*1	For 4 ch*2	For 8 ch*3
100 MS/s	1 sec.	0.5 sec.	—
10 MS/s	10 sec.	5 sec.	—
1 MS/s	1 min. 40 sec.	50 sec.	20 sec.
100 kS/s	10 min.	5 min.	3 min. 20 sec.
10 kS/s	2 hours	1 hour	40 min.
1 kS/s	20 hours	10 hours	5 hours
100 S/s	10 days	5 days	60 hours

Recorder mode

Sampling interval	For 1 ch*1	For 4 ch*2	For 8 ch*3
1 µs	20 sec.	20 sec.	10 sec.
10 µs	3 min. 20 sec.	3 min. 20 sec.	1 min. 40 sec.
100 µs	40 min.	40 min.	10 min.
1 ms	5 hours	5 hours	2 hours
10 ms	60 hours	60 hours	20 hours
100 ms	20 days	20 days	10 days
200 ms	20 days	20 days	20 days

Measurement examples to SD memory card

Scope mode

Sample Rate	For 1 ch*1	For 4 ch*2	For 8 ch*3
1 MS/s	60 min.	—	—
100 kS/s	10 hours	5 hours	2 hours
10 kS/s	120 hours	50 hours	20 hours
1 kS/s	50 days	20 days	10 days
100 S/s	50 days	50 days	50 days
10 S/s	50 days	50 days	50 days
5 S/s	50 days	50 days	50 days

Recorder mode

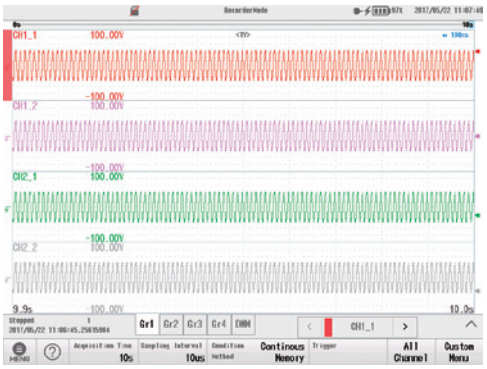
Sampling interval	For 1 ch*1	For 4 ch*2	For 8 ch*3
1 µs	10 min.	—	—
10 µs	2 hours	2 hours	1 hour
100 µs	20 hours	20 hours	10 hours
1 ms	10 days	10 days	5 days
10 ms	50 days	50 days	50 days
100 ms	50 days	50 days	50 days
200 ms	50 days	50 days	50 days

*1: When using one modul of 720211 *2: When using two moduls of 720211 *3: When using two moduls of 720254

Comprehensive testing made easy

Full recording flexibility

For users who are more familiar with chart recorders than with long memory oscilloscopes, the DL350 offers a choice of operating modes. Recorder mode is suitable for long-term continuous recording for a specific duration and where the sampling interval is specified. A setup wizard can be used in this mode to quickly guide the operator through the entire setup process.

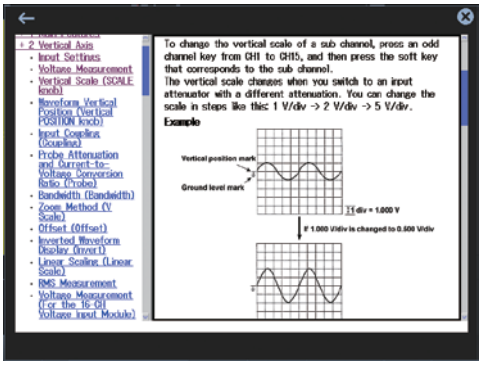


Scope mode enables the DL350 to be used just like an oscilloscope with all the associated benefits, like comprehensive triggering and flexible memory use. Using the history memory enables up to 1000 separate triggered acquisitions to be captured to the internal memory and viewed afterwards. Thus the causes and effects of abnormalities can be carefully analyzed as easily as paging through a photo album.

Intuitive operation

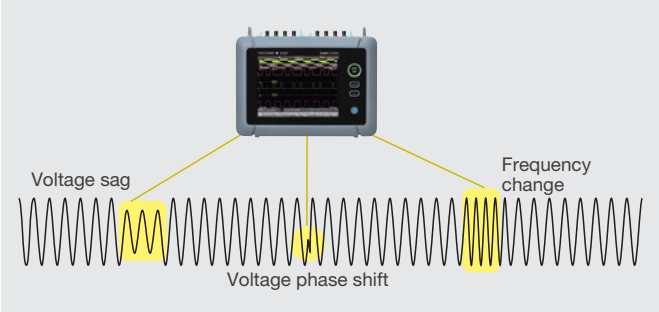
An 8.4 inch resistive touch screen has been adopted in order to deliver superior noise free performance. In environments with the highest levels of electrical noise such as motors and inverters, measurement precision is maintained whilst enabling the unit to be operated by using (gloved) fingers or stylus.

Even when the backlight is switched off and the touch screen is inactive the user still has access to the START/STOP, manual trigger and data saving keys. For users unfamiliar with state-of-the-art measuring instruments, there is also help at hand via the built-in digital manual.



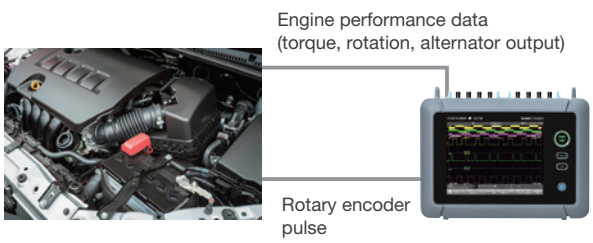
A wealth of triggers for fault finding

The user has a choice of a simple level trigger or can use enhanced triggers such things as pulse width, waveform period and across multiple channels. For example, the wave window trigger is ideal for AC power line monitoring which enables voltage sags, surges, spikes, phase shifts or drop outs to be easily captured (available for 40 to 1000 Hz waveforms).
Leave a DL350 unattended and automatically save the waveform to a file, or send a notification email, if and when it triggers.



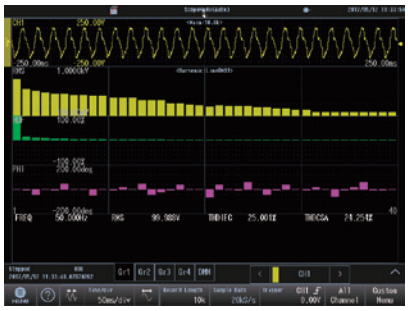
External sampling clock and triggers

The DL350 is first and foremost a field tool however it still provides the functionality you expect in a bench instrument. The sampling clock, trigger and start/stop controls are all available as external signals, thus, for example, a rotary angle encoder or degree wheel can be used as the sample clock to analyze engine rotation and performance.

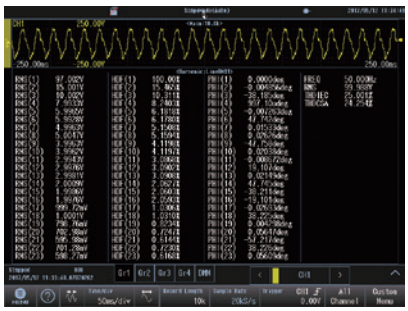


Verify power line quality using harmonic, power or FFT analysis

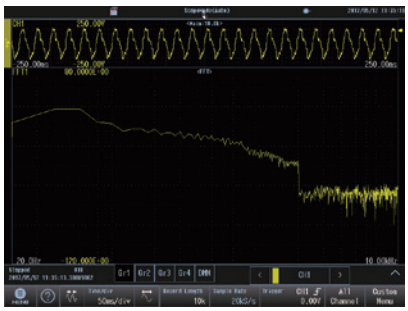
The power in single and 3 phase systems can be evaluated. Additionally for fundamental waveforms of 50 or 60 Hz, up to 40 harmonic orders can be analyzed. Alternatively use the suite of FFT functions to perform full frequency analysis.



Harmonics analysis (bar graph)



Harmonics analysis (listed)

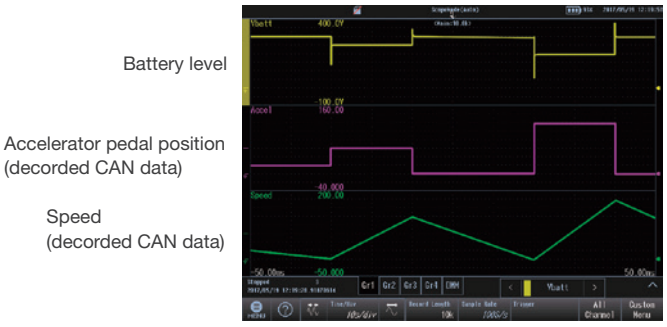


FFT analysis

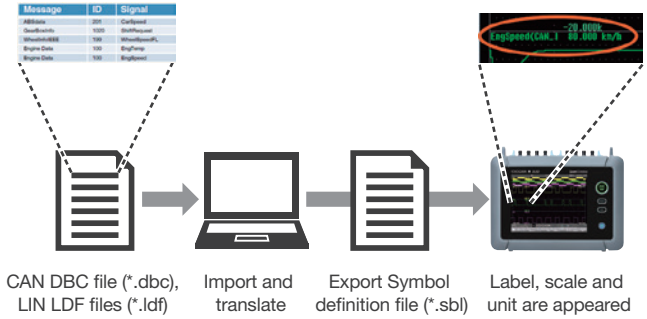
Advanced features to support in-vehicle testing

CAN bus, LIN bus and SENT monitoring

Use the DL350 with /VE option and bus monitor module to decode CAN bus, LIN bus or SENT signals and display information such as engine temperature, vehicle speed and brake pedal position as trend waveforms and compare this with the analog data coming from the actual sensors. This enables automotive engineers to gain an insight into the dynamic behavior of the complete electromechanical system.



The symbol editor is a software tool that makes it possible to define which physical values from the CAN or LIN bus data frame will be trended as waveform data on the display of the DL350. The Symbol Editor can accept vehicle installed definition files (CAN DBC, LIN LDF)



Position and global timing using GPS

An optional GPS unit* enables latitude, longitude, altitude, speed and motion direction data to be synchronized with the waveform data, perfect for drive testing, mobile testing, or distributed field recordings.

*Release pending in the EU and Korea. Contact your local sales office for further details.

Merge all data on third-party mapping software

Mains, DC or rechargeable battery power

The built-in rechargeable battery provides 3 hours of continuous operation for mobile measurements or can serve as a backup power supply if the main DC power is disconnected. This makes the DL350 a highly reliable ScopeCorder for tests which are difficult or expensive to repeat.

Operates in freezing temperatures

Even when used with the rechargeable battery, the DL350 will operate in temperatures from 0 to 45 degrees. The DL350 brings high-quality laboratory measurements into the harsh environments of the field.

Wide Temp. Operation 0 to 45˚C
(with Battery/DC power)

Vibration resistant

Instruments used for in-vehicle driving tests or field maintenance must be able to make reliable measurements. The DL350 has an aluminum inner frame and an external rubber bumper and conforms to the Japanese JIS D1601 standard for resisting in-vehicle shock and vibration.

Rubber bumper

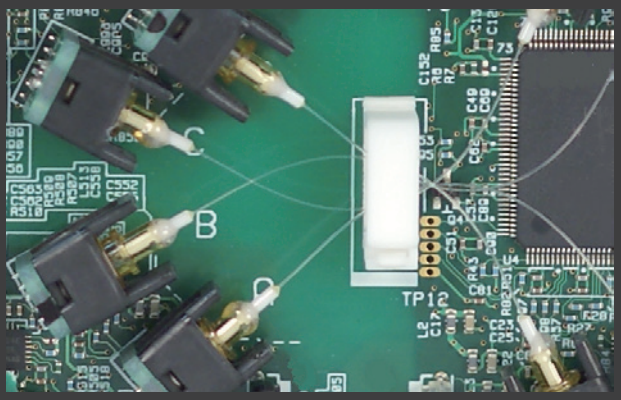
Vibration Resistant Design

Technology Story

Input modules used in the DL350 ScopeCorder are compatible with the DL850E and DL850EV ScopeCorders, and the SL1000. The DL350 inherits the technological developments of more than 30 years of commitment to the measurement needs of electromechanical systems.

isoPROTM – pioneering measurement technology

Input modules are powered by YOKOGAWA's isoPROTM technology, which offers industry-leading isolation performance at the highest speeds. isoPROTM core technology, designed with energy-saving applications in mind, delivers the performance needed to develop high-efficiency inverters that operate at high voltages, large currents and high frequency.
The use of optical fibers enables the achievement of high speed data transmission and high voltage isolation.



Higher voltage registration and better CMRR

720268 High Voltage Input Module
The new high-Voltage, high-resolution, 1 MS/s 16 bit Isolation Module (model 720268), which is also capable of direct RMS measurements, has an improved sample rate (1 MS/s) and an improved maximum input voltage (1000 Vrms).

Normally, to realize high insulation performance in a small package, it is necessary to raise the input impedance and lower the voltage of the internal circuit. However the increase in input impedance causes a reduction in the common-mode rejection ratio (CMRR) and measurement accuracy.

Thanks to the new digital isolator in this module, high voltage input signals can be acquired without an increase in size. High insulation performance is maintained without compromising the CMRR.

Flexible operation

1 START/STOP key
LED indicates the DL350 measuring status.

2 TRIGGER key
Used for triggering the DL350 manually

3 SAVE key
A pre-programmable button that saves data to SD card or network storage

4 Power switch

5 8.4-inch touch screen

6 Input module slots (2 slots)

7 Logic input terminals

8 GPS* input terminal

9 EXT I/O
Multifunctional port used for external start/stop input, trigger I/O, external clock input and other functions

10 SD memory card slot

11 USB ports for peripherals and storage devices

12 Ethernet (100BASE-TX/10BASE-T)

13 USB port (PC)

14 Battery pack (/EB option)

*Release pending in the EU and Korea. Contact your local sales office for further details.

The application solver

Using different modules and accessories, the DL350 ScopeCorder addresses the complex measurement and analysis needs of widely diverse applications in the field.

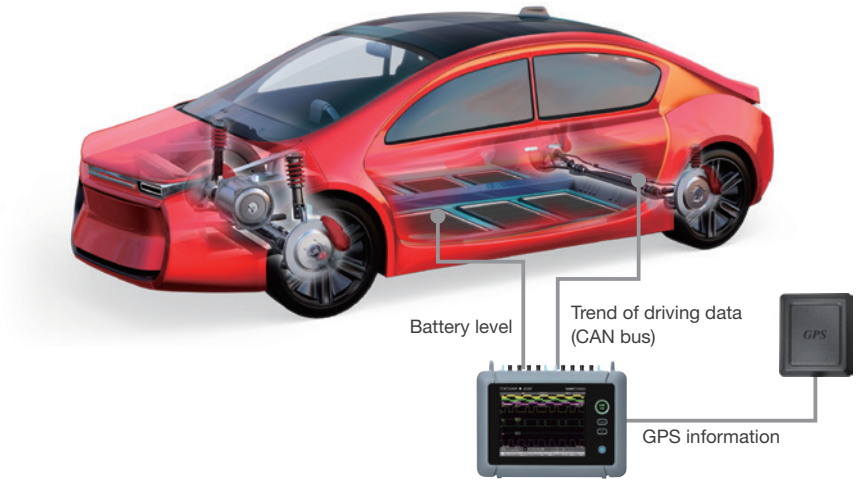
Electric vehicle inverter voltage evaluation

The voltage fluctuations of the input and output of the inverter can be measured alongside the trends of speed, acceleration and braking from the data on the CAN bus.

Up to 2.5-hours of continuous data can be directly recorded to the SD card with sample rates up to 200 kS/s.

The optional rechargeable battery pack enables the DL350 to be continuously operated without burdening the in-vehicle power supply.

The optional GPS unit* adds coordinate information to the recording data to enable the measurements to be correlated with the location of the vehicle in a drive test.



Recommended modules		Recommended accessory	
High-speed isolated module (100 MS/s)		GPS unit*	
CAN bus monitor module (/VE option requierd)			

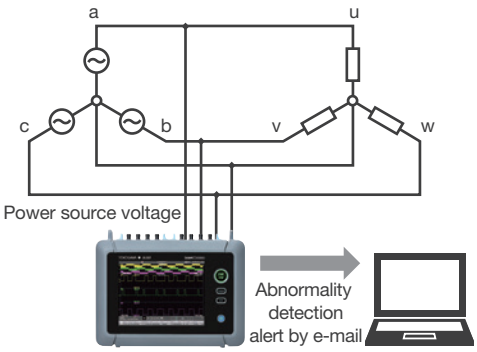
*Release pending in the EU and Korea. Contact your local sales office for further details.

Power line monitoring in plants and factories

By using a wave-window trigger, voltage sags, surges, spikes and dropouts can be detected and captured.

Multi-phase voltages up to 1 kVrms and 1.4 kV peak can be recorded using 720268 high-voltage isolation modules.

In the case of unattended operation, waveforms can be saved, or an e-mail sent, when the DL350 is triggered.



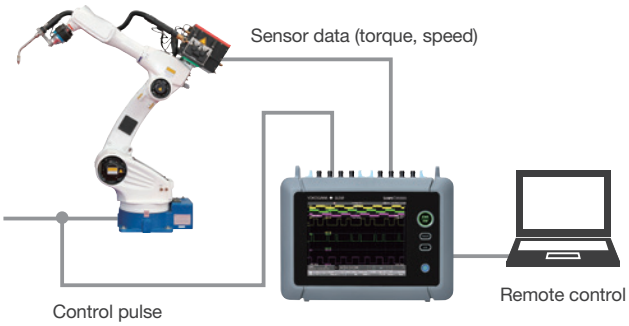
Recommended modules		Recommended functions
High-voltage isolated module (1 kVrms) 	High-voltage isolated module (1 kVrms) 	Wave-window trigger, Action-on-trigger

Industrial robot maintenance

It is possible to monitor and record the control signals to the servomotors and their speed and torque at the same time.

For condition monitoring, FFT analysis can be used on the vibration signals from accelerometers to help identify potential failures in machines or components.

Remote operation is available using the ‘assistant software’ or the input/output terminals making it potentially safer to use.



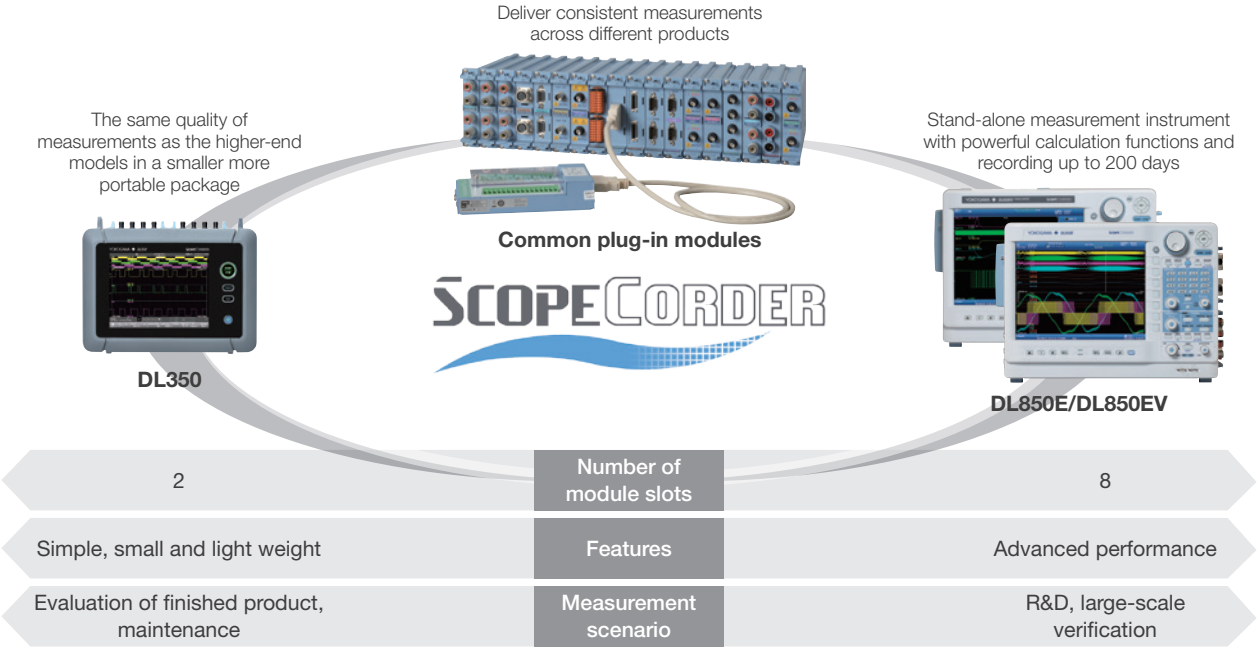
Recommended modules		Recommended functions
4-ch input isolated module 	Acceleration/Voltage module 	FFT analysis, Remote control

Consistent measurement results in R&D and maintenance

Traditionally different measuring instruments of various sizes and capabilities are used in the R&D lab and in the field. Since the accuracy, noise immunity and other characteristics are not the same, engineers struggle to correlate measurements.

The plug-in modules of the DL350 are common* to those of the DL850E and DL850EV, the higher-end ScopeCorder models. By using common* modules for product design, validation and on-site maintenance, the high quality of the measurements is consistent.

*With some exceptions



Extensive line-up: high-speed, high voltage, analog and digital

Fast Sampling

100 MS/s Input Module
720211

100 MS/s Sampling
12 bit Resolution
1 kV isolated input

High Voltage

High Voltage Input Module
720268

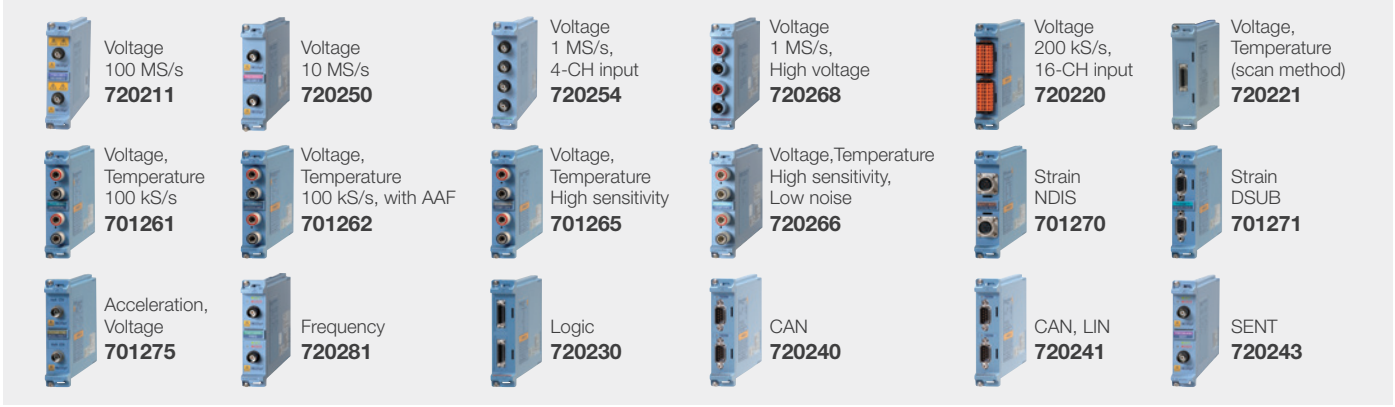
Conforms to 1000 Vrms CAT II and 600 Vrms CAT III
Great for maintenance of power distribution equipment

In-vehicle Comm.

CAN Bus Monitor Module
720240

Decode CAN bus messages and display them as trends on-screen

Input module lineup for DL350



Notes: The following modules are not available on DL350
701250, 701251, 701255, 701267, 701281, 720210, 701260, 701280

Module selection

Input	Model No.	Sample rate	Resolution	Bandwidth	Number of channels	Isolation	Maximum input voltage*10 (DC+ACpeak)	DC accuracy	Note
Analog Voltage	720211*8	100 MS/s	12-Bit	20 MHz	2	Isolated	1000 V*2, 200 V*3	±0.5%	High speed · High voltage · Isolated
	720250	10 MS/s	12-Bit	3 MHz	2	Isolated	800 V*2, 200 V*3	±0.5%	high noise immunity
	720254	1 MS/s	16-Bit	300 kHz	4	Isolated	600 V*2, 200 V*3	±0.25%	4-CH BNC input, low noise, high noise immunity
	720268	1 MS/s	16-Bit	300 kHz	2	Isolated	1000V*9 *11	±0.25%	with AAF, RMS, and high noise immunity
	720220	200 kS/s	16-Bit	5 kHz	16	Isolated (GND-terminal) non-isolated (CH-CH)	42 V*3	±0.3%	16-CH voltage measurement (Scan-type)
Analog Voltage & Temperature	720221*7	10 S/s	16-Bit	600 Hz	16	Isolated	42 V	±0.15% (Voltage)	16-CH voltage or temperature measurement (scan method) Thermocouple (K, E, J, T, L, U, N, R, S, B, W, Au-Fe-chromel)
	701261	100 kS/s (Voltage), 500 S/s (Temperature)	16-Bit (Voltage), 0.1°C (Temperature)	40 kHz (Voltage), 100 Hz (Temperature)	2	Isolated	42 V	±0.25% (Voltage)	thermocouple (K, E, J, T, L, U, N, R, S, B, W, iron-doped gold/chromel)
	701262	100 kS/s (Voltage), 500 S/s (Temperature)	16-Bit (Voltage), 0.1°C (Temperature)	40 kHz (Voltage), 100 Hz (Temperature)	2	Isolated	42 V	±0.25% (Voltage)	thermocouple (K, E, J, T, L, U, N, R, S, B, W, iron-doped gold/chromel), with AAF
	701265	500 S/s (Voltage), 500 S/s (Temperature)	16-Bit (Voltage), 0.1°C (Temperature)	100 Hz	2	Isolated	42 V	±0.08 (Voltage)	thermocouple (K, E, J, T, L, U, N, R, S, B, W, iron-doped gold/chromel), high sensitivity range (0.1 mV/div), and low noise (±4 μVtyp.)
	720266	125 S/s (Voltage), 125 S/s (Temperature)	16-Bit (Voltage), 0.1°C (Temperature)	15 Hz	2	Isolated	42 V	±0.08 (Voltage)	thermocouple (K, E, J, T, L, U, N, R, S, B, W, iron-doped gold/chromel), high sensitivity range (0.1 mV/div), and low noise (±4 μVtyp.)
Strain	701270	100 kS/s	16-Bit	20 kHz	2	Isolated	10 V	±0.5% (Strain)	Supports strain NDIS, 2, 5, 10 V built-in bridge power supply
	701271	100 kS/s	16-Bit	20 kHz	2	Isolated	10 V	±0.5% (Strain)	Supports strain DSUB, 2, 5, 10 V built-in bridge power supply, and shunt CAL
Analog Voltage, Acceleration	701275	100 kS/s	16-Bit	40 kHz	2	Isolated	42 V	±0.25% (Voltage) ±0.5% (Acceleration)	built-in anti-aliasing filter, Supports built-in amp type acceleration sensors (4 mA/22 V)
Frequency	720281	1 MS/s	16-Bit	resolution 625 ps	2	Isolated	420 V*2, 42 V*3	±0.1% (Frequency)	Measurement frequency of 0.01 Hz to 500 kHz, Measured parameters (frequency, rpm, period, duty, power supply frequency, distance, speed)
Logic	720230	10 MS/s	—	—	8-bit × 2 ports	non-isolated	depend on logic probe used.	—	(8-bit/port) × 2, compatible with four-type of logic probe (sold separately)
CAN	720240	100 kS/s	—	—	60 signals × 2 port	Isolated	10 V	—	CAN Data of maximum 32-bit allowable It is available for DL850EV and DL350 /VE option. In the DL850EV, maximum two (2) modules can be installed in a main unit.*5 *6
CAN, LIN	720241	100 kS/s	—	—	60 signals × 2 port	Isolated	10 V (CAN port) 18 V (LIN port)	—	CAN port × 1, LIN port × 1 Available for DL850EV and DL350 /VE option. In the DL850EV, maximum two (2) modules can be installed in a main unit.*5 *6
SENT	720243	100 kS/s	—	—	11 data × 2 ports	Isolated	42 V	—	Supported protocol: SAE J2716. Available for DL850EV and DL350 /VE option. In the DL850EV, maximum four (4) modules can be installed in a main unit.*5 *6

*1: Probes are not included with any modules. *2: In combination with 700929, 702902 or 701947 probe. *3: Direct input *4: In combination with 10:1 probe model 701940
*5: Any other modules can be installed in the remaining slots. *6: In the DL850EV, up to four CAN Bus Monitor Modules (720240), CAN & LIN Bus Monitor Modules (720241) or SENT Monitor Module (720243) in total can be used on a single main unit. In the DL850EV, for the CAN Bus Monitor Modules (720240) and CAN & LIN Bus Monitor Modules (720241), up to two in total can be used on a single main unit.
*7: The 16-CH Scanner Box (701953) is required for measurement. *8: Class 1 Laser Product, IEC60825-1:2007 *9: In combination with 758933 and 701954 or 701904 and 701954.
*10: See bulletin DL850E-01EN for voltage-axis sensitivity setting and measurement range. *11: 1000 Vrms (1000 VDC or 1414 Vpeak maximum) However, when using with DL850E/EV and SL1000, 850V (DC + AC peak)

Accessories and software

PC data and setup file management

DL350 Assistant software —Free Software—

Data files or setup configuration files stored in the DL350 SD card can be backed up with the press of a button.
Remote setting, start-stop control and setup file editing can also be easily done on the connected PC.

Remote waveform monitoring and instrument control

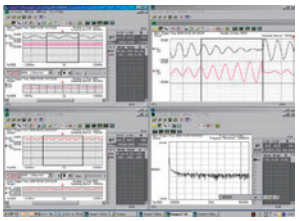
Xwirepuller —Free Software—

Remote control and waveform display monitoring of a DL350 via USB or Ethernet.

Display and analysis of recorded waveforms

Xviewer LITE —Free Software—

Load waveforms captured by the DL350 and display, zoom, and export the data to the popular CSV format.



Xviewer —Advanced Software—

In addition to the features of Xviewer LITE, parameter measurement, statistical analysis, FFT and filtering on downloaded DL350 Data can be performed.

Free Xviewer trial

Get the free 30 day trial version of Xviewer at tmi.yokogawa.com.

Software Control http://tmi.yokogawa.com/ea/products/oscilloscopes/oscilloscopes-application-software/

	Free Software		Advanced Software (Trial version available)
Off-line waveform display and analysis	**XviewerLITE—Basic check—** Zoom, V-cursor, conversion to CSV format	**DIAdem, LabVIEW DataPlugin**[*1] [*2]	**Xviewer—Advanced Analysis—** Advanced and useful functions are supported. Good for precise, off-line waveform analysis. • Waveform observation and analysis • Cursor, Parameteric Measure • Statistical Analysis • Multiple file display • Advanced waveform operations • Comment, marking, printing and making report • Optional Math computation feature • Remote monitor • Instruments communication function • Transferring waveform & image files
Waveform monitoring on a PC	**XWirepuller** Remote monitor and operation Transferring image files.		
Data transfer to a PC	**DL350** Assistant Software		
Command control Custom software development	**Control library "TMCTL"** For Visual Studio **LabVIEW instrument driver**[*2]		**MATLAB Tool Kit**[*2] Remote control from MATLAB and data file importing.

*1: The DataPlugin software can be downloaded from the National Instruments (NI) web site.
*2: Coming soon. Refer to our web site.


AC adapter
720921


DC power cable
720922


Battery Pack:
739883
Battery Pack Cover:
720923


10:1 Probe
702902


100:1 Probe
701947


Safety BNC cable
1 m: **701902**
2 m: **701903**


1:1 Safety BNC adapter lead
701901


1:1 Safety Adapter Lead For 720268
701904


Alligator clip adaptor set
758929


Clamp-on probe
AC 50 A: **720930**
AC 200 A: **720931**


Scanner box
701953


Logic probe
(TTL level/contact input)
1 m: **702911**
3 m: **702912**


Bridge head (NDIS)
120 Ω: **701955**
350 Ω: **701956**


Bridge head (DSUB)
120 Ω: **701957**
350 Ω: **701958**


Carrying case
93050

GPS unit*
B8093YA

*Release pending in the EU and Korea. Contact your local sales office for further details.

Specifications (Main unit)

*For the plug-in modules specifications, see the "Bulletin DL850E-01EN".

Main Specifications (Main Unit)	
Type	Plug-in input unit
Number of slots	2
Maximum number of input channels	8 channels (when a 4-CH module is installed in the both slots) + the unit standard logic is 16 bit 32 channels (when a 16-CH module is installed in the both slots) + the unit standard logic is 16 bit 240 channels (when the 720240 or 720241 module is installed in the both slots) + the unit standard logic is 16 bit
Memory capacity	Total 200 Mpoint (100 Mpoint per module)

Recorder Mode Function			
Waveform acquisition and display			
Recording conditions	Recording for a specified time		Records data from start for a specified time.
	Continuous recording		Records data until stopped.
	Start at trigger		Records data from a trigger for a specified time.
	Finish with trigger		Records data for a specified time until a trigger.
Acquisition mode	Normal	Normal waveform acquisition	
	Envelope	The peak values are held at the maximum sample rate regardless of the time axis setting.	
Recording time	10 seconds to 50 days		
Sampling interval	1 µs to 200 ms (1-2-5 system)		
Action when recording is finished	Saves display image data, saves waveform data, sounds a notification buzzer and transfers an e-mail.		
Real-time SD card recording			
Binary format	Sampling interval		Depends on the number of channels being used. Minimum: 10 µs (when 10 channels are used) *1
	Maximum number of recording points		1 Gpoint (There are limits based on a module being used.)
	Operation overview		Stores data in the binary format when acquisition occurs.
ASCII format	Recording interval		1, 2, 5, 10, 15, 20, 30 sec, 1, 2, 5, 10, 15, 20, 30, 60 min.
	Capacity		2 GByte
	Operation overview		Stores data in the text format at specified intervals
Event recording	Able to record up to 100 events through the event input terminal.		
Display time length	1 ms to 10 s (1-2-5 steps), 20 s, 30 s, 40 s, 50 s, 60 s, 100 s, 200 s, 300 s 10 to 60 min (10-min steps), 100 min 2 hours, 5 hours, 10 to 60 hours (10-hour steps), 80 hours, 100 hours 5 days, 10 days, 20 days, 30 days*2, 40 days*2, 50days*2		
Zoom	1 window		
Display format	1, 2, 3, 4, 5, 6, 8, 12, 16 TY display windows		
Maximum number of displayed traces	32 (standard logic: 16 bit, including Math)		
X-Y display	The X and Y axes can be selected from analog input waveforms and MATH waveforms (up to 2 traces and 1 window).		

Vertical Axis		
Vertical axis setting	It can be set in the measurement range.	
Channel on/off	CHn, CHn_m and MATHn can be turned on and off separately.	
Vertical axis zooming	You set the scale using upper and lower limits.	
Linear scaling	It can be set to AX + B or P1-P2. (only for voltage, stress, and frequency).	
Triggering Section		
Selectable trigger level range	0 ± measurement range	
Trigger hysteresis	When measuring voltage: Select form ±1%/±5%/±10% of the range. When measuring temperature: Select form ±0.5°C, ±1.0°C, and ±2.0°C. When measuring strain: Select form ±2.5%/±12.5%/25% of the range. When measuring acceleration: Select form ±1%/±5%/±10% of the range. When measuring frequency: Select form ±0.1%/±5%/±10% of the range. CAN/LIN/SENT: Select form ±0.1%/±5%/±10% of the span width.	
Manual trigger	Dedicated key operation	
Trigger source	CHn, CHn_m (select an input channel and specify bit for logic), external trigger Time	
Trigger type	Edge	Rising, falling, or rising or falling. (Rising or falling is unavailable for logic.)
	Time	Date (year, month, and day), time (hour, minute and second)
	OR	The DL350 triggers on the OR of multiple trigger source edges (including a Windows trigger).
	AND	The DL350 triggers on the AND of multiple state conditions (including a Windows trigger).

Analysis			
Cursors	T-Y waveform Horizontal, Vertical, H&V, Marker and Degree X-Y waveform Horizontal, Vertical, H&V and Marker FFT waveform Marker and Peak		
Automated measurement of waveform parameters			
Parameters	Analog waveform and Math		PP, Amp, Max, Min, High, Low, Avg, Mid, Rms, Sdev, +Over, –Over Rise, Fall, Freq, Period, +Width, –Width, Duty, Pulse, Burst1, Burst2, Avg.Freq, Avg.Period, Int1TY, Int2TY, Int1XY, Int2XY, Delay 1 cycle mode
	Logic waveform		Freq, Period, Pulse, Duty, Avg.Freq, Delay
Statistical processing	Statistical items: Max, Min, Avg, Sdv, and Cnt Maximum number of cycles: 10000 Maximum measurement range: 100 Mpoint		
Cyclic statistical processing	The DL350 automatically measures the waveform parameters of the data and performs statistical processing on the parameters once per period.		
Waveform computation	Operators: +, –, ×, ÷, binary computation, frequency, period, moving average (10 points) and RMS Computation length: up to 2 Mpoint (when 1 waveform is used).		
FFT	Type: LS, RS, PS, PSD Time windows: Hanning, Hamming, FlatTop, and Rectangle		

Harmonic analysis		
Maximum number of simultaneous analysis		Line: 8 channels, power: 1 system
Fundamental wave		50 Hz, 60 Hz or auto setting
FFT points		2048
Analysis order		Fundermental wave to 40th
Window width		10 periods (for 50 Hz), 12 periods (for 60 Hz) or 8 periods (auto)
Types of harmonic analysis		Harmonic RMS value, percentage of content, phase angle, distortion factor (IEC or CSA) and total RMS value
Power analysis		It can be selected from 1P2W (single-phase, two-wire), 1P3W (single-phase, three-wire) or 3P3W (three-phase, three-wire)
Analysis result display		Displays one item selected from 8 line channels and 1 power system Display form: List or bar graph
Analysis result recording		All analysis results can be stored in a media. Data format: CSV

*1 Sometimes 10 µs or more can be stored depending on the capacity of the SD card.
*2 Only during real-time recording

Scope Mode Function

Waveform Acquisition and Display

Acquisition mode	Normal	Normal waveform acquisition
	Envelope	The peak values are held at the maximum sample rate regardless of time axis setting.
	Averaging	The number of times to average: 2 to 65536 in 2^n steps or Infinite (attenuation constant 2 to 256 in 2^n step).
Record length		10 k, 25 k, 50 k, 100 k, 250 k, 500 k, 1 M, 2.5 M, 5 M, 10 M, 25 M, 50 M, 100 M
Selectable time scale range		1 µs/div to 1 s/div (in 1-2-5 steps), 2 s/div, 3 s/div, 4 s/div, 5 s/div, 6 s/div, 8 s/div, 10 s/div, 20 s/div, 30 s/div 1 min/div to 6 min/div (in 1 min steps), 8 min/div, 10 min/div, 12 min/div, 30 min/div 1 h/div to 6 h/div (in 1 h steps), 8 h/div, 10 h/div, 12 h/div 1 day/div to 5 days/div (in 1 day steps)
Action when recording is finished		Saves display image data, saves waveform data, sounds a notification buzzer and transfers an e-mail.
Real-time SD card recording (binary format)		Sampling interval Depends on the number of channels being used. Maximum: 100 kS/s (when 10 channels are used)*1
		Maximum number of recording points 5 Gpoint (There are limits based on a module being used.)
		Operation overview Stores data in the binary format when acquisition occurs.
Event recording		Able to record up to 100 events through the event input terminal.
Zoom		2 windows
Display format		1, 2, 3, 4, 5, 6, 8, 12, 16 TY display windows
Maximum number of displayed traces		32 (standard logic: 16 bit, including Math)
X-Y display		The X and Y axes can be selected from analog input waveforms and MATH waveforms (up to 2 traces and 1 window).
History feature		Up to 1000 histories
Accumulation		Waveform overlay (The number of times is limitless.)

Vertical and Horizontal Control

Vertical axis setting	Scale/div
Channel on/off	CHn, CHn_m and Mathn can be turned on and off separately.
Vertical axis zooming	×0.1 to ×100 (varies depending on the module) You set the scale using upper and lower limits or switch between different scales.
Vertical position setting	Waveforms can be moved in the range of ±5 div.
Linear scaling	It can be set to AX + B or P1-P2 (only for voltage, stress, and frequency).
Roll mode display	Roll mode is enabled when the trigger mode is set to Auto, Single, or On Start, and the time axis setting is greater than or equal to 100 ms/div.

Triggering Section

Trigger mode		Auto, Normal (repeat), Single (one-off), or On Start
Selectable trigger level range		0 ±10 div
Trigger hysteresis		When measuring voltage: Select from ±0.1 div, ±0.5 div and ±1 div. When measuring temperature: Select from ±0.5℃, ±1.0℃ and ±2.0℃. When measuring strain: Select from ±2.5%, ±12.5% and 25%. When measuring acceleration: Select from ±0.1 div, ±0.5 div and ±1 div. When measuring frequency: Select from ±0.01 div, ±0.5 div and ±1 div. CAN/LIN/SENT: Select from ±0.01 div, ±0.5 div and ±1 div of the span width.
Selectable trigger position range		0 to 100% (of the display record length: resolution: 0.1%)
Selectable trigger delay range		0 to 10 s (resolution: 10 ns)
Manual trigger		Dedicated key operation
Simple trigger	Trigger source	CHn and CHn_m (select an input channel and specify bit for logic), EXT, or Time
	Trigger slope	Rising, falling, or rising or falling. (Rising or falling is unavailable for logic.)
	Time trigger	Date (year, month, and day), time (hour, minute and second), and time interval (10 seconds to 24 hours)
Enhanced trigger	Trigger source	CHn, CHn_m (select an input channel and specify bit for logic), EXT
	Trigger type	OR / AND / Wave Window / Edge On A / Period / Pulse Width

Analysis

Cursors		T-Y waveform Horizontal, Vertical, H&V, Marker and Degree X-Y waveform Horizontal, Vertical, H&V and Marker FFT waveform Marker and Peak
Automated measurement of waveform parameters		
Parameters		Analog waveform and Math PP, Amp, Max, Min, High, Low, Avg, Mid, Rms, Sdev, +Over, –Over Rise, Fall, Freq, Period, +Width, –Width, Duty, Pulse, Burst1, Burst2, Avg.Freq, Avg.Period, Int1TY, Int2TY, Int1XY, Int2XY, Delay, 1 cycle mode
		Logic waveform Freq, Period, Pulse, Duty, Avg.Freq, Delay
Statistical processing		Statistical items: Max, Min, Avg, Sdv, and Cnt Maximum number of cycles: 10000 Maximum measurement range: There is no restriction on the data in the memory. For SD recording waveforms, up to 100 Mpoint.
Continuous statistical processing		Statistical processing is performed while waveforms are acquired.
History statistical processing		The DL350 automatically measures the waveform parameters of each history waveform and performs statistical processing on the parameters.
Cyclic statistical processing		The DL350 automatically measures the waveform parameters of the data and performs statistical processing on the parameters once per period.
Waveform computation		
Operators: +, –, ×, ÷, binary computation, shift, frequency, period, moving average (10 points) and RMS		
Computation length: Up to 2 Mpoint (when 1 waveform is used).		
FFT		
Type: LS, RS, PS, PSD		
Time windows: Hanning, Hamming, FlatTop, and Rectangle		
Average: Time axis and frequency axis		
GO/NO-GO determination: Specified actions are performed on acquired waveforms.		
Zone determination		Determination zone: Up to 6, the number of target waveforms: up to 8, AND or OR determination.
Parameter determination		Determines by the combination of parameters (waveform parameters or harmonic analysis results) up to 8.
Action at the time of determination		Saves display image data, saves waveform data, sounds a notification buzzer and transfers an e-mail.
Harmonic analysis		
Maximum number of simultaneous analysis		Line: 8 channels, power: 1 system
Fundamental wave		50 Hz, 60 Hz or auto setting
FFT points		2048
Analysis order		Fundamental wave to 40th
Window width		10 periods (for 50 Hz), 12 periods (for 60 Hz) or 8 periods (auto)
Types of harmonic analysis		Harmonic RMS value, percentage of content, phase angle, distortion factor (IEC or CSA) and total RMS value
Power analysis		It can be selected from 1P2W (single-phase, two-wire), 1P3W (single-phase, three-wire) or 3P3W (three-phase, three-wire)
Analysis result display		Displays one item selected from 8 line channels and 1 power system Display form: List or bar graph
Analysis result recording		All analysis results can be stored in a media. Data format: CSV

*1 Sometimes only 100 kS/s or less can be stored depending on the capacity of the SD card.

Time Axis

Time accuracy	±0.001%
External clock input	Clock input is available through the external-clock input terminal.

Display

Display	8.4-inch color TFT LCD (resistive touch panel) Display resolution: 800 (horizontal) × 600 (vertical)
Display format	T-Y (up to 16 divisions with zoom feature), X-Y, FFT and harmonic analysis
Defective pixels	Within 10 ppm over the total number of pixels including RGB

Main Unit Standard Logic Input

Input format	Non-isolated (common to main unit GND) Dedicated probes required (automatic detection)
Compatible probes	700986, 700987, 702911, 702912
Maximum sample rate	10 MS/s
Number of inputs	8 bit × 2
Chatter suppression	Off, 5 ms, 10 ms, 20 ms, 50 ms, 100 ms

Data Storage

Data Storage

Type of storage data	Measurement data, analysis results, setting values, display images
Storage format of measurement data	Binary format (.WDF), MATLAB format (.MAT) and text format (.CSV) Maximum file size (MAT and CSV formats): 2 GByte
Storage destination	SD card, USB storage and network drive

Display Image Storage

Storage format of image data	PNG, JPEG, BMP, monochrome or color
Storage destination	SD card, USB storage and network drive

Storage

SD Memory Card

Number of slots	1
Maximum capacity	32 GB
Supported cards	SD and SDHC compliant memory cards

USB Storage		
Compatible USB storage devices	Mass storage devices that are compliant with USB Mass Storage Class Ver. 1.1	
Available space	Up to 2 TB Partition style: MBR, format: FAT16 and FAT32	

USB Ports for Peripherals	
Connector type	USB type A (receptacle)
Electrical and mechanical specifications	USB Rev. 2.0 compliant
Supported transfer mode	HS (High Speed: 480 Mbps), FS (Full Speed: 12 Mbps), LS (Low Speed: 1.5 Mbps)
Compatible devices	Mass storage devices that are compliant with USB Mass Storage Class Ver. 1.1 104 or 109 keyboards that are compliant with USB HID Class Ver. 1.1 Mouse devices that are compliant with USB HID Class Ver. 1.1 HP ink-jet printers or BrotherPocketJET printers that are compliant with USB Printer Class Ver. 1.0
Number of ports	2
Power supply	5 V, 500 mA (total of the 2 ports)
External Printer Output	
Compatible models	Mobile printer PocketJET 300 dpi of Brother Industries, Ltd. Ink-jet printer (single-function product) of Hewlett-Packard Company*1
Output format	Screen hard copy, Detailed waveform print*2

*1: Refer to their catalogs or home page *2: Available only with the Brother's printer

Auxiliary I/O Section		
External Clock Input Terminal		
Connector type	Screwless terminal block	
Maximum voltage to the ground	Non-isolated (common to main unit GND)	
Input level	TTL (0 to 5 V)	
Maximum frequency	1 MHz	
Minimum pulse width	300 ns	
Detected edge	Rising	
Trigger Input Terminal		
Connector type	Screwless terminal block	
Maximum voltage to the ground	Non-isolated (common to main unit GND)	
Input level	TTL (0 to 5 V)	
Minimum pulse width	1 µs	
Detected edge	Rising or falling	
Trigger delay time	Within 1 µs + 1 sample period	
Trigger Output Terminal		
Connector type	Screwless terminal block	
Maximum voltage to the ground	Non-isolated (common to main unit GND)	
Output level	5 V CMOS	
Output formats		
Normal format	Logic	Low when a trigger occurs and high after acquisition is completed.
	Output delay	Within 1 µs + 1 sample period
	Output hold time	1 µs
Pulse format	Logic	Transmits a pulse when a trigger occurs
	Output delay	Within 1 µs + 1 sample period
	Pulse width	1 ms, 50 ms, 100 ms, 500 ms
Sample pulse format	Logic	Transmits pulses at a given frequency during waveform acquisition
	Frequency range	5 Hz to 200 kHz (1-2-5 steps)
Start/Stop	Logic	High level output during waveform acquisition
GO/NO-GO Determination I/O		
Connector type	Screwless terminal block	
Maximum voltage to the ground	Non-isolated (common to main unit GND)	
Output level	5 V CMOS	
External Start/Stop Input		
Connector type	Screwless terminal block	
Maximum voltage to the ground	Non-isolated (common to main unit GND)	
Input level	TTL (0 to 5 V) or contact	
Event Input		
Connector type	Screwless terminal block	
Maximum voltage to the ground	Non-isolated (common to main unit GND)	
Input level	TTL (0 to 5 V) or contact	
COMP Output (Probe-compensation-signal output terminal)		
Output signal frequency	1 kHz ±1%	
Output amplitude	1 Vp-p ±10%	
GPS Interface		
Input connector	Mini DIN 9-pin	
Compatible GPS unit	B8093YA optional accessories (sold separately)	

Computer Interface	
USB-PC Connection	
Connector type	USB type B (mini)
Electrical and mechanical specifications	USB Rev. 2.0 compliant
Supported transfer mode	HS (High Speed: 480 Mbps) and FS (Full Speed: 12 Mbps)
Supported protocols	USBTMC-USB488 (USB Test and Measurement Class Ver. 1.0)*1 Mass Storage Class Ver. 1.1 (target: SD card)
PC system requirements	Windows 7, 8.1, 10

Ethernet	
Connector type	RJ-45 modular jack
Ports	1
Electrical and mechanical specifications	IEEE802.3
Transmission system	Ethernet (100BASE-TX, 10BASE-T)
Communication protocol	TCP/IP
Supported services	DHCP, DNS, SNTP client, SMTP client, FTP client, VXI-11, and Web server

*1: A separate driver is required.

General Specifications	
Standard operating conditions	Ambient Temperature: 23 ±5°C Ambient humidity: 20 to 80% RH After the DL350 has been warmed up for 30 minutes and then calibration has been performed
Recommended calibration period	1 year
Warm-up time	At least 30 minutes
Operating environment	Temperature: 0 to 45°C (While an AC adapter is working: 0 to 40°C, while a battery is being charged: 0 to 35°C) Humidity: 20 to 85% RH (no condensation) Altitude: 2000 m or less
Storage environment	Temperature: –20 to 60°C Humidity: 20 to 85% RH (no condensation)
Power supply	The DL350 operates on the AC adapter (720921), DC power input (720922) or the battery pack (739883).*1 *2
AC adapter (720921)	
Rated supply voltage	100 to 240 VAC
Permitted supply voltage range	90 to 264 VAC
Rated supply frequency	50 or 60 Hz
Permitted supply voltage frequency range	47 to 63 Hz
Maximum power consumption	120 VA
Withstand voltage	3 kV (between the main unit and AC adapter power line)
Insulation resistance	10 MΩ (between the main unit and AC adapter power line)
DC power input (720922)	
Rated supply voltage	10 to 30 VDC (at the DL350 connector end)
Maximum power consumption	45 W
Withstand voltage (when the power is turned off or charging is stopped)	0.6 Wtyp
DC power cable	Cigarette lighter plug Type, length: 2.5 m
Battery pack (739883)	
Type	Lithium-ion
Operation time	Approx. 3 hours
Charge time	Approx. 6 hours (When the DL350 is turned off.)
Installation position	Vertical orientation installation, horizontal orientation installation or inclined installation
External dimensions	Approx. 305 mm (W) × 217 mm (H) × 92 mm (D) (not including the protrusions)
Weight	Approx. 3.9 kg (when the DL350 equipped with the battery and 2 pieces of 720254.)
Instrument cooling method	Forced air cooling (exhaust)
Battery backup	The settings and clock are backed up with an internal lithium battery. Life: Approx. 5 years (at an ambient temperature of 23°C)
Safety standard	Compliant standards EN61010-1, EN61010-2-030, EN61010-031, EN60825-1 Pollution degree 2 Measurement Category: See the specifications of each module.
Emissions	Compliant standards EN61326-1 Class A, EN61326-2-1, EN55011: Class A, Group 1 EMC Regulatory Arrangement in Australia and New Zealand EN55011 Class A, Group 1 Korea Electromagnetic Conformity Standard
Immunity	Compliant standards EN61326-1 Table 2 (for use in industrial locations), EN61326-2-1
Environmental standard	Compliant standards EN50581 Monitoring and control instruments including industrial monitoring and control instruments.
Standard of resistance against vibration	JIS D 1601:1995 5.2 5.3 (1) Type 1: Type A compliant

*1: Operation of the battery pack requires the battery pack cover (720923).
*2: AC adapter or DC input has priority if those input and battery are available

GPS unit (B8093YA) Specifications	
Receiver type	GPS/GLONASS/QZSS/SBAS (MSAS/WAAS/EGNOS/GAGAN)
Function	GPS data acquisition (latitude, longitude, altitude, speed, moving direction and GPS information), DL350 time synchronization
Measurement accuracy *1	Horizontal position: 15 m or less (GPS information/SA=OFF/PDOP≤3) Speed: 1 m/s (GPS information/SA=OFF/PDOP≤3)
Following performance	Altitude: –500 to +18000 m Speed: 1800 km/h or less Acceleration: 2 G or less
Measurement resolution	Latitude and longitude: 1 µ° Altitude: 0.1 m, 1 m Speed: 0.01 km/h, 0.1 km/h Direction: 0.01°

*1: The specification values may not be attained depending on the measurement location, environment and measurement time.

Model and suffix code

Model	Suffix Code	Description
DL350		DL350 ScopeCorder*1 *2
Languages	-HE	English menu
	-HC	Chinese menu
	-HK	Korean menu
	-HG	German menu
	-HF	French menu
	-HL	Italian menu
	-HS	Spanish menu
	-HR	Russian menu
Options	/VE	Vehicle Edition
	/EB	Battery pack + Battery pack cover*2

*1: The main unit requires plug-in module (s).
*2: AC adapter(720921) is not included in DL350. It is required for charging battery.
Standard accessories: Hand strap, Slot cover panel (2), User's manual

AC adapter, DC power cable and Battery Pack (Not included in DL350. Please order separately.)

Model	Suffix code	Description
720921		60 W AC Adapter
Power cord	-M	PSE compliant
	-D	UL/CSA Standard
	-F	VDE/Korean Standard
	-Q	BS/Singapore Standard
	-H	GB Standard
	-T	BSMI Certification
	-N	NBR Standard
	-Y	No Power Cord
720922		DC power cable (Cigarette lighter plug Type)
739883		Battery Pack*1 *2 *3
720923		Battery Pack Cover*3

*1: AC adapter (720921) is required for charging battery.
*2: Operation of the battery pack (739883) requires the battery pack cover (720923)
*3: Included in the /EB option.

Plug-in module model numbers

Model	Description
720211	High-speed 100 MS/s 12-Bit Isolation Module (2 ch)
720250	High-speed 10 MS/s 12-Bit Isolation Module (2 ch)
720254	4-CH 1 MS/s 16-Bit Isolation Module
720268	High-Voltage 1 MS/s 16-Bit Isolation Module (with AAF, RMS)
720220	Voltage Input Module (16 ch)
701261	Universal Module (2 ch)
701262	Universal Module (with Anti-Aliasing Filter, 2 ch)
701265	Temperature/High-Precision Voltage Module (2 ch)
720266	Temperature/High-Precision Voltage Isolation Module (Low noise)
720221	16-CH Temperature/Voltage Input Module
701953-L1	16-CH Scanner Box (provided with 1 m cable)
701953-L3	16-CH Scanner Box (provided with 3 m cable)
701270	Strain Module (NDIS, 2 ch)
701271	Strain Module (DSUB, Shunt-CAL, 2 ch)
701275	Acceleration/Voltage Module (with Anti-Aliasing Filter, 2 ch)
720281	Frequency Module (2 ch)
720230	Logic Input Module (16 ch)
720240	CAN Bus Monitor Module
720241	CAN & LIN Bus Monitor Module
720243	SENT Monitor Module

*Probes are not included with any modules.
*The /VE option is required when using the 720240, 720241 or 720243 module.
*The use of a 720221 module always requires the External Scanner Box (model 701953).

Xviewer model numbers and suffix codes

Model	Suffix Codes	Description
701992	-SP01	Xviewer Standard Edition (1 license)
	-GP01	Xviewer Math Edition (1 license)

*Some volume license packs are available. Please contact our sales representative.

Probes, cables, and converters

Model	Product	Description*1
702902	10:1 Probe (for isolated BNC input)	Operating temp. range: –40 to 85°C, length 2.5 m
701947	100:1 Probe (for isolated BNC input)	1000 V (DC+ACpeak) CAT II
700929	10:1 Probe (for isolated BNC input)	1000 V (DC+ACpeak) CAT II, length 1.5 m
701901	1:1 Safety BNC adapter lead	1000 Vrms-CAT II
701904	1:1 Safety Adapter Lead	1000 Vrms-CAT II, 600 Vrms-CAT III
(in combination with followings)		
B9852MM	Safety mini-clip (Hook type)	1000 Vrms-CAT III black
B9852MN	Safety mini-clip (Hook type)	1000 Vrms-CAT III red
701954	Large alligator-clip (Dolphin type)	1000 Vrms-CAT II, 1 set each of red and black
758929	Alligator clip adaptor set (Rated voltage 1000 V)	1000 Vrms-CAT II, 1 set each of red and black
758922	Alligator clip adaptor set (Rated voltage 300 V)	300 Vrms-CAT II, 1 set each of red and black
758921	Fork terminal adapter set	1000 Vrms-CAT II, 1 set each of red and black
701940	Passive probe*2	Non-isolated 600 Vpk (10:1)
366926	1:1 BNC-alligator cable	Non-isolated 42 V or less, 1 m
366961	1:1 Banana-alligator cable	Non-isolated 42 V or less, 1.2 m
720930	Clamp-on probe	AC 50 A
720931	Clamp-on probe	AC 200 A
701955	Bridge head (NDIS, 120 Ω)	With 5 m cable
701956	Bridge head (NDIS, 350 Ω)	With 5 m cable
701957	Bridge head (DSUB, 120 Ω)	Shunt-CAL with 5 m cable
701958	Bridge head (DSUB, 350 Ω)	Shunt-CAL with 5 m cable
758924	Safety BNC-banana adapter	500 Vrms-CAT II
702911	Logic probe*3	8-Bit, 1 m, non-Isolated, TTL level/Contact Input
702912	Logic probe*3	8-Bit, 3 m, non-Isolated, TTL level/Contact Input
700986	High-speed logic probe*3	8-Bit, non-Isolated, response speed: 1 µs (typ.)
700987	Isolated logic probe*4	8-Bit, each channel isolated
758917	Measurement lead set	Measurement leads (2 per set) Alligator-Clip is required separately.
758933	Measurement lead set	1000 V/19 A/1 m length Alligator-Clip is required separately.
701902	Safety BNC-BNC cable (1 m)	1000 Vrms-CAT II (BNC-BNC)
701903	Safety BNC-BNC cable (2 m)	1000 Vrms-CAT II (BNC-BNC)
B8093YA	GPS unit*5	For DL350
701948	Plug-on clip	For 702902, 700929 and 701947
701906	Long test clip	For 701901 and 701904
A1800JD	Terminal	For 720220 input terminal, one (1) piece
705926	Connecting cables	Connecting cable for 701953 (1 m)
705927	Connecting cables	Connecting cable for 701953 (3 m)
93050	Carrying Case	

*1: Actual allowable voltage is the lower of the voltages specified for the main unit and cable.
*2: 30 Vrms is safe when using the 701940 with an isolated type BNC input.
*3: Includes one each of the B9879PX and B9879KX connection leads.
*4: Additionally, 758917 and either the 758922 or 758929 are required for measurement.
*5: Release pending in the EU and Korea. Contact your local sales office for further details.

This is a Class A instrument based on Emission standards EN61326-1 and EN55011, and is designed for an industrial environment. Operation of this equipment in a residential area may cause radio interference, in which case users will be responsible for any interference which they cause.

3-Year Warranty

NOTICE

- Before operating the product, read the user's manual thoroughly for proper and safe operation.

Yokogawa's approach to preserving the global environment

- Yokogawa's electrical products are developed and produced in facilities that have received ISO14001 approval.
- In order to protect the global environment, Yokogawa's electrical products are designed in accordance with Yokogawa's Environmentally Friendly Product Design Guidelines and Product Design Assessment Criteria.

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