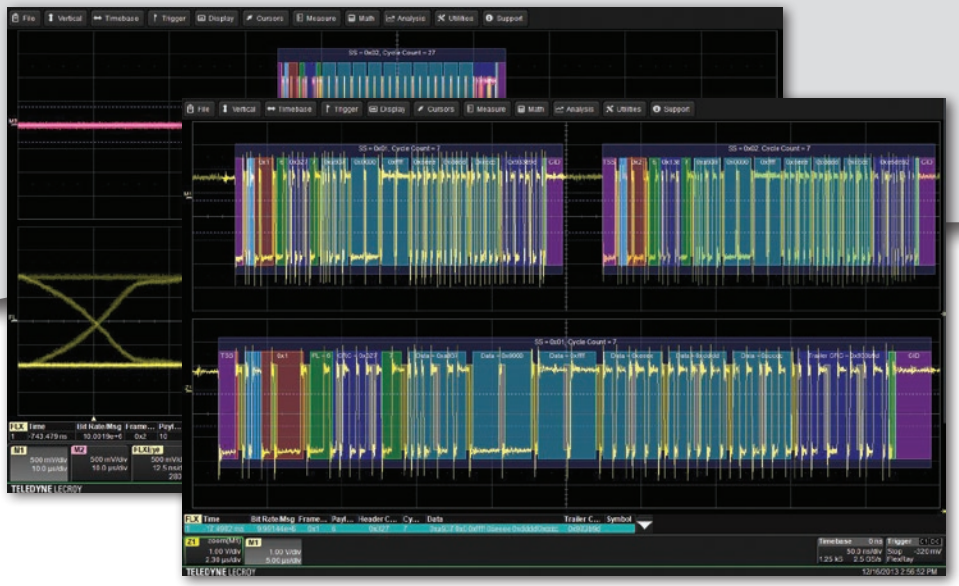
TELEDYNE LECROY
Everywhereyoulook™

FlexRay™ Trigger, Decode and Physical Layer Test



Trigger on Static or Dynamic Slot IDs and FlexRay Symbols, apply a color-coded, easy-to-understand decode over your FlexRay signal, perform automatic eye diagram mask testing and make physical layer timing measurements.

Key Features

- **The most comprehensive oscilloscope-based FlexRay solution**
- **Complete FlexRay Trigger Decode and Physical Layer Test in one instrument**
- **Triggering and decoding of FlexRay protocol version 3.0**
- **Eye diagram mask testing with error location**
- **Physical layer measurement parameters for Propagation Delay, Asymmetric Delay, Truncation and Jitter**
- **Supports 2.5, 5, and 10 Mb/s FlexRay signals**
- **Easily view the decoded signals with an intuitive color-coded decode overlay**
- **Supports triggering for**
  - **Frame ID (Static and Dynamic)**
  - **Frame Cycle Count**
  - **Frame Qualifiers**
  - **Symbols**
  - **Errors**
- **Convenient table display with quick "zoom to byte" capability**
- **Quick Search capability for specific message packets**

The FlexRay™ trigger, decode and physical layer test package adds a unique set of tools to your oscilloscope simplifying how you design and debug your FlexRay systems and shorten testing time. The powerful internal FlexRay trigger quickly locates specific IDs or messages and the unique overlay shows decoded data directly on top of the physical layer signal. The eye diagram and timing measurements quickly locate physical layer problems.

Built-in Oscilloscope Trigger Makes Setup Easy

Isolate specific FlexRay messages with the built-in oscilloscope trigger. Since the trigger is not a FlexRay node, connection to your FlexRay bus is simplified; and no re-programming of the vehicle network is required, simply connect a differential probe to your FlexRay signal. All the triggering is done in the oscilloscope and setup is completely integrated into the intuitive trigger menu.

The Most Intuitive Decode

Patented software algorithms deconstruct the waveform into protocol decode information, then overlay the decoded data on the waveform. Depending on the time base setting or the amount of zoom, the decode information is condensed or expanded to better assist in understanding events. Various sections of the protocol are color-coded to make it easy-to-understand. Communication Cycle Start and Error Frames are highlighted. The decode operation is fast — even with long acquisitions. The user can choose to decode into Hex or Binary formats.

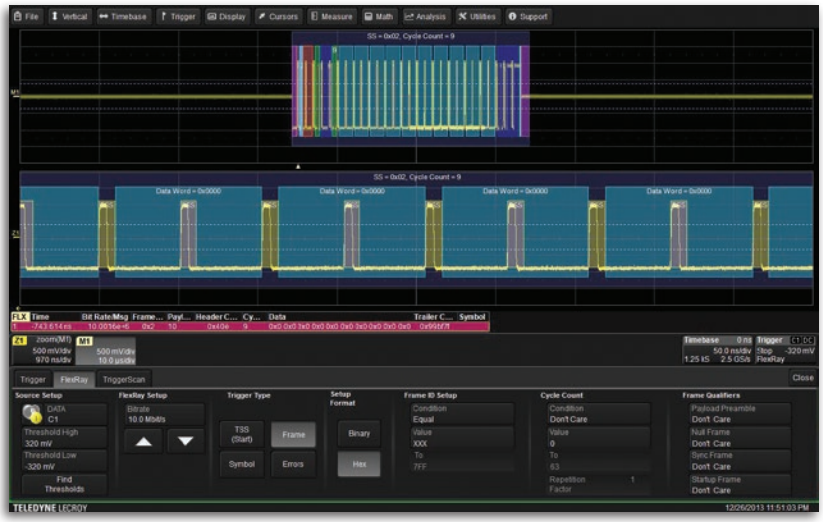
Powerful Physical Layer Test

Quickly locate physical layer problems using powerful eye diagram mask test, watch the eye build up over time and use the error indicator to find mask violations and isolate problems. Mask testing combined with the built in automated FlexRay timing measurements let you know how your FlexRay physical layer is performing.

BROADEST OSCILLOSCOPE-BASED FLEXRAY SOLUTION

Extensive Triggering

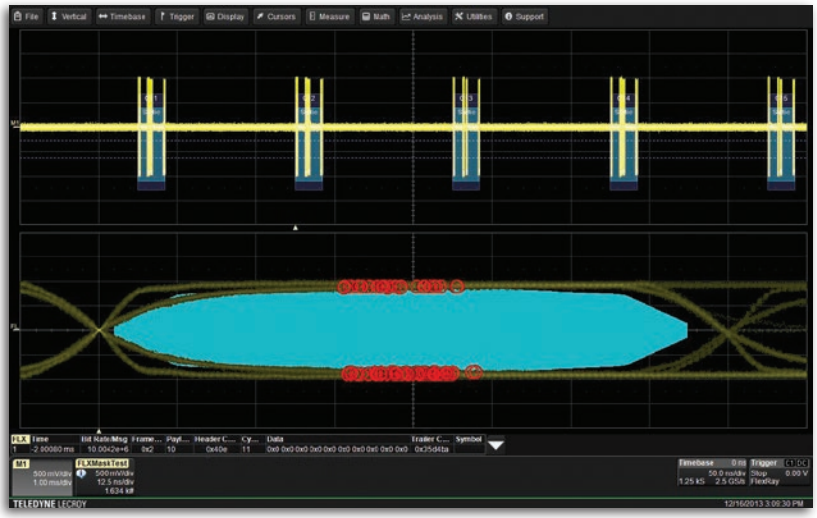
Triggering on the complex FlexRay protocol is made easy with an intuitive interface and a wide range of trigger settings for all aspects of the protocol. Set up a simple TSS (Start) symbol trigger with a single button press or trigger on any part of a FlexRay frame including ID, Cycle Count, Cycle Repetition Factor and Frame Qualifier. FlexRay defined Symbols and Errors can also be incorporated into the trigger making it as simple or advanced as necessary. Conditional triggering can be set to trigger on a range of Frame IDs or Cycles.



Trigger on every aspect of the FlexRay Frame as well as Symbols and Errors including FSS, BSS, FES, CRC, CID, CAS/MTS and Wakeup by selecting the appropriate boxes.

Eye Diagram Mask Testing

Eye diagrams are an important part of testing many serial data standards and FlexRay is no different. Leveraging Teledyne LeCroy's techniques developed with extremely fast serial data signals, the FlexRay eye diagram mask test overlays all the bits on FlexRay signal in an eye diagram with pass/fail mask testing. Tell the oscilloscope to stop on any mask violation and quickly locate the source of physical layer problems. By configuring the trigger for a specific Frame ID or range of IDs an eye diagram can be created to show only those Frames.



Gain valuable insight into your FlexRay communications channel by viewing eye diagrams, physical layer measurements and decoded protocol data at one time.

Physical Layer Measurements

Seeing the eye diagram gives good insight to your FlexRay system but measuring key timing parameters like Propagation Delay, Asymmetric Delay, Truncation and Jitter help you understand how signals propagate along the channel.
Use Teledyne LeCroy's statistics and histicons to understand the range of measurements on the FlexRay channel.

Measure	PrDly(C2,C3)	AsDly(C2,C3)	Trunc(C2,C3)	Jitter(C2)
value	7.145 ns	-66 ps	1.044 ns	1.000091 µs
status	✓	✓	✓	✓

Measure	PrDly(C2,C3)
value	6.937 ns
mean	6.78813 ns
min	6.167 ns
max	7.493 ns
sdev	234.77 ps
num	732
status	✓
histo	

Quickly measure channel properties with measurement parameters defined by the FlexRay specification. Teledyne LeCroy's statistical measurements with histograms, tracks and trends let you see how the channel behaves over time.

Convenient Table Display Summarizes Results

Turn your oscilloscope into a protocol analyzer with the Table display of decoded information. Custom configure the Table to display only the information you want and export Table data to an Excel file. Touch a message in the table and automatically zoom for detail.

FLX	Time	Bit Rate/Msg	Frame...	Payl...	Header C...	Cy...	Data	Trailer C...	Symbol
1	-19.9981 ms	9.99189e+6	0x1	6	0x327	6	0xa936 0x0 0xffff 0xeeee 0xdddd 0xcccc	0x70dd10	
2	-19.9735 ms	9.99860e+6	0x2	6	0x138	6	0xa938 0x0 0xffff 0xeeee 0xdddd 0xcccc	0x6331f	
3	-19.8981 ms	9.99142e+6	0x5	6	0x3d0	6	0x696e 0x100 0x302 0x504 0x706 0x908	0xe23b5	
4	-19.8735 ms	9.99880e+6	0x6	6	0x1cf	6	0x696e 0x100 0x302 0x504 0x706 0x908	0xc2980b	
5	-19.7981 ms	9.99034e+6	0x9	6	0x29	6	0x696e 0x100 0x302 0x504 0x706 0x908	0x53050b	
6	-19.7735 ms	9.99877e+6	0xa	6	0x236	6	0x696e 0x100 0x302 0x504 0x706 0x908	0x9fbeb5	
7	-19.6981 ms	9.99169e+6	0xd	6	0x7fd	6	0x696e 0x100 0x302 0x504 0x706 0x908	0xd4e9d1	
8	-19.6735 ms	9.99863e+6	0xe	6	0x5e2	6	0x696e 0x100 0x302 0x504 0x706 0x908	0x18526f	
9	-19.5981 ms	9.99151e+6	0x11	6	0x7db	6	0x696e 0x100 0x302 0x504 0x706 0x908	0xe94877	
10	-19.5735 ms	9.99895e+6	0x12	6	0x5c4	6	0x696e 0x100 0x302 0x504 0x706 0x908	0x25f3c9	

Display your values in an easy-to-understand table. Touch a row to zoom, or export to Excel with one button push.

Search and Zoom

ID or Data values can be quickly located by searching for a specific value. In a long acquisition, pressing NEXT advances the single byte to the byte right or left of the current message.

Search through long record of decoded data by entering the message or address you are looking for and clicking the right or left search arrows.

More Tools for Your Embedded System Test

Teledyne LeCroy offers the same powerful triggering and intuitive decoding capabilities for I²C, SPI, UART, RS-232, Audiobus (I²S, LJ, RJ, TDM), CAN, LIN, FlexRay,™ MIL-STD-1553) signals. For complete embedded system testing, the MS-250 and MS-500 adds 18 or 36 digital channels to the digital oscilloscope allowing you to look at all your analog, digital, and serial data waveforms simultaneously with complete analog/digital cross pattern triggering.

SPECIFICATIONS AND ORDERING INFORMATION

Specifications

	FlexRaybus TDP
	Definition
Protocol Setup	Select Bitrate (2.5, 5 or 10 Mb/s). Select FlexRay Channel A or Channel B
	Decode Capability
Format	All decoding is hexadecimal except for Cycle Count which is decoded using a decimal format
Decode Setup	Two threshold definitions required. Default is to Percent amplitude. Select Bitrate. Select FlexRay Channel A or Channel B
Decode Input	Any analog Channel, Memory or Math trace
# of Decode Waveforms	Up to 4 buses may be decoded at one time. In addition, zooms can be displayed (with decoded information)
Location	Overlaid over DATA waveform, on Grid. (Note: Use multi-grid if there is more than one decoder ON)
Visual Aid	Color Coding for TSS, FSS, Frame Qualifiers, Slot ID, Payload Length, Header CRC, Cycle Count, Data, BSS, Payload CRC and FES Decode information is intelligently annotated based on timebase setting
	Trigger Capability
Format	Hexadecimal or Binary for Frame ID Decimal for Cycle Count
Trigger Setup	Trigger on TSS (Start), Frame ID, Cycle Count, Symbols and Errors Symbols: Channel Idle Delimiter (CID) Symbol, Collision Avoidance Symbol (CAS), Media Access Test Symbol (MTS), Wakeup Pattern (WUP) Errors: Frame Start Sequence (FSS) Error – triggers when the logic high time between the TSS and the first byte is too long Byte Start Sequence (BSS) Error – triggers anytime the BSS pattern is not seen between bytes where expected Frame End Sequence (FES) Error – triggers when the FS is not seen after the last byte
Frame ID and Cycle Count Condition Setup	≤, <, =, >, ≥, in range, out of range, don't care
Data Setup	Hexadecimal: # Data Bytes = 0 to 8. Data can be defined by nibble. Triggers on that data pattern regardless of position or in user settable location Binary: Any combination of 0,1, or X for 1-64 bits. Triggers on that data pattern regardless of position or in user settable location
Bit Rates	2.5, 5.0 or 10 Mb/s selectable
Trigger Input	Any analog Channel or the EXT input
Trigger Design	Internal to oscilloscope, settable like any other oscilloscope trigger
	Physical Layer Test
Eye Diagram	Eye diagram creation with mask testing at TP1 and TP4. Mask testing allows for 'Stop on Failure'
Format	Propagation Delay, Asymmetric Delay, Truncation, Jitter
	Search Capability
Pattern Search	Search by Next ID, Next Frame, or Next Error in Hexadecimal formats
	Other
	FlexRaybus TD Includes all Decode, Trigger and Search functionality described in FlexRaybus TDP, no Physical Layer Test included

Ordering Information

FlexRay TDP

Product Description	Product Code
FlexRay Trigger, Decode & Physical Layer Test Option for WR Xi/Xi-A	WRXi-FlexRaybus TDP
FlexRay Trigger, Decode & Physical Layer Test Option for WR 6 Zi	WR6Zi-FlexRaybus TDP
FlexRay Trigger, Decode & Physical Layer Test Option for HDO6K	HDO6K-FlexRaybus TDP
FlexRay Trigger, Decode & Physical Layer Test Option for WP 7 Zi/Zi-A	WPZi-FlexRaybus TDP
FlexRay Trigger, Decode & Physical Layer Test Option for WM 8 Zi/Zi-A	WM8Zi-FlexRaybus TDP

FlexRay TD

FlexRay Trigger & Decode Test Option for WS	WSXs-FlexRaybus TD
FlexRay Trigger & Decode Test Option for HDO4K	HDO4K-FlexRaybus TD
FlexRay Trigger & Decode Option for WR Xi/Xi-A	WRXi-FlexRaybus TD
FlexRay Trigger & Decode Option for WR 6 Zi	WR6Zi-FlexRaybus TD
FlexRay Trigger & Decode Option for HDO6Ki	HDO6K-FlexRaybus TD
FlexRay Trigger & Decode Option for WP 7Zi/Zi-A	WPZi-FlexRaybus TD
FlexRay Trigger & Decode Option for WM 8 Zi/Zi-A	WM8Zi-FlexRaybus TD

Related Products

Product Description	Product Code
PROTObus MAG Serial Debug Toolkit for WR Xi/Xi-A	WRXi-PROTObus MAG
PROTObus MAG Serial Debug Toolkit for WR 6 Zi	WR6Zi-PROTObus MAG
PROTObus MAG Serial Debug Toolkit for HDO6K	HDO6K-PROTObus MAG
PROTObus MAG Serial Debug Toolkit for WP 7 Zi/Zi-A	WPZi-PROTObus MAG
PROTObus MAG Serial Debug Toolkit for WM 8 Zi/Zi-A	WM8Zi-PROTObus MAG

Customer Service

Teledyne LeCroy scopes are designed, built, and tested to ensure high reliability. In the unlikely event you experience difficulties, our digital oscilloscopes are fully warranted for three years. This warranty includes:

- No charge for return shipping • Long-term 7-year support
- Upgrade to latest software at no charge

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Local sales offices are located throughout the world.
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FlexRayTDP-DS-30j
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