TELEDYNE LECROY
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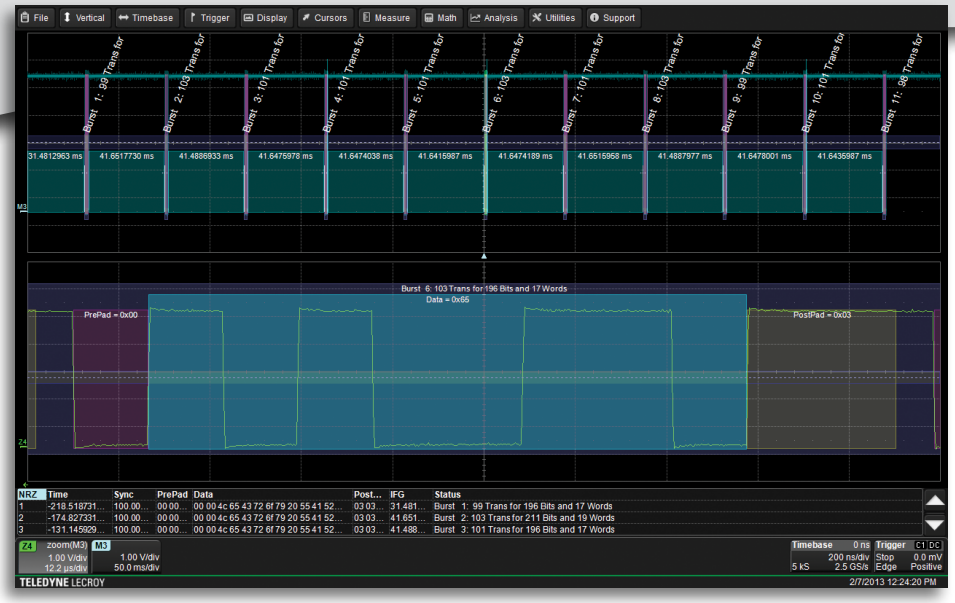
TEquipment.NET USA
An Interworld Highway, LLC Company

Manchester and NRZ Configurable Protocol Decode



Quickly decode serial buses that use Manchester and NRZ encoding schemes with configurable, user-definable protocol formats.

Key Features

- **User definable protocol decoding of Manchester and NRZ encoded buses**
- **Flexible decoding of buses with bit rates up to 10 Gb/s**
- **Configurable word and packet grouping for custom protocol definition**
- **Intuitive color-coded decode is overlaid directly on physical layer waveform**
- **Convenient table display with quick "zoom to message" capability**
- **Search feature quickly identifies specific packets and data**

Today's oscilloscopes provide an array of protocol specific serial data decoding tools to help verify bus performance and debug system problems. These tools provide valuable insight into buses using those protocols but not all systems are built on industry standards and rely on proprietary encoding or buses not supported by oscilloscope decode tools.

Flexible, User-Definable Protocol Decoding

The Configurable Manchester and NRZ Decode options enable flexible, user-definable protocol decoding of serial buses built with these encoding schemes from 10 b/s to 10 Gb/s. The physical layer specs like bit rate, idle state and polarity can be easily defined enabling quick decoding of every bit transmitted on the bus. Higher level decode can be done by configuring bits to words and then words to packets.

Configure and Decode Complex Protocols

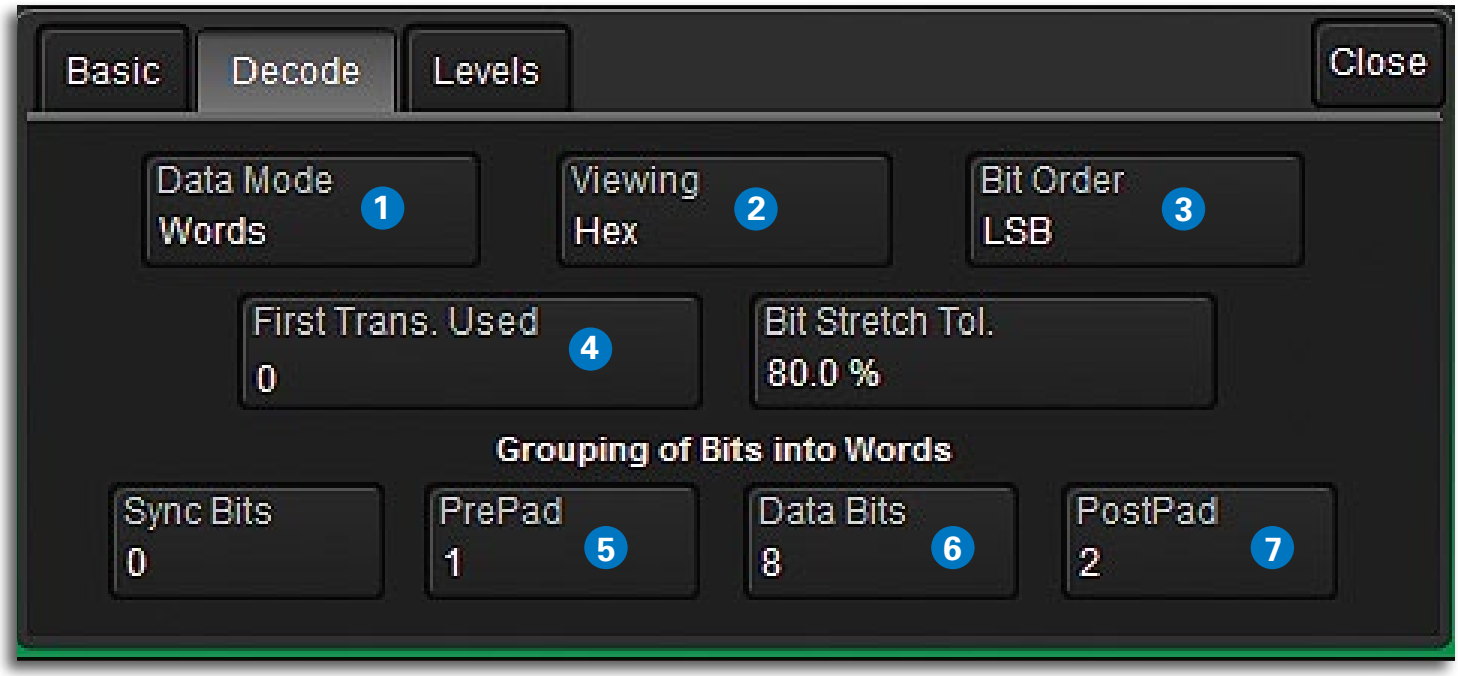
Define the number of sync bits, header or pre-amble bits, data bits and footer or CRC bits to build a custom protocol decoder for a proprietary bus or decode Manchester or NRZ based industry standard buses like PSI5, DALI, and proprietary NRZ protocols.

Support on Multiple Oscilloscope Platforms

The configurable Manchester and NRZ decode option is available on a wide range of oscilloscope models from 200 MHz to 65 GHz.

DEFINE, CONFIGURE, DECODE

Manchester and NRZ encoding schemes both use a variety of methods for making bits into words, words into packets and packets into protocols. The configurable Manchester and NRZ decode capabilities are designed to provide the flexibility needed to display decoded protocol information built on these encoding schemes. This flexibility enables quick decoding of protocols built on industry standards or custom, proprietary protocols.



User-definable protocol controls enable flexible serial bus decoding.

Protocol Decode Setup

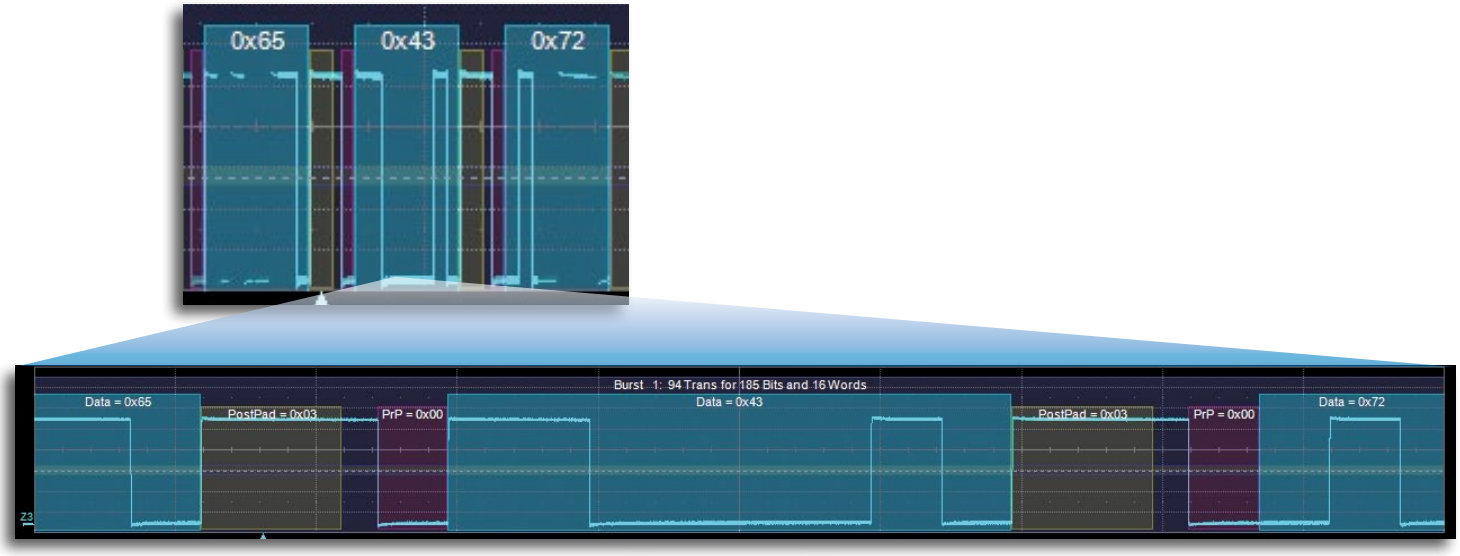
1. Decode data packet by grouping bits into words
2. View decoded data in Hex, ASCII or Decimal
3. Set decode bit order as LSB or MSB
4. Select a start point for decoding so that only transitions of interest are decoded.

Word, Packet, Frame Setup

5. Group up to 32 bits for address, pre-amble or sub-address information
6. Choose custom number of bits from 0 – 32 for word size
7. Define CRC or footer information by setting a specific amount of post-pad bits

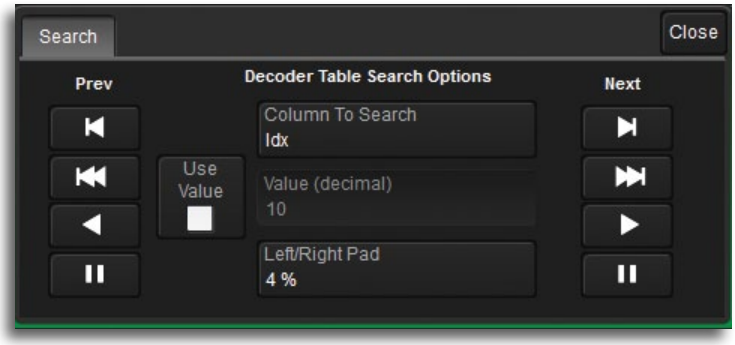
Intuitive Decode

Color-coded overlays display the protocol decode directly on top of the physical layer waveform for an easy-to-understand visual display. The decode information condenses or expands depending on the timebase or zoom setting, simplifying both routine verification and complex troubleshooting.



Powerful Search

Quickly search through long captures of decoded Manchester or NRZ encoded buses for specific details such as Data, Sync, Interframe Gap or Status.



Search functionality and user interface provides an easy way to step through search results to isolate specific areas of interest.

Convenient Table

Turn the oscilloscope into a protocol analyzer with the table display of protocol information. Configure the table to display information, such as, sync, pre & post data, and export table data to an Excel file.

NRZ	Time	Sync	PrePad	Data	Post...
1	-218.518731...	100.00...	00 00...	00 00 4c 65 43 72 6f 79 20 55 41 52...	03 03...
2	-174.827331...	100.00...	00 00...	00 00 4c 65 43 72 6f 79 20 55 41 52...	03 03...
3	-131.145929...	100.00...	00 00...	00 00 4c 65 43 72 6f 79 20 55 41 52...	03 03...
4	-87.4585309...	100.00...	00 00...	00 00 4c 65 43 72 6f 79 20 55 41 52...	03 03...
5	-43.7713258...	100.00...	00 00...	00 00 4c 65 43 72 6f 79 20 55 41 52...	03 03...
6	-89.9300594 µs	100.00...	00 00...	00 00 4c 65 43 72 6f 79 20 55 41 52...	03 03...

Display decoded values in an easy-to-understand table.

SPECIFICATIONS & ORDERING INFORMATION

	Manchester / NRZ
	Definition
Protocol Setup	Select Bit rate (10 bit/s - 10 Gbit/s), Idle State (IdleLow, IdleHigh, Don't Care), Polarity (Low = 0, Low = 1)
	Decode Capability
Format	Bits, Words
Basic Setup	Bit rate, Idle State, Polarity
Decode Setup	First Transition Used (0 - 400), Bit Stretch Tolerance (0 - 100 %), Sync Bits (0 - 100), PrePad Bits (0 - 32), Data Bits (1 - 32), PostPad Bits (0 - 32)
# 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 waveform, on Grid
Visual Aid	Color Coding for Idle, timeout, Prepad, Data, PostPad. Decode information is intelligently annotated based on timebase setting.
	Search Capability
Pattern Search	Search for the following: Time, Sync, Prepad, Data, Postpad, Interframe Gap and Status. Selection available for use of defining decimal or hexadecimal search value with Data mode = Words
	Other
Supported Encoding Variants	NRZ-L Manchester (Single Wire)
Compatible With...	Fully compatible with HDO6000, HDO4000, WaveRunner® 6 Zi Series, WaveSurfer® Xs/Xs-A/Xs-B Series, WaveRunner® Xi/Xi-A Series, WavePro® 7 Zi/Zi-A Series, WaveMaster® 8 Zi/Zi-A Series, LabMaster 9Zi-A Series, and LabMaster 10Zi Series. Bandwidth of oscilloscope must be equal to bit rate with a minimum oscilloscope sample rate of 4x the bit rate.

Ordering information

Manchester Decode Option

Product Description	Product Code
Manchester Decode Option for HDO4k	HDO4K-Manchesterbus D
Manchester Decode Option for HDO6k	HDO6K-Manchesterbus D
Manchester Decode Option for WaveSurfer Xs/Xs-B	WSXs-Manchesterbus D
Manchester Decode Option for WaveRunner 6 Zi	WR6Zi-Manchesterbus D
Manchester Decode Option for WaveRunner Xi/Xi-A	WRXi-Manchesterbus D
Manchester Decode Option for WavePro 7 Zi/Zi-A	WPZi-Manchesterbus D
Manchester Decode Option for WaveMaster 8 Zi-A	WM8Zi-Manchesterbus D
Manchester Decode Option for LabMaster 9 Zi-A	LM9Zi-Manchesterbus D
Manchester Decode Option for LabMaster 10 Zi	LM10Zi-Manchesterbus D

NRZ Decode Option

Product Description	Product Code
NRZ Decode Option for HDO4K	HDO4K-NRZbus D
NRZ Decode Option for HDO6K	HDO6K-NRZbus D
NRZ Decode Option for WaveSurfer Xs/Xs-B	WSXs-NRZbus D
NRZ Decode Option for WaveRunner 6 Zi	WR6Zi-NRZbus D
NRZ Decode Option for WaveRunner Xi/Xi-A	WRXi-NRZbus D

Customer Service

Teledyne LeCroy oscilloscopes and probes 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, and our probes are warranted for one year.

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

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