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Mess- und Prüftechnik. Die Experten.

Serial Triggering and Analysis

3 Series MDO, 4/5/6 Series MSO Applications Datasheet



On a serial bus, a single signal often includes address, control, data, and clock information. This can make isolating events of interest difficult. Optional serial applications transform the oscilloscope into a robust tool for debugging serial buses with automatic decode and analysis for I²C, SPI, eSPI, CAN, CAN FD, CAN XL, LIN, FlexRay, 100BASE-T1, SENT, RS-232/422/485, UART, USB 2.0, USB 3.0, Ethernet, I3C, SPMI, Spacewire, 8b10b, NFC, NRZ, MIL-STD-1553, ARINC 429, I²S, LJ, RJ, PSI5, CPHY, CXPI, DPHY, SMBus, 1-WIRE, EtherCAT, and TDM.

Key features

- Automated Serial Decode and Analysis Options for I²C, SPI, eSPI, I3C ¹, CAN, CAN FD, CAN XL, LIN, FlexRay, SENT¹, RS-232/422/485, UART, USB 2.0, USB 3.0, Ethernet¹, SPMI¹, MIL-STD-1553, ARINC 429, I²S, LJ, RJ, PSI5, DPHY, CXPI, CPHY, SMBus, 1-WIRE, EtherCAT, and TDM
- Trigger on all the critical elements of a serial bus such as address, data, etc.
- Decode all the critical elements of each message. No more counting 1s and 0s!
- Search through long acquisitions with user-defined criteria to find specific messages
- Event Table shows decoded serial bus activity in a tabular, timestamped format for quick summary of system activity

Serial Triggering and Analysis Applications

The serial applications support automatic trigger and decode for I²C, SPI, CAN, CAN FD, CAN XL, LIN, FlexRay, 100BASE-T1, SENT, RS-232/422/485, UART, USB 2.0, USB 3.0, Ethernet, I3C, SPMI, Spacewire, 8b10b, NRZ, MIL-STD-1553, ARINC 429, I²S, LJ, RJ, PSI5,

SMBus, EtherCAT, and TDM buses, making it easier to locate, analyze, and debug events of interest.

Serial triggering

Trigger on packet content such as start of packet, specific addresses, specific data content, unique identifiers, etc. on popular serial interfaces such as I²C, SPI, CAN, CAN FD, CAN XL, LIN, FlexRay, SENT, RS-232/422/485, UART, USB 2.0, USB 3.0, Ethernet, I3C, SPMI, MIL-STD-1553, ARINC 429, I²S, LJ, RJ, PSI5, and TDM.

Bus display

The bus display provides a higher-level, combined view of the individual signals (clock, data, chip enable, and so on) that make up your bus, making it easy to identify where packets begin and end and identifying sub-packet components such as address, data, errors, and so on.

Bus decoding

Tired of having to visually inspect the waveform to count clocks, determine if each bit is a 1 or a 0, combine bits into bytes, and determine the hex value?

Let the oscilloscope with a serial application do it for you! Once you've set up a bus, the oscilloscope decodes each packet on the bus, and displays the value in hex, binary, ASCII, or decimal (certain buses only) in the bus waveform.

Results table

In addition to seeing decoded packet data on the bus waveform itself, you can view all captured packets in a tabular view much like you would see in a software listing. Packets are time stamped and listed consecutively with columns for each component (Address, Data, and so on).

Wave Inspector[®] search

Serial triggering is very useful for isolating the event of interest, but once you've captured it and need to analyze the surrounding data, what do you do?

In the past, users had to manually scroll through the waveform counting and converting bits and looking for what caused the event. With a serial application, you can enable the oscilloscope to automatically search through the acquired data for user-defined criteria including serial packet content. Each occurrence is highlighted by a search mark. Rapid navigation between marks is as simple as pressing the \leftarrow and

¹ Not available for 3 Series MDO.

 \rightarrow arrow buttons on the oscilloscope front panel or the Search badge. The 3 Series MDO uses the arrows in the Search badge to navigate.

I²C characteristics

Bus setup options

Characteristic	Description
I ² C Sources	Analog channels
(Clock and Data)	Digital channels
	Active Math channels ¹
	Active Reference channels ¹
Thresholds	Per-channel thresholds
Recommended Probing	Single-ended
Include R/W in Address	Yes or No
Address/Data Formats Available	Hex Binary

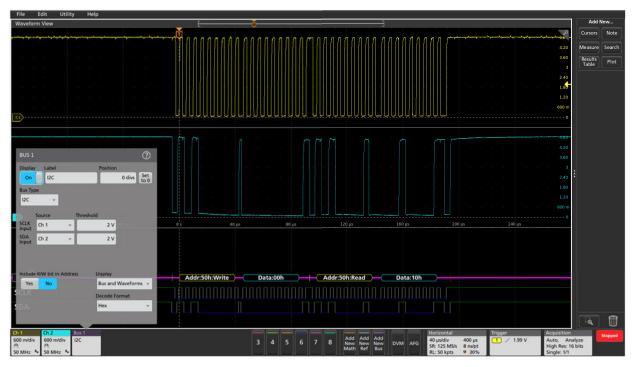
Display modes

Characteristic	Description
Bus	Bus only
Bus and Waveforms	Simultaneous display of bus and digital waveforms
Results Table	Decoded packet data in a tabular view

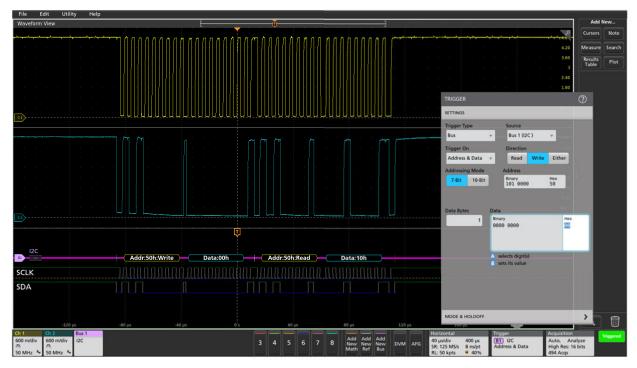
Bus trigger and search options

Characteristic	Description
Trigger and/or Search	Start
On	Repeated Start
	Stop
	Missing Ack
	Address (7 or 10 bit)
	Data (1-5 bytes)
	Address and Data

Characteristic	Description
Maximum Clock/Data Rate	Up to 10 Mb/s (automatic selection)
Decode Display	Start (green bar)
	Address (yellow packet)
	Data (cyan packet)
	Missing Ack (! symbol in red box)
	Stop (red bar)



Color-coded I²C bus display, using hexadecimal display format.



Triggering on a specific address value on the l^2C bus.

SPI characteristics

Bus setup options

Characteristic	Description
SPI Sources	Analog channels
(Clock, Data, and Slave Select)	Digital channels
Slave Selecty	Active Math channels ¹
	Active Reference channels ¹
Thresholds	Per-channel thresholds
Recommended Probing	Single-ended
Decode Configuration:	Slave Select (2 wire SDI), Idle Time (2 wire
Framing	Slave Select (3-wire SPI), Idle Time (2-wire SPI)
Clock	Rising or Falling Edge
Slave Select	Active High or Active Low
Data	Active High or Active Low
Word Size	4 - 32 bits
Bit Order	Most Significant (MS) First, Least Significant (LS) First
Formats Available	Hex
	Binary

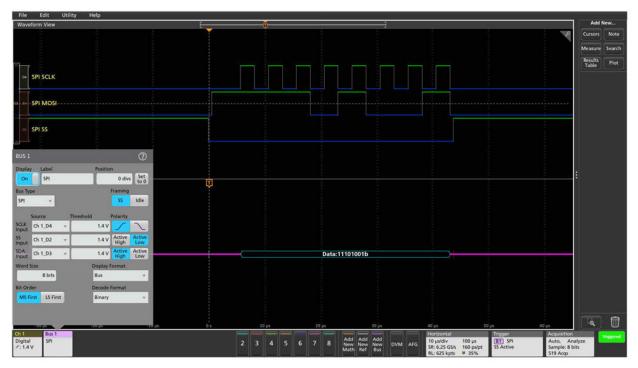
Bus trigger and search options

Characteristic	Description
Trigger and/or Search	SS Active (3-wire SPI)
OII	Start of Frame (2-wire SPI)
	Data (1-16 bytes)

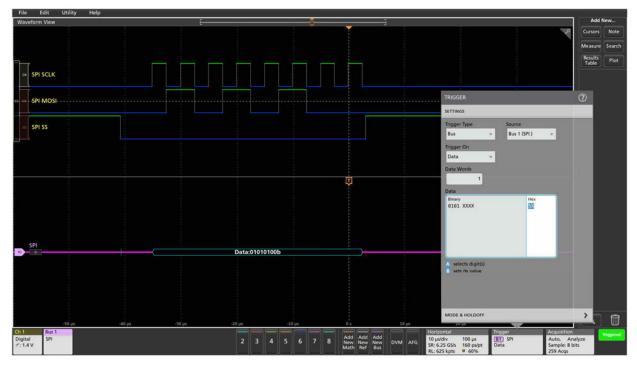
Bus decode

Characteristic	Description
Maximum Clock/Data Rate	Up to 10 Mb/s (automatic selection)
Decode Display	Start (green bar)
	Data (cyan packet)
	Stop (red bar)

Characteristic	Description
Bus	Bus only
Bus and Waveforms	Simultaneous display of bus and digital waveforms
Results Table	Decoded packet data in a tabular view



SPI bus, captured with digital channels, showing binary display format of the color-coded SPI bus decoding.



Triggering on a specific data value on the SPI bus.

I3C characteristics¹

Bus setup options

Characteristic	Description
I3C Sources	Analog channels
(Clock and Data)	Digital channels
	Active Math channels
	Active Reference channels
Thresholds	Per-channel thresholds
Speed	High Speed (480 Mb/s)
	Full Speed (12 Mb/s)
	Low Speed (1.5 Mb/s)
Recommended Probing	Single-ended
Formats Available	Hex
	Binary
	Mixed Hex
Version	1.0
	1.1

Display modes

Characteristic	Description
Bus	Bus only
Bus and Waveforms	Simultaneous display of bus and digital waveforms
Results Table	Decoded packet data in a tabular view

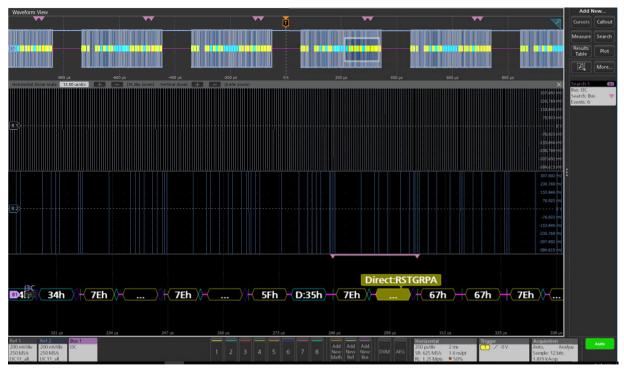
Bus search options

Characteristic	Description
Search On	Start
	Repeated Start
	Address
	Data
	I3C SDR Direct Message
	I3C SDR Broadcast Message
	I3C DDR Message
	Errors
	Hot-Join
	Direct Message End
	Stop
	HDR Restart
	HDR Exit

Characteristic	Description
Maximum Clock/Data Rate	Up to 12.5 Mb/s (automatic selection)
Decode Display	Start (green bar)
	Address (yellow packet)
	Commands (cyan packet)
	Data (cyan packet)
	Parity (purple packet)
	Stop (red bar)

Bus Decode	Results												Х	Add New
Bus 1 (I3C)												70 Pack	ets Decoded	Cursors Callou
1	937.5ps	Direct:GETSTATUS						1		-			1	Measure Search
2	98.4375ns	-	23:Read	-	12 13	-	-	10		-				Results Plot
3	242.1875ns	Direct SETDASA	-	-	-			1						Table
4	339.6875ns	-	7E:Write	-	-			1		-			1	More.
5	438.4375ns	Direct:GETMOODS	**			**	**	0						
	535.9375ns		23:Read	-	AC AC ACACA8	**		110		-				Search 1
	804.6875ns	Broadcast:DEFSLVS	-	**	01 56		-	0011111111		-				Bus: I3C Search: Bus
	1.309688µs	Direct:GETSTATUS	**	-				1		-				Events: 10
	1,407188µs		23:Read		12 13			10						
0	1.550938µs	Direct:SETDASA		-		**	-	1						
11	1.648438µs		7E:Write	-	**		**	1						
2	1.747187µs	Direct:GETMXDS			-			0						
3	1.844688µs	-	23:Read	**	AC AC ACACAB	**		110						
14	2.113437µs	Broadcast:DEFSLVS	**		01 56		-	0011111111						
US 1				0	**	**		1						
I3C Sour CLK Ret		1.0 1.1 Threshold 0 V					indiatad	600 ns		s 1 ps	יבע 1.2 אין		4 µs X 1.428571 V 714.286 mV WU J J J W W	
iDA Ret	12 v	ov											-1.428571 V 1.428571 V	
		Bus	Format	•								313666-1286	-714,286 mV -1,428571 V	
		Mixed	e Format I Hex										} ₩	
00 ns 00 mlV/div	Ref 2	Bus 1	19264	200 na			400 rs	Add	Add Add	600 ns Horizonta 200 ns/dw			Acquisition Auto, Analy	Preview

I3C bus setup and MixedHex display, showing decode with version 1.1.



Searching the I3C bus with decode version 1.1 for the packet with Reset Group Address.



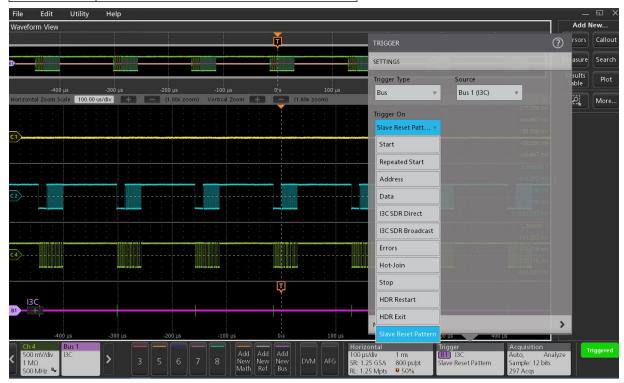
The Protocol Decode Results Table provides a time-stamped, tabular view of all captured packets on the I3C bus.



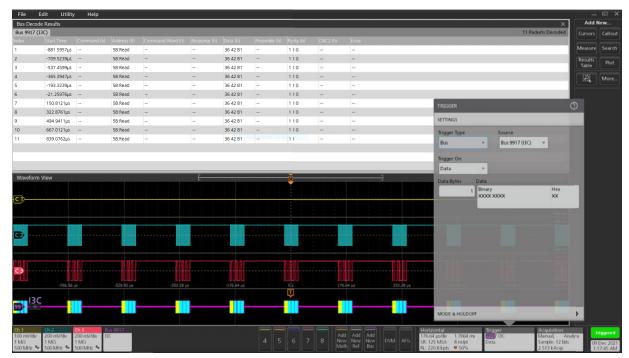
Searching on a specific data pattern on the I3C bus and automatically searching on Sync.

I3C (Trigger) characteristics

Characteristic	Description
I3C Sources	 Select the I3C bus on which to trigger. Trigger On Select the type of information on which to trigger.
Trigger On	 Start Repeated Start Address Data I3C SDR Direct I3C SDR Broadcast Hot join Errors HDR Exit HRD Restart Stop Slave Reset Pattern



I3C 1.1 version Slave Reset pattern trigger.



Triggering on a specific 7-Bit read address value on the I3C bus.

RS-232, RS-422, RS-485, UART characteristics

Bus setup options

Characteristic	Description
Sources, RS-232, UART	Analog channels
UARI	Digital channels
	Active Math channels ¹
	Active Reference channels ¹
Sources, RS-422, RS-485	Analog channels
KS-400	Active Math channels ¹
	Active Reference channels ¹
Polarity	Normal (RS-232)
	Inverted (UART, RS-422, RS-485)
Parity	None
	Odd
	Even
Recommended Probing, RS-232, UART	Single-ended
Recommended Probing, RS-422, RS-485	Differential
Number of Bits	7 - 9
Formats Available	Hex
	Binary
	ASCII
	Packet View
Data Inputs	One, Two
Bit Order	MSB, LSB

Characteristic	Description
Results Table	Decoded packet data in a tabular view

Bus trigger and search options

Characteristic	Description
Trigger and/or Search On	Start
	End of Packet
	Data (1 - 10 bytes)
	Parity Error

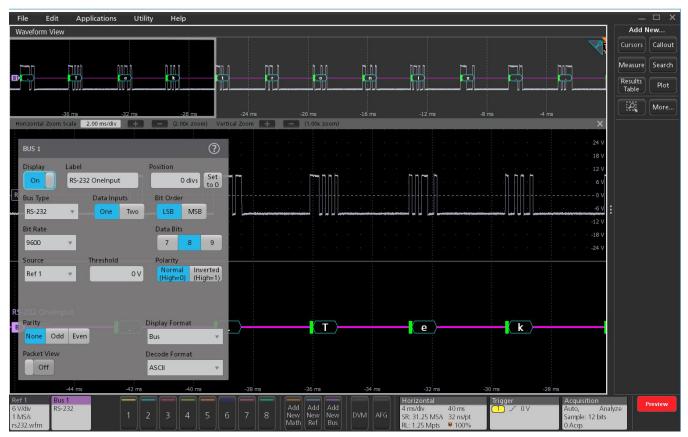
Bus decode

Characteristic	Description
Maximum Clock/Data	Up to 15 Mb/s
Rate	For 3 Series MDO: Up to 10 Mb/s
Bit Rate Selection	300 b/s
	1,200 b/s
	2,400 b/s
	9,600 b/s
	19,200 b/s
	38,400 b/s
	115,200 b/s
	921,600 b/s
	Custom (All but 3 Series MDO: 50 b/s - 15 Mb/s
	Custom (for 3 Series MDO): 50 b/s - 10 Mb/s
Decode Display	Start (green packet)
	Data (cyan packet)
	Parity (purple packet)
	Parity Error (red packet)

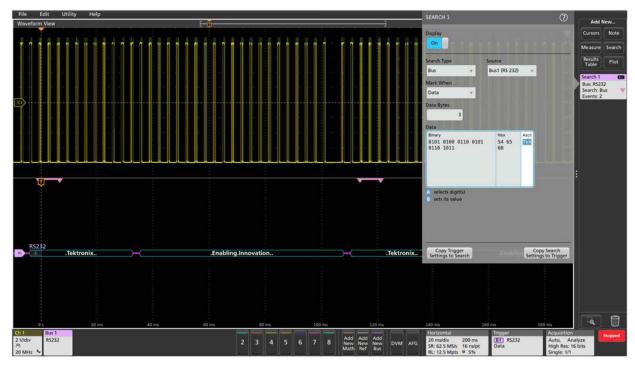
Display modes

Characteristic	Description			
Bus	Bus only			
Bus and Waveforms	Simultaneous display of bus and digital waveforms			
Table continued				

Table continued...



RS-232 bus setup and ASCII display, showing assignment of source signal, digital threshold, and polarity.



RS-232 bus shown in Packet View format, with the Wave Inspector search automatically searching for the data string "Tek".

CAN characteristics (Version 2.0)

Bus setup options

Characteristic	Description
Source for CAN_H, CAN_L, Rx, or Tx	Analog channels
(single-ended probing)	Digital channels
	Active Math channels ¹
	Active Reference channels ¹
Source for Diff	Analog channels
(differential probing)	Active Math channels ¹
	Active Reference channels ¹
Thresholds	Per-channel thresholds
Recommended Probing:	Single-ended
CAN_H, CAN_L, Rx, Tx	Differential
Diff	
Bit Rate Selection:	
Predefined list of rates	10 kb/s - 1 Mb/s
Table continued	I

Characteristic	Description
Custom	All but 3 Series MDO: 1 kb/s - 1 Mb/s 3 Series MDO: 10 kb/s - 1 Mb/s
Sample Point	All but 3 Series MDO: 0% - 100% of bit period of unit interval
	3 Series MDO: 5% - 95% of bit period of unit interval
Formats Available	Mixed Hex
	Hex
	Binary
	Symbolic (.dbc) ¹

Characteristic	Description		
Bus	Bus only		
Bus and Waveforms	Simultaneous display of bus and digital waveforms		
Table continued			

Characteristic	Description
Results Table	Decoded packet data in a tabular view

Bus trigger and search options

Characteristic	Description
Trigger and/or Search	Start of Frame
On	Type of Frame (Data, Remote, Error, Overload)
	Identifier (Standard or Extended)
	Data (number of bytes 1-8, trigger or search when =, \neq , <, <, >, ≥)
	Identifier and Data
	EOF
	Missing Ack
	Bit Stuff Error

Characteristic	Description
Message and Signal	As defined by the .dbc file ¹

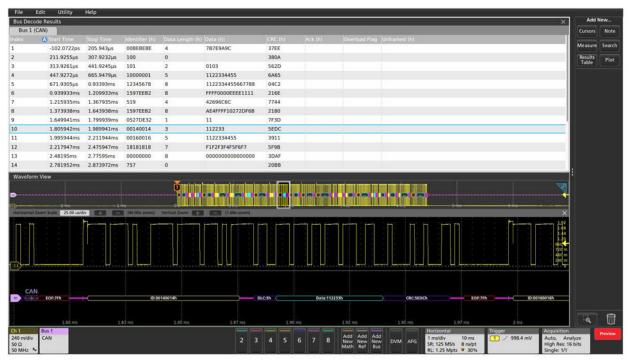
Bus decode

Characteristic	Description
Maximum Clock/Data Rate	Up to 1 Mb/s (automatic selection)
Decode Display	Start of Frame (green bar)
	Identifier (yellow packet)
	Data Length Control (purple packet)
	Data (cyan packet)
	CRC (purple packet)
	End of Frame (red bar)
	Errors (red packet)

Symbolic bus search options

Characteristic	Description
Message	As defined by the .dbc file ¹
Table continued	•

Table continued...



Protocol Decode Results Table provides a time-stamped, tabular view of all captured packets on the CAN bus.



Triggering on a specific extended Identifier value on the CAN bus.

CAN XL characteristics

Bus setup options

Characteristic	Description
Source for CAN_H, CAN_L, Rx, or	Analog channels
Tx	Digital channels
(Single-ended probing)	Active Math channels
	Active Reference channels
Source for Diff	Analog channels
(Differential probing)	Active Math channels
	Active Reference channels
Thresholds	Per-channel thresholds
Recommended Probing:	
CAN_H, CAN_L, Rx, Tx	Single-ended
Diff	Differential
Nominal Bit Rate Selection:	
Predefined list of rates	10 kb/s - 1 Mb/s
Custom	50 kb/s - 1 Mb/s
XL Bit Rate Selection:	
Predefined list of rates	1 Mb/s - 20 Mb/s
Custom	500 kb/s - 20 Mb/s
Sample Point	55% - 95% of bit period of unit interval
Formats Available	Mixed Hex
	Hex
	Binary

Bus trigger and search options

Description
Start of Frame
End of Error
Start of Frame
Type of Frame (XL Data Frame)
Priority Identifier
Data (1 byte)

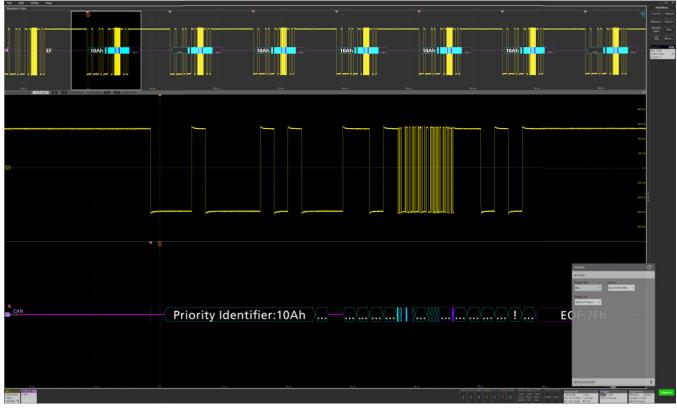
Characteristic	Description
	XL Bits (Acceptance Field, Virtual CAN Network ID, SDU Type, Simple Extended Content, Stuff Bit Count, Arbitration to Data Sequence, Data to Arbitration Sequence)
	ADS Type (Arbitration to Data High Bit, Data High Bit 1, Data High Bit 2, Data Low Bit)
	DAS Type (DAH, Active High 1, Active High 2, Active Low 1)
	End of Frame
	Error (Missing Ack, XL Form Error, CRC, Any Error)
	CRC Type (PCRC, FCRC)

Bus decode

Characteristic	Description
Decode Display	Start of Frame (green bar)
	Priority Identifier (cyan packet)
	Remote Request Substitute (cyan packet)
	FD Format Indicator (cyan packet)
	XL Format Indicator (cyan packet)
	Reserved Bit XL Format (cyan packet)
	XL Bits (cyan packet)
	Data Length Control (purple packet)
	PCRC (purple packet)
	Data (cyan packet)
	FCRC (purple packet)
	FCP (purple packet)
	Ack (cyan packet)
	Ack Delimiter (cyan packet)
	End of Frame (Dark pink packet)
	Errors (red packet)
Table continued	

Characteristic	Description			Characteristic	Description
Search On	Start of Fram	Start of Frame			DAS Type (DAH, Active High 1, Active High 2
	Type of Fram	Type of Frame (XL Data Frame)			Active Low 1)
	Priority Identi	Priority Identifier			End of Frame
	Data (1 byte)				Error (Missing Ack, XL Form Error, CRC, Any
			(Error)
	Network ID, S Content, Stut	XL Bits (Acceptance Field, Virtual CAN Network ID, SDU Type, Simple Extended Content, Stuff Bit Count, Arbitration to Data Sequence, Data to Arbitration Sequence)			CRC Type (PCRC, FCRC)
		rbitration to Da ata High Bit 2, I	ta High Bit, Data Data Low Bit)		
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0 404.400ga 275 - 4 M 541.200ga 380 - 8	1 - 006 1 - 009	1 12% 84 1 88% 65	#06/189 #10/29/10/20/07/20 #10/00/47 #10/	114 1 - 114 1 -	
15 -471.1844a 315 - 8 16 -465.964a 380 - 8	1 - 004 1 - 007	1 1276 EA 1 28/9 6C	APORTER 2014 2014 2014 2014 2014 2014 2014 2014	118 1 - 188 1 -	
17 - 20.67540 275 - 0 18 - 270.39500 28C - 0	t - 004 t - 009	1 UN EA 1 BP9 K	9706/389 78:10 2/9 1/8 2/42 1/9 2/9 47/50047 1 10:544110 79:354 (44) 2/46 03 09 2/8 (46) 2/47 1/9 2/8 3/9 06 09 2/3 391 6/9 1/1	168 1 - 169 1 -	
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19 475.5118µ8 275 - 0 10 540.1984µ8 280 - 0	t - 00 t - 00	1 1236 EA 1 0899 EC	ICSABITC IP 01 304 345 248 00 09 200 C4C87473 1	100 1 -	
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Protocol Decode Results Table provides a time-stamped, tabular view of all captured packets on the CAN XL bus.



Triggering on Start of Frame on the CAN XL bus and searching on it.

CAN FD (ISO and non-ISO) characteristics

Bus setup options

Characteristic	Description	
Source for CAN_H,	Analog channels	
CAN_L, Rx, or Tx	Digital channels	
(single-ended probing)	Active Math channels ¹	
	Active Reference channels ¹	
Source for Diff	Analog channels	
(differential probing)	Active Math channels ¹	
	Active Reference channels ¹	
Thresholds	Per-channel thresholds	
Recommended	Single -ended	
Probing:	Differential	
CAN_H, CAN_L, Rx, or Tx		
Diff		
Version	ISO	
	non-ISO	
SD Bit Rate Selection:	10 kb/s - 1 Mb/s	
Predefined list of rates	All but 3 Series MDO: 50 kb/s - 10 Mb/s	
Custom	3 Series MDO: 10 kb/s - 1 Mb/s	
FD Bit Rate Selection:	All but 3 Series MDO: 1 Mb/s - 16 Mb/s	
Predefined list of rates	3 Series MDO: 1 Mb/s - 7 Mb/s	
Custom	All but 3 Series MDO: 500 kb/s - 16 Mb/s	
	3 Series MDO: 500 kb/s - 7 Mb/s	
Sample Point	All but 3 Series MDO: 55% - 95% of bit period of unit interval	
	3 Series MDO: 15% - 95% of bit period of unit interval	
Formats Available	Mixed Hex	
	Hex	
	Binary	
1	Symbolic (.dbc) ¹	

Display modes

Characteristic	Description
Bus	Bus only
Bus and Waveforms	Simultaneous display of bus and digital waveforms
Results Table	Decoded packet data in a tabular view

Bus trigger and search options

Characteristic	Description
Trigger and/or Search	Start of Frame
On	Type of Frame (Data, Remote, Error, Overload)
	FD Bits (Bit Rate Switch bit, Error State Indicator bit)
	Identifier (Standard or Extended)
	Data (1-8 bytes, trigger or search when =, \neq , <, <, >, \geq)
	Identifier and Data
	End of Frame
	Error (Missing Ack, Bit Stuffing Error, FD Form Error, Any Error)

Symbolic bus search options

Characteristic	Description
Message	As defined by the .dbc file ¹
Message and Signal	As defined by the .dbc file ¹

Characteristic	Description
Decode Display	Start of Frame (green bar)
	Identifier (yellow packet)
	Data Length Control (purple packet)
	Data (cyan packet)
	CRC (purple packet)
	End of Frame (red bar)
	Errors (red packet)



Protocol Decode Results Table provides a time-stamped, tabular view of all captured packets on the CAN FD bus.



Triggering on a specific Identifier value and data pattern on the CAN FD bus and automatically searching on the same data pattern.

LIN characteristics (Version 2.0)

Bus setup options

Characteristic	Description
LIN Source	Analog channels
	Digital channels
	Active Math channels ¹
	Active Reference channels ¹
Thresholds	Per-channel thresholds
Recommended Probing	Single-ended
Polarity	Normal
	Inverted
Bit Rate Selection:	
Predefined list of rates	1.2 kb/s - 19.2 kb/s
Custom	All but 3 Series MDO: 1 kb/s - 100 kb/s
	3 Series MDO: 800 b/s - 100 kb/s
Sample Point	All but 3 Series MDO: 0% - 100% of bit period of unit interval
	3 Series MDO: 10% - 90% of bit period of unit interval
LIN Standard	V 1.x
	V 2.x
	Both
Include Parity Bits with	Yes
ID	No
Formats Available	Hex
	Binary
	Mixed

Display modes

Characteristic	Description
Bus	Bus only
Table continued	

Characteristic	Description
Bus and Waveforms	Simultaneous display of bus and digital waveforms
Results Table	Decoded packet data in a tabular view

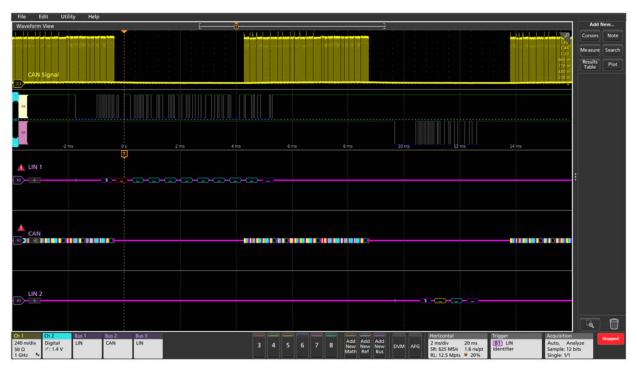
Bus trigger and search options

Characteristic	Description
Trigger and/or Search	Sync
	Identifier
	Data (number of bytes 1-8, trigger or search when =, ≠, <, ≤, >, ≥, Inside Range, Outside Range)
	ID and Data
	Wakeup Frame
	Sleep Frame
	Error (Sync, ID Parity, Checksum)

Characteristic	Description
Maximum Clock/Data Rate	Up to 100 kb/s, by LIN definition up to 20 kb/s (for automated decoding of bus)
Decode Display	Start of Frame (green bar)
	Sync
	Identifier (yellow packet)
	Data (cyan packet)
	CRC (purple packet)
	Errors (red packet)

	de Results								× Add	d New
Bus 1 (LIN)	12							Cursors	s N
	A Start Time	Stop Time	Identifier ((h) Parity (b)	Unframed (h)	Data (h)	Checksum (h)			
	-107.4613ms	-100.3323ms	3C	00		80 FF FF FF FF FF FF FF	80	Checksum: Checksum, calculated 07h	Measure	e Se
	-760.8545µs	3.411407ms	00	10		2F 45 C3	90	Checksum: Checksum, calculated 2Fh	Results	F) 🕞
	105.8623ms	112.936ms	01	11		1E AF 74 99 E2 45 8C 83	2A		Table	
	133.1646ms	133.428ms								
	212.5379ms	219.6142ms	02	11		54 43 A8 2E C6 B6 81 2F	AO	Identifier: Parity		
	319.2824ms	324.6193ms	03	00		12 48 B1 16 14	C9	Checksum: Checksum, calculated FFh		
	425.9819ms	429.0045ms	04	11		3F	FB	Sync: Invalid sync field		
	532.6003ms	536.7754ms	05	10		98 1D E7	DC			
	639.3519ms	643.5739ms	06	00		67 23	6F			
	746.0544ms	751.3855ms	07	01		DC 2C 34 8E E8	4B	Checksum: Checksum, calculated 04h		
veform	i View	į	i i	ľ			1		খ	
[I View 140 ms com Scale 1.00 m05			100 ru om) Vertical Zo		200 ms31	0 00 ms	400 ms 500 ms 600 ms 700 ms	* *	
[-140 ms				am C 3		00 ms		: ×	
[-140 ms								×	
[-140 ms								* *	
[-140 ms						90 ms		 ×	
[-140 ms						90 ms		×	
[-140 ms						90 ms		* *	
ontal 2	-140 ms								×	
[-140 ms		(100.00x.20	oen) Veetical Ze					* *	
	-140 ms		(100.00x.20	oen) Veetical Ze				600 ms 0 700	×	
ontal 2	-140 ms		(100.00x.20	oen) Veetical Ze					×	
LIN +	- 1 Jo mol			oen) Veetical Ze		(1.00 room)				
LIN +	soon faa't 1.00 mad			om) Vertical Za	h	(1.00 room)	h)(0202995)	Bula (25) Bila (45) Bula (25) Bila (45) C 24A no 111 ms 112 ms 113 ms 114 ms Horizontal Trigger Acq	x x zistion zistion z. Analyze	

Protocol Decode Results Table provides a time-stamped, tabular view of all captured LIN packets.



Display of multiple LIN and CAN buses, showing timing between the buses.

FlexRay characteristics (Version 2.0)

Bus setup options

Characteristic	Description
Source for Differential Probing	Analog channels
(Bdiff)	Active Math channels ¹
	Active Reference channels ¹
Source for Single-ended Probing (BP, BM)	Analog channels
	Digital channels
	Active Math channels ¹
	Active Reference channels ¹
Source for Single-ended Probing	Analog channels
(Tx, Rx)	Digital channels
	Active Math channels ¹
	Active Reference channels ¹
Thresholds:	High and Low thresholds
Bdiff	High and Low thresholds
BP, BM (analog channels)	Single threshold
BP, BM (digital channels)	Single threshold
Tx, Rx	
Recommended Probing:	Differential
Bdiff, BP, BM	Single-ended
Tx, Rx	
Channel Type	A
	В
Bit Rate Selection:	2.5 Mb/s, 5 Mb/s, 10 Mb/s
Predefined list of rates	1 Mb/s - 10 Mb/s
Custom	
Formats Available	Hex
	Binary
	Mixed Hex (Decimal: ID, Len, and Count; Hex: Data and CRCs)

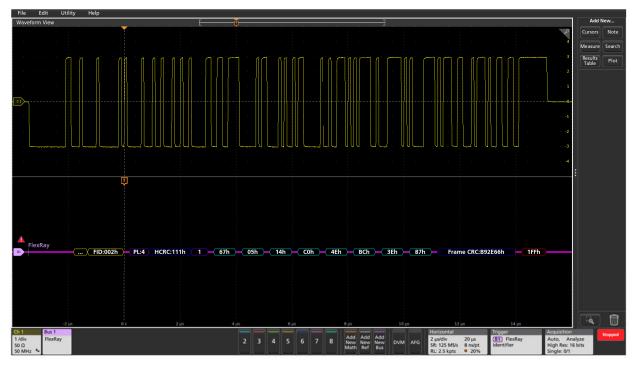
Display modes

Characteristic	Description
Bus	Bus only
Bus and Waveforms	Simultaneous display of bus and digital waveforms
Results Table	Decoded packet data in a tabular view

Bus trigger and search options

Characteristic	Description
Trigger and/or Search	Start of Frame
On	Indicator Bits (Normal, Payload, Null, Sync, Startup)
	Cycle Count (when =, \neq , <, ≤, >, ≥)
	Header Fields (Indicator Bits, Identifier, Payload Length, Header CRC, and Cycle Count)
	Identifier (when =, \neq , <, ≤, >, ≥)
	Data (when =, ≠, <, >, ≤, ≥)
	Identifier and Data
	End Of Frame (Static, Dynamic)
	Error (Header CRC, Trailer CRC, NULL Frame in Static, NULL Frame in Dynamic, Sync Frame in Dynamic, Start Frame No Sync)

Characteristic	Description
Maximum Clock/Data Rate	Up to 10 Mb/s (for automated decoding of bus)
Decode Display	TTS (purple box)
	Start (green bracket)
	Frame ID (yellow box)
	Payload Length (purple box)
	Headers (purple box)
	Cycle Count (yellow box)
	Data (cyan box)
	CRC, DTS, CID (purple box)
	Stop (red bracket)



Decoded FlexRay bus, with the acquisition triggered on a specified identifier value.



Decoded FlexRay bus, with all data values in a specific range marked with pink brackets.

SENT Characteristics¹

Bus setup options

Characteristic	Description
SENT source	Analog channels
	Digital channels
	Active Math channels
	Active Reference channels
Thresholds	Per-channel thresholds
Recommended Probing	Single-ended
Polarity	Normal
	Inverted
Clock Tick	1 µs - 300 µs
Tick Tolerance	1% - 30%
Fast Data Channels	1 or 2
Data Nibbles	3, 4, or 6 nibbles
(1 Fast Data Channel)	
Channel Widths (C1/C2)	12/12, 14/10, or 16/8 bits
(2 Fast Data Channels)	
Pause Pulse	Yes
	No
Slow Channel	None
	Enhanced w/ 4-bit ID
	Enhanced w/ 8-bit ID
	Short
Formats Available	Mixed Hex
	Binary
	Hex
	Mixed Decimal

Display modes

Characteristic	Description
Bus	Bus only
Bus and Waveforms	Simultaneous display of bus and digital waveforms
Results Table	Decoded packet data in a tabular view

Bus trigger options

Characteristic	Description
Trigger On	Start of Packet
	Fast Channel(s) (Status/Communication, Data)
	Slow Channel (Message ID, Data)
	CRC Error (Fast channel, Slow channel)

Bus search options

Characteristic	Description
Search On	Start of Packet
	Fast Channel(s) (Status/Communication, Data)
	Slow Channel (Message ID, Data)
	Pause Pulse (Number of Ticks)
	Error (Frame Length, Fast channel CRC, Slow channel CRC)

Characteristic	Description
Maximum Clock/Data Rate	Up to 10 Mb/s (for automated decoding of bus)
Decode Display	Sync (green packet)
	Fast Channel Status (purple packet)
	Slow Channel Message ID (yellow packet)
	Data (cyan packet)
	CRC (purple packet)
	Pause (purple packet)
	Errors (red packet)

File E	dit Utility	Help									
Bus Decode								×		Add	New
Bus 1 (SEN				1						Cursors	Note
Transferrer and the		Status	Chan 1 (h)			S ID (h)	S Data (F	Second Second			Caret
44	-13.23838ms		B5E	4F5	В		**			Measure	Search
45	-12.38638ms	01 00	282	4C9	5	-				Results Table	Plot
46	-11.53438ms		978	1A2	3			-		Table	
47	-10.68238ms	11 00	0EC	7FE	2		(min)				
48	-9.830377ms	10 00	694	482	3	**		**	-40 ms -30 ms -20 ms -10 ms 0's 10 ms 20 ms 30 ms 40 ms		
49	-8.978379ms	01 00	866	38F	3	07	075	01	Horizontal Zoom Scale 2.50 multiv 📫 🧰 (4.00x zoom) Vertical Zoom 🖬 🚛 (1.00x zoom) 🗙		
50	-8.126378ms	10 00	95D	A54	C	Start	**	1.00	201V		
51	-7.274379ms	10 00	OBE	F4A	D			**			
52	-6.422379ms	10 00	E48	083	0	**					
53	-5.570378ms	10 00	41A	DCB	F	**	aa (**			
54	-4.718377ms	10 00	5D8	FD7	F						
55	-3.866378ms	11 00	1F7	0E5	2			-			
56	-3.014378ms	00 00	3C1	3BC	0	**					
57	-2.162378ms	00 00	F08	3D5	5	**	** (a sense a service de la se		
58	-1.310377ms	00 00	A97	4A9	F						
59	-458.378µs	00 00	F06	DFB	6						
60	393.6206µs	00 00	27F	C72	С	-			340 mV		
61	1.245621ms	01 00	532	FB3	A	-	-	-	and the second		
62	2.097622ms	01 00	85E	4F5	8	**					
63	2.949623ms	01 00	282	4C9	5						
64	3.801621ms	10 00	978	1A2	3	**					
65	4.653623ms	11 00	OEC	7FE	2		** (
66	5.505623ms	10 00	694	482	3	**					
67	6.357621ms	01 00	B66	38F	3	07	075	01			
68	7.209623ms	10 00	95D	A54	с	Start			SENT		
69	8.061621ms	10 00	OBE	F4A	D		**				
70	8.913622ms	10 00	E48	083	0			-) Data:075h 01h (ID:07h) Data:075h)		
71	9.765623ms	10 00	41A	DCB	F						
72	10.61762ms	10 00	5D8	FD7	F						
73	11.46962ms	11 00	1F7	0E5	2	**	** (-			
74	12.32162ms	00 00	3C1	38C	0					112	
									-17.5 ms -15 ms -12.5 ms -10 ms -7.5 ms -5 ms -2.5 ms 0 s 2.5 ms	<u> </u>	
	Bus 1 SENT				2	3 4 5	6 7		Add Add Add Add Add New	alyze	Stopped

Protocol Decode Results Table provides a time-stamped, tabular view of all captured packets on the SENT bus.



Triggering on a specific Fast Channel Status and data pattern on the SENT bus and automatically searching on the same data pattern.

MIL-STD-1553 characteristics

Bus setup options

Characteristic	Description
MIL-STD-1553 Source	Analog channels
	Active Math channels
	Active Reference channels
Polarity	Normal
	Inverted
Thresholds	Single-ended: Per-channel thresholds
	Differential: High and low thresholds
Recommended Probing	Single-ended or differential
Bit Rate	1 Mb/s per the standard
Response Time	2 µs-100 µs
Formats Available	Mixed Hex
	Mixed ASCII
	Hex
	Binary

Display modes

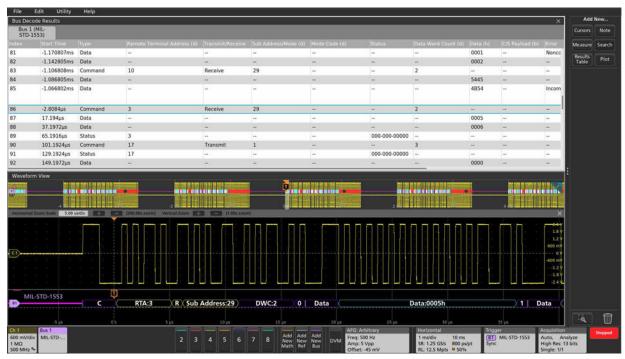
Characteristic Description	
Bus	Bus only
Results Table	Decoded packet data in a tabular view

Bus trigger and search options

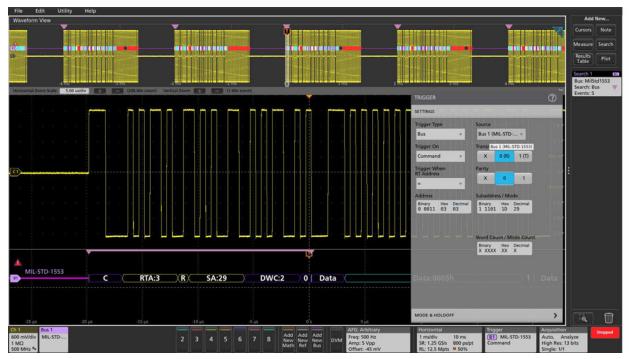
Characteristic	Description
Trigger and/or Search On	Sync Command (Transmit/Receive Bit, Parity, Subaddress / Mode, Word Count / Mode Count, and RT Address =, ≠, <, ≤, >, ≥, Inside Range, Outside Range) Status (Parity,

Characteristic	Description
	Bit 9 - Message Error,
	Bit 10 - Instrumentation,
	Bit 11 - Service Request,
	Bit 15 - Broadcast Command Received,
	Bit 16 - Busy,
	Bit 17 - Subsystem Flag,
	Bit 18 - Dynamic Bus Control Acceptance,
	Bit 19 - Terminal Flag,
	and Data =, ≠, <, ≤, >, ≥,
	Inside Range, Outside Range)
	Data (Parity, and Data =, \neq , <, ≤, >, ≥,
	Inside Range, Outside Range)
	Time (RT / IMG) (> Maximum, < Minimum, Inside range, Outside Range)
	Error (Parity Error, Sync Error, Manchester Error (trigger only), Non-contiguous Data)

Characteristic	Description
Maximum Clock/Data Rate	Up to 1Mb/s (for automated decoding of bus)
Decode Display	Start (green bar)
	Sync (purple packet with Word Type identified)
	Address (yellow packet)
	R/T (purple packet)
	Word Count (purple packet)
	Data (cyan packet)
	Parity (purple packet)
	Errors (red packet)
	Stop (red bar)



Protocol Decode Results Table provides a time-stamped, tabular view of all captured MIL-STD-1553 packets.



Triggering on a specific command pattern on the MIL-STD-1553 bus and automatically searching on the same pattern.

ARINC 429 characteristics (ARINC Specs 429 PART 1-17)

Bus setup options

Characteristic	Description	
ARINC 429 Source	Analog channels	
	Active Math channels	
	Active Reference channels	
Signal Type	Differential	
Polarity	Normal	
	Inverted	
Thresholds	High and low thresholds	
Recommended Probing	Differential	
Bit Rate Selection:	12.5 kb/s, 100 kb/s	
Predefined list of rates	10 kb/s - 1 Mb/s	
Custom		
Data Format	Data (19 bits)	
	SDI+Data (21 bits)	
	SDI+Data+SSM (23 bits)	
Formats Available	Mixed Hex	
	Hex	
	Binary	

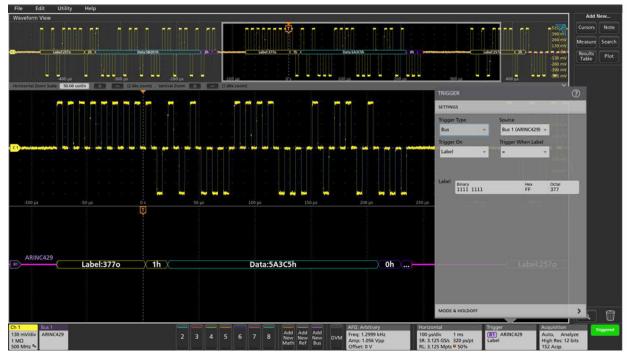
Bus trigger and search options

Characteristic	Description
Trigger and/or Search	Word Start
	Label (when =, ≠, <, ≤, >, ≥, Inside Range, Outside Range)
	Data (when =, ≠, <, ≤, >, ≥, Inside Range, Outside Range)
	Label and Data (Label value and Data =, ≠, <, ≤, >, ≥, Inside Range, Outside Range)
	Word End
	Error (Any Error, Parity Error, Word Error, Gap Error)

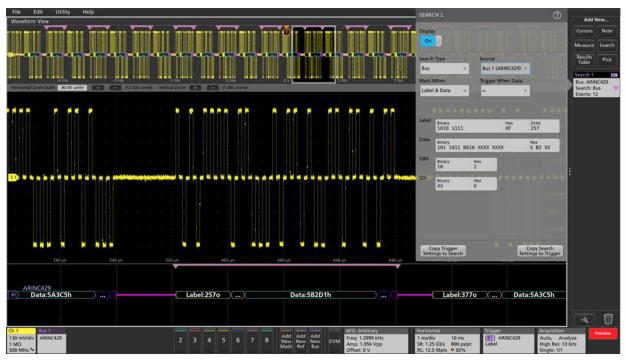
Bus decode

Characteristic	Description
Decode Display	Start (green bracket)
	Label (yellow box)
	Source Destination Identifier (yellow box)
	Data (cyan box)
	Sign/Status Matrix (purple box)
	Parity (purple box)
	Stop (red bracket)
	Error (red box)

Characteristic	Description
Bus	Bus only
Results Table	Decoded packet data in a tabular view



Decoded ARINC 429 bus, with the acquisition triggered on a specified label value.



Decoded ARINC 429 bus, with all data values in a specific range marked with pink brackets.

Audio characteristics

Bus setup options

Characteristic	Description
Audio Sources (Bit Clock, Word Select, Data)	Analog channels
	Digital channels
,	Active Math channels ¹
	Active Reference channels ¹
Thresholds	Per-channel thresholds
Bit Clock Polarity	Rising Edge
	Falling Edge
Word Select Polarity	Normal
	Invert
Data Polarity	Active High
	Active Low
Word Size	4 - 32 bits
Formats Available	Hex
	Binary
	Signed Decimal

Characteristic	Description
Results Table	Decoded packet data in a tabular view

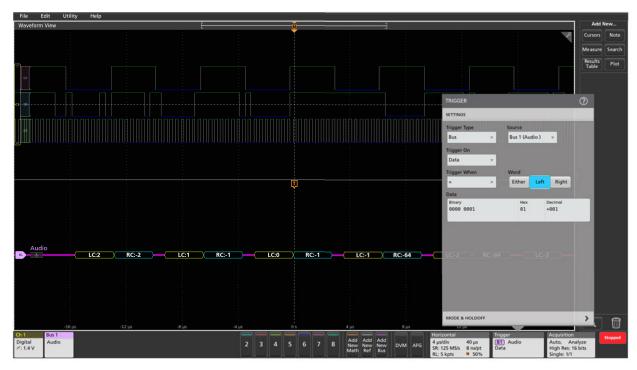
Bus trigger and search options

Characteristic	Description
	Word Select (I ² S, LJ, RJ only)
On	Frame Sync (TDM only)
	Data (when =, ≠, <, >, ≤, ≥, Inside Range, Outside Range; Left, Right, or Either Word)

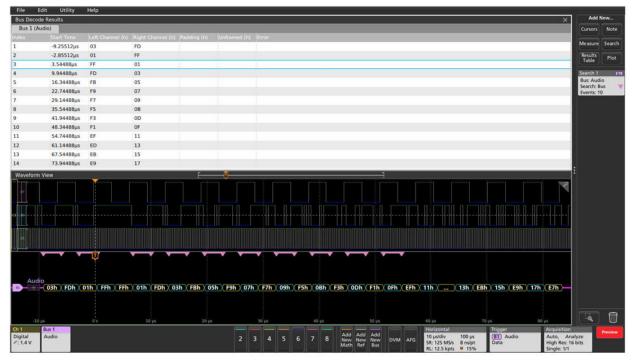
Bus decode

Characteristic	Description
Maximum Clock/Data Rate	All but 3 Series MDO: Up to 10 Mb/s (for automated decoding of bus)
	3 Series MDO: Up to 12.5 Mb/s (for automated decoding of I2S/LJ/RJ bus)
	3 Series MDO: Up to 25 Mb/s (for automated decoding of TDM bus)
Decode Display	Left Channel Data (I ² S, LJ, RJ) (yellow box)
	Right Channel Data (I ² S, LJ, RJ) (cyan box)
	Channel 1 Data (TDM) (yellow box)
	Channel 2 - N Data (TDM) (cyan box)

Characteristic	Description
Bus	Bus only
Bus and Waveforms	Simultaneous display of bus and digital waveforms
Table continued	



Decoded I²S bus, with data values displayed in signed decimal format, and the MSO triggered on a specific data value.



Decoded I²S bus, with data values displayed in hex and Results Table format, and the Wave Inspector automatic search marking all occurrences of the data values equal to 0X hex.

USB 2.0 Characteristics (Version 2.0)

Bus setup options

Characteristic	Description
USB 2.0 Source(s)	Analog channels
	Digital channels (single-ended)
	Active Math channels
	Active Reference channels
Thresholds	Per-channel thresholds
Speed	USB 1.0 (1.5 Mbps)
	USB 1.1 (12 Mbps)
	USB 2.0 (480 Mbps)
Recommended Probing:	
USB 1.0 and USB 1.1	Single-ended
USB 2.0	Differential
Formats Available for	Mixed Hex
USB 1.0, USB 1.1, and USB 2.0	Hex
	Binary
	Mixed ASCII

Display modes

Characteristic	Description
Bus	Bus only
Bus and Waveforms	Simultaneous display of bus and digital waveforms
Results Table	Decoded packet data in a tabular view

Bus trigger options

Characteristic	Description
Trigger On	Sync
	Reset
	Suspend
	Resume
	End of Packet
	Token (address) Packet

Characteristic	Description
	Data Packet
	Handshake Packet: ACK, NAK, STALL, NYET (USB 2.0 only)
	Special Packet: PRE (USB 1.1 only), ERR, SPLIT, PING, Reserved
	Error: PID check, CRC5 or CRC16, Bit stuffing (USB 1.0 and USB 1.1 only)

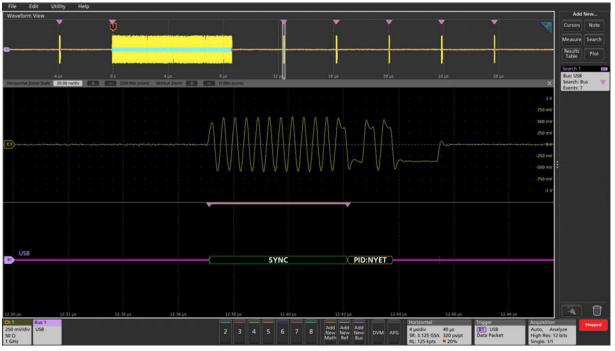
Bus Search options

Characteristic	Description
Search On	Sync
	Reset
	Suspend
	Resume
	End of Packet
	Token (address) Packet
	Data Packet
	Handshake Packet: ACK, NAK, STALL, NYET (USB 2.0 only)
	Special Packet: PRE (USB 1.1 only), ERR, SPLIT, PING, Reserved
	Error: PID check, CRC5 or CRC16, Bit stuffing (USB 1.0 and USB 1.1 only)

Characteristic	Description
Decode Display	Start of packet (green bar)
	Sync (green packet)
	PID (yellow packet)
	Token (address) (yellow packet)
	Data (cyan packet)
	CRC (purple packet)
	Error (red packet)
	End of packet (red bar)



Protocol Decode Results Table provides a time-stamped, tabular view of all captured packets on the USB bus.



Triggering on a specific data pattern on the USB 2.0 bus and automatically searching on Sync.

USB 3.0 Characteristics (Version 3.0)

Bus setup options

Characteristic	Description
USB 3.0 Source(s)	Analog channels
	Digital channels
	Active Math channels
	Active Reference channels
Thresholds	Per-channel thresholds
Speed	USB 3.0 (5 Gbps)
Recommended Probing:	
USB 1.0, USB 1.1, and USB 3.0	Single-ended
	Differential
Formats Available for USB 3.0	Hex
	Binary
	Mixed Hex
Packet View for USB 3.0	On
	Off

Display modes

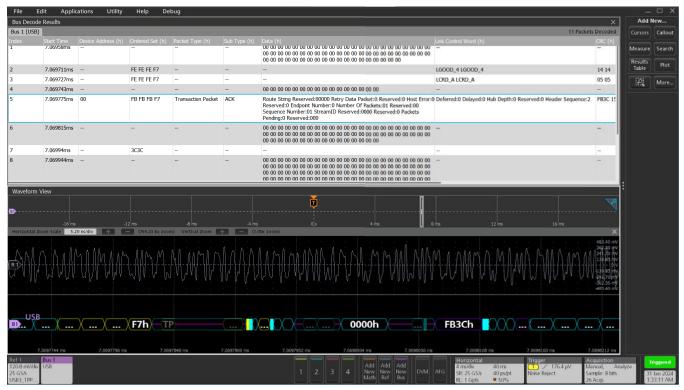
Characteristic	Description
Bus	Bus only
Bus and Waveforms	Simultaneous display of bus and digital waveforms
Table continued	

Table continued...

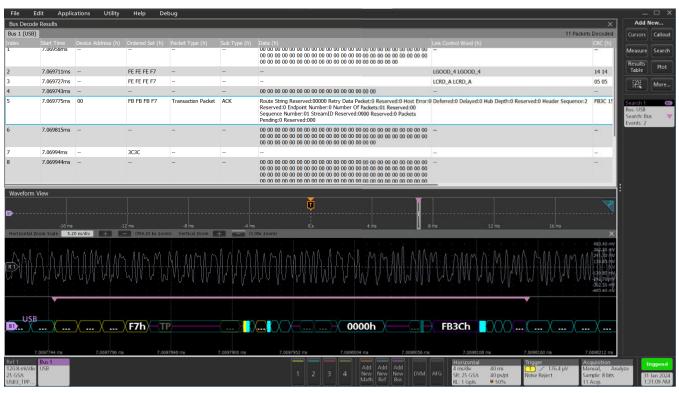
Characteristic	Description
Results Table	Decoded packet data in a tabular view

Bus Search options

Characteristic	Description
Search On	Packet View On Only
	Ordered Set: DPPSTART, DPPEND, DPPABORT, LCSTART, HPSTART
	LMP: Port Capability, Port Configuration, Port Configuration Response, Precision Time Management, Set Link Function, U2 Inactivity Timeout, Vendor Device Test, ANY
	 TP: ACK, DEV Notification, ERDY, NRDY, PING, PING Response, STATUS, STALL, ANY
	DP: ITP, ANY
	Error: CRC5, CRC16, CRC32
	Packet View Off Only
	 Ordered Set: TSEQ, TS1, TS2, SKP Compliance Pattern: CP0, CP1, CP2, CP3, CP4, CP5/6, CP7/8 Custom
	Error: Character, Disparity
	Control Character: COM, EDB, END, EPF, SDP, SHP, SKP, SLC, SUB, Any



USB3 bus setup and Mixed Hex display, showing decode with speed USB 3.0 and packet view On.



Searching the USB bus with decode speed USB 3.0 and packet view On for the TP packets

Ethernet characteristics¹

Bus setup options

Characteristic	Description	
Ethernet Source(s)	Analog channels Active Math channels Active Reference channels	
Thresholds	Per-channel thresholds	
Speed	10BASE-T 100BASE-TX	
Recommended Probing	Differential	
Formats Available	Mixed Hex Hex Binary Mixed ASCII	

Display modes

Characteristic	Description
Bus	Bus only
Bus and Waveforms	Simultaneous display of bus and digital waveforms
Results Table	Decoded packet data in a tabular view

Bus trigger options

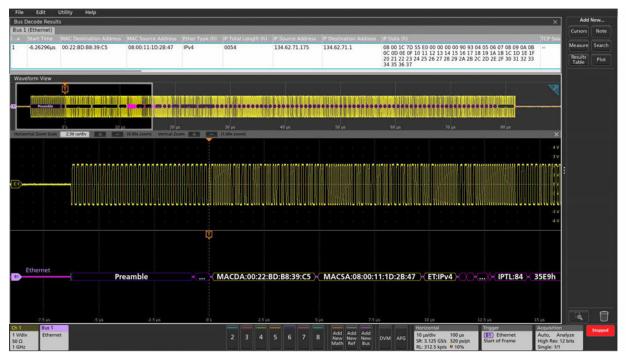
Characteristic	Description
Trigger On	Start Frame Delimiter
	MAC Addresses
	Q-Tag Control Information
	MAC Length/Type
	IPv4 Header
	TCP Header
	MAC Data
	TCP-IPv4 Client Data

Characteristic	Description	
	ldle	
	End of Packet	
	Frame Check Sequence (CRC) Error	

Bus search options

Characteristic	Description
Search On	Start Frame Delimiter
	MAC Addresses
	Q-Tag Control Information
	MAC Length/Type
	IPv4 Header
	TCP Header
	MAC Data
	TCP-IPv4 Client Data
	Idle
	End of Packet
	Frame Check Sequence (CRC) Error

Characteristic	Description
Decode Display	Start of Packet (green bar)
	Preamble (purple packet)
	SFD (purple packet)
	Address (yellow packet)
	EtherType (yellow packet)
	IP packet (purple packet)
	Data (cyan packet)
	IPv4 packet (pink packet)
	TCP packet (white packet)
	Frame Check Sequence (yellow packet)
	Error (red packet)
	End of packet (red bar)



Protocol Decode Results Table provides a time-stamped, tabular view of all captured packets on the 10BASE-T Ethernet bus

File	e Edit L	Jtility Help								
Bus	Decode Results	1							X Add New	+
Bus	1 (Ethernet)								Cursors Not	te
1	56/11/me	MAC Destination Address 00:22:90:ED:45:C5	08:00:11:FF:01:CA	Ether Type (h)	IP Total Length (h) 0054	134.62.74.162	IP Destination Address 134.62.74.1	08 00 17 A2 06 A3 00 00 6B 0B 6E AF 00 00 00 00 00 00 00 00 00	Measure Sear	rch
								00 00 00 00 00 00 00 00 00 00 00 00 00	Results	
								00 00 00 00	Table Plo	<u>и</u>
2	9.604915µs	00:22:90:ED:45:C5	08:00:11:FF:01:CA	0088		-	-	-	** Search 1	-
									Bus: Ethernet Search: Bus	
									Events: 6	
3	19.84485µs	00:22:90:ED:45:C5	08:00:11:FF:01:CA	0054	-	-	-		-	
4	30.08472µs	00:22:90:ED:45:C5	08:00:11:FF:01:CA	IPv4	0054	134.62.74.162	134.62.74.1	08 00 17 A2 06 A3 00 00 6B 0B 6E AF 00 00 00 00 00 00 00 00		
								00 00 00 00 00 00 00 00 00 00 00 00 00		
								00 00 00 66		
5	40.32477µs	00:22:90:ED:45:C5	08:00:11:FF:01:CA	IPv4	0054	134.62.74.162	134.62.74.1	-	0	
6	50.56483µs	00:22:90:ED:45:C5	08:00:11:FF:01:CA	IPv4	0054	134.62.74.162	134.62.74.1	-	2048	
Wa	veform View									
					and Total and a state			and the better is a local and the best when when we have been a strategied in the second		
-		an fine con ann an aith an a	a pante present alle for	IN THE OWNER OF THE OWNER OWNE		ten Ultigen die gewennen	LUND CONTRACTOR			
Hor	zontal Zoom Scale	250.00 mildiv +1 -1	(40.00s zoom) Vertical Zo		(1.00x zoom)	and the second second second			×	
			m H H			AMAN		E E E E E E E E E	-2V	
									1 V	
9		ه لو وقا ولا من و من و و	ليغ ويتنظيح ولايع د	. بالوطيع بيا	Physic by the	har h daama a	نواط والورة لتورينك وال	والمرابعة المحصية والمراجعة والمراجعة والمراجع والمراجع والمراجع والمحاط	P. 67	
- L									-17	
	- 30.	75 µs 31 µs	31.25 µs		50 µs	31.75 µs		32.25 µs 32.50 µs 32.75 µs		
4	Ethernet									
81)	P SFD (MACDestAddr:00:22:9	0:ED:45:C5 MAC	Src Addr:08:0	0:11:FF:01:CA	ET:IPv4) IPTL:84 (IP	Pl:0000h 0000h 64 9989h 134.62.	74.162	
									(TTT) 6	-
Ch 1 500	nV/div Etherne						Add Add Add	10 ut/div 100 us (R1) Ethernet	Auto, Analyze	ped
50 D	200000 - 20000000 				2 3 4	5 6 7 8	New New New C Math Ref Bus	SR: 3.125 G5/s 320 ps/pt Start of Frame	High Res: 12 bits	
1 GP	2					-n n $-n$		RL 312.5 kpts 9 10%	lingle: 0/1	

Triggering and automatically searching on the 100BASE-TX Ethernet bus.

SPMI characteristics¹ (Version 2.0)

Bus setup options

Characteristic	Description		
SPMI Sources (Clock	Analog channels		
and Data)	Digital channels		
	Active Math channels		
	Active Reference channels		
Thresholds	Per-channel thresholds		
Recommended Probing	Single-ended		
Formats Available	Mixed Hex		
	Hex		
	Binary		

Display modes

Characteristic	Description
Bus	Bus only
Bus and Waveforms	Simultaneous display of bus and digital waveforms
Results Table	Decoded packet data in a tabular view

Bus trigger options

Description	
Sequence Start Condition (SSC)	
Reset	
Sleep	
Shutdown	
Wakeup	
Authenticate	
Master Read	
Master Write	
Register Read	

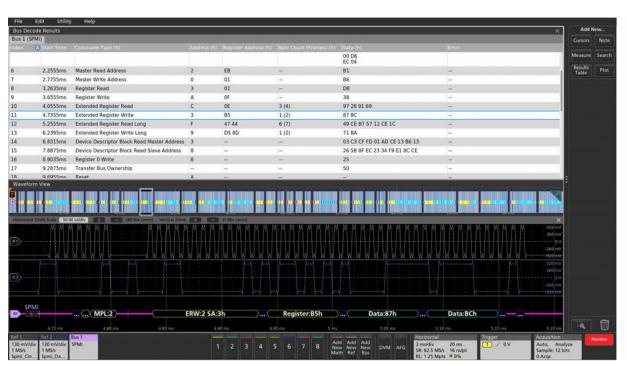
Characteristic	Description		
	Register Write		
	Extended Register Read		
	Extended Register Write		
	Extended Register Read Long		
	Extended Register Write Long		
	Device Descriptor Block Master Read		
	Device Descriptor Block Slave Read		
	Register 0 Write		
	Transfer Bus Ownership		
	Parity Error		

Bus search options

Characteristic	Description
Search On	Sequence Start Condition (SSC)
	Reset
	Sleep
	Shutdown
	Wakeup
	Authenticate
	Master Read
	Master Write
	Register Read
	Register Write
	Extended Register Read
	Extended Register Write
	Extended Register Read Long
	Extended Register Write Long
	Device Descriptor Block Master Read
	Device Descriptor Block Slave Read
	Register 0 Write
	Transfer Bus Ownership
	Parity Error

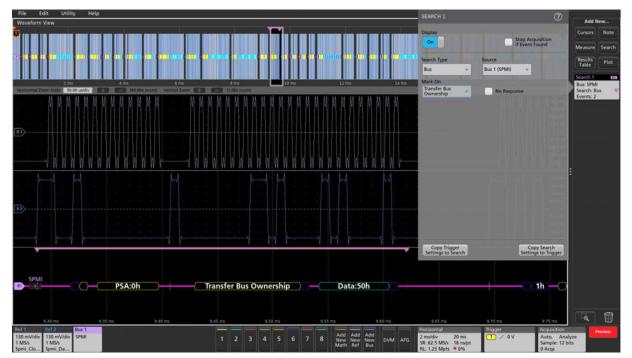
Bus decode

Characteristic	Description
Decode Display	Arbitration Start (yellow bar)
	Connect Bit (purple packet)
	Master ID (purple packet)
	Alert Bit (yellow packet)
	Slave Request Bit (yellow packet)
	Master Priority Level (gray packet)
	SSC (green bar)
	Command Frame, including Byte Count ² (yellow packet)
	Address (yellow packet)
	Data (cyan packet)
	Parity (purple packet)
	Ack/Nack (purple packet)
	Parity error (red packet)
	End of packet (red bar)



Protocol Decode Results Table provides a time-stamped, tabular view of all captured packets on the SPMI bus.

² The actual decimal Byte Count is displayed in Mixed Hex format, but the raw value is shown in Binary and Hex formats.



Automatically searching the SPMI bus for the Transfer Bus Ownership command

SpaceWire characteristics

Bus setup options

Characteristic	Description				
SpaceWire Sources	Analog Channels				
(Strobe and Data)	Digital Channels				
	Active Math Channels				
	Active Reference Channels				
Thresholds	Per-Channel Thresholds				
Recommended Probing	Differential				
Address/Data Formats	Hex				
Available	Binary				

Display modes

Characteristic	Description
Bus	Bus Only
Bus and Waveforms	Simultaneous display of bus and digital waveforms
Results Table	Decoded packet data in a tabular view

Bus search options

Characteristic	Description
Search On	Synchronization
	Control Code
	Control Character
	Data
	Errors

Characteristic	Description
Maximum Clock/Data Rate	2 Mbits/sec to 200 Mbits/sec
Decode Display	Null
	Control Character
	Control Code
	FCT
	Time-Code
	Parity
	Data-Control Flag
	Data
	End Of Packet
	Error End Of Packet
	Escape Sequence
	Escape Error
	Start FCT
	Start NULL

File	Edit	Applications	Utility	Help						SEARCH 1	C	2		
Wave	form View								- 4 - e - <mark>1</mark>				dd New	e
20	, ti									Display		Curr	iors N	lote
			_							On	Stop Acquisitio	in Uran	sure Se	arch
a														
		Incorrection of			a sa ang kang kang kang kang kang kang kang					Startin type	Source	Resi	ale	Plot
1.2			-							Bus v	Bus 1 (SpaceWire) +	Sear	ch 1	
	0.5	ale 2.00 us/div	100 µs	200 ps	300 µs	400 µs	500	μs	600 µs	Mark On	and an and a second	Bus:	SpaceWin	re
Honzo	intal zoom se	2.00 05/012	÷	(Solog Zoom) Verba	Loom ET E 2.45	zoom)				Control Code			chc Bus ts: 1	
										Control Code Type				
										Time Code	-			
R 1										Time Code				
										Binary H	lex			
										XXX XXXXX X	CX			
		108 µs		110 µs 1	12 µs 114 µ		116µs	118 µs	120 pr	11114				
										1000				
R2														
										the second second				
										A CONTRACTOR OF A CONTRACTOR A				
-	SpaceW	lire	-1							Conv Trigger	Copy Search			
<u>(11)</u>	(.)	^{/ire} Data:51	-n		ESC:7h	<u>on</u>	lime-0	Code:3Ch	<u></u>	Copy Trigger Settings to Search	Settings to Trigg	er		
												-		-
Ref 1	Ref 2							Add Add A		Horizontal	Trigger Acquisit		Au	to
500 ml 104.53		mV/div SpaceWire 5361	6					New New N	Iew DVM AFG		t OV Auto, Sample:	Analyze 12 bits	18 km	2019
spacev		ewire	-					Math Ref B		RL: 1.25 Mpts 95.9%	2.575 k/	Acqs	18 Jun 3:26:4	1 AM

Searching on a specific data pattern on the SpaceWire bus and automatically searching on Sync.

File	Edit Appli	ications Utility	Help		l .	(, I.I.I.									(,	Tektr	onix
Bus Dec	code Results															×	Add N	ew
Bus 1 (S	ipaceWire)																Cursors	Note
Index																and the second se		
7	177.9241µs	FCT FCT FCT FCT FCT FCT FCT FCT FCT FCT FCT FCT	-		-												Measure	
	_	FCT FCT	-		_	_											Table	Plot
8	213.2803µs	-	-	89 C4 CD 17 D8 D9 32	-													
9	258.1069µs	EOP																
10	260.001µs	FCT FCT FCT	-		-													
11	267.5773µs	-	-	5A 72 86														
12	287.1495µs	EOP	-	-	-													
13	289.0436µs	FCT FCT	-	-	-													
14	294.0945µs	**	-	97 71	-													
15	307.353µs	EOP																
16	309.2471µs	FCT FCT FCT FCT																
Horizont	0 s tal Zoom Scale 2.	109 µs 00 us/div + -	200 µs	300 ps Vertical Zoom	(2:40x 2	400 pr som)	5 5	507 1	1 111 1111	600 600		70	Ομs	809 µs		900 µs -2 V X		
R1)										1						625 mV 208,333 mV -208,333 mV -208,333 mV -625 mV -1.041667 V		
		1			1	-			1.1	1			1 12		1.10	625 mV		
R2																208.333 mV		
																-208.333 mV		
																-625 mV		
186 µs		168 µs	190 µs	192 µs	19	us :	19	16 µs	1	198 µs		200 µs	1 1 11	102 µs	204 µ	s -1.041667 V		
4																		
S	paceWire					-				-								
BI	+ FCT:4h	0h FCT	:4h_) 0h	FCT:4h	0h/	FCT:4	lh_) 0	h (F	CT:4h	<u>)</u> 0h	FC1:	:4h)	0h (CT:4h) Oh (FCT:4h		
																	Tà I	
								18										U
Ref 1 500 mV/c 104.5361	div 500 mV/div 1 104.5361	Bus I SpaceWire			1 2	3 4	5 6	7 8	Add A New N	Add Add lew New Ref Bus	DVM AF		s/div 1 m 25 GS/s 800	ps/pt	per) ∕ 0V	Sample: 12 bits	nalyze s 18.	Auto Jun 2019
spacewin	e spacewire	2			الصالط	لنصالحك	لصنالنصا	كالصبا			ان	- RL: 1.	25 Mpts 🛛 🐺 5.	9%		1.847 kAcqs	3.2	5:53 AM

The Protocol Decode Results Table provides a time-stamped, tabular view of all captured packets on the SpaceWire bus.

Automotive Ethernet (100BASE-T1) characteristics (Version BRR V3.2)

Bus setup options

Characteristic	Description					
Ethernet Source(s)	Analog Channels					
	Active Math Channels					
	Active Reference Channels					
Thresholds	Per-channel Thresholds					
Speed	100 Mbits/sec					
Recommended Probing	Differential					
Formats Available	Mixed Hex					
	Hex					
	Binary					
	Mixed ASCII					

Display modes

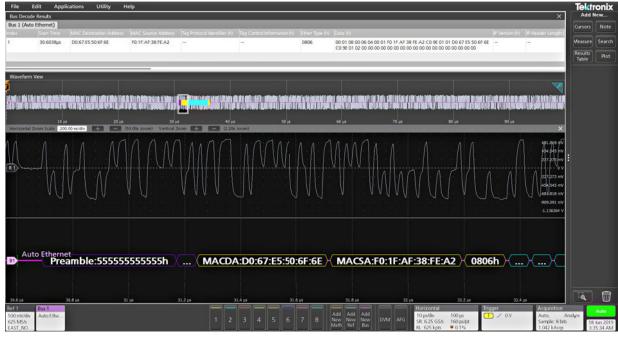
Characteristic	Description
Bus	Bus Only
Results Table	Decoded packet data in a tabular view

Bus search options

Description
Start of Frame
Start of Frame Delimiter
MAC Addresses
Q-Tag Control Information
MAC Length/Type
IPv4 Header
TCP Header
MAC Data
TCP-IPv4 Client Data

Characteristic	Description
	End of Packet
	Frame Check Sequence (CRC) Error

Characteristic	Description
Maximum Clock/Data Rate	100 Mbits/sec
Decode Display	Start of Packet (green bar)
	Preamble (purple packet)
	SFD (purple packet)
	Address (yellow packet)
	EtherType (yellow packet)
	IP packet (purple packet)
	Data (cyan packet)
	IPv4 packet (pink packet)
	TCP packet (white packet)
	Frame Check Sequence (yellow packet)
	Error (red packet)
	End of packet (red bar)



The Protocol Decode Results Table provides a time-stamped, tabular view of all captured packets on the Automotive Ethernet (100BASE-T1) bus.



Searching on a specific data pattern on the Automotive Ethernet (100BASE-T1) bus and automatically searching on Start of Frame.

8b10b Characteristics (Line encoding)

Bus setup options

Characteristic	Description
8b10b Sources	Analog Channels
(Strobe and Data)	Digital Channels
	Active Math Channels
	Active Reference Channels
Thresholds	Per-Channel Thresholds
Recommended Probing	Differential
Formats Available	Hex
	Binary
	Symbolic

Bus decode

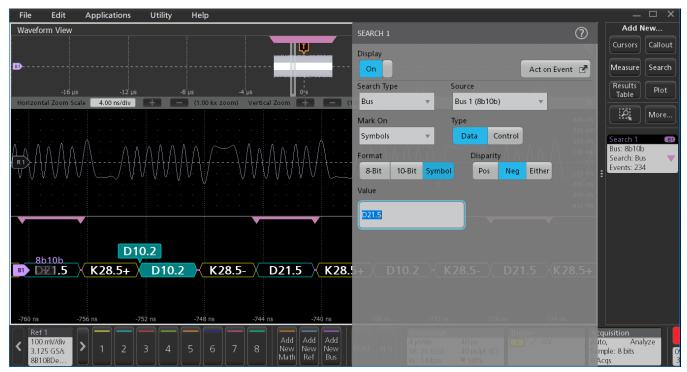
Characteristic	Description
Maximum Clock/Data Rate	1 Tbits/sec
Decode Display	Control Symbol (yellow packet) Data Symbol (cyan packet)
Error Handling	Invalid Symbols Running Disparity (6 bit and 4 bit)

Display modes

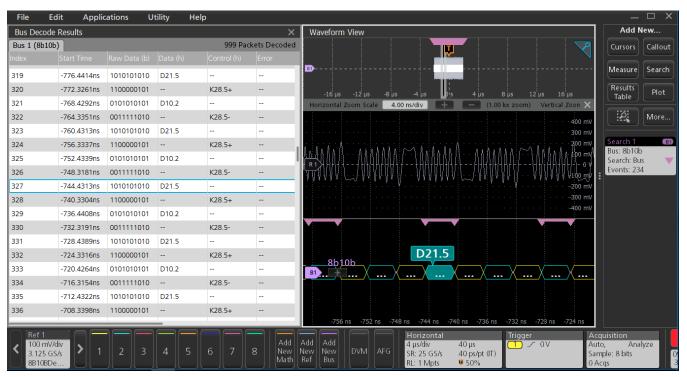
Characteristic	Description
Bus	Bus Only
Bus and Waveforms	Simultaneous display of bus and digital waveforms
Results Table	Decoded packet data in a tabular view

Bus search options

Characteristic	Description
Search On	Symbols [Format:8bit,10bit&symbol]
	Errors



Searching on a specific data symbol in symbol format on a 8b10b bus



The Protocol Decode results table provides time-stamped, tabular view of all captured packets on a 8b10b bus

Bus setup

NFC characteristics

Characteristic	Description
NFC sources	 Analog channels (Spectrum View to be turned on) Active Math channels Active Reference channels
Salient features	
	 Decode capability for NFC protocol Decode capability for ISO/IEC 15693, ISO/ IEC14443A, ISO/IEC14443B, and FeliCa Standards
	 Decode capability for Command and Response packets
	 Search capability for SOC, SOS, SYNC, EOC, SOF, AFI, PUPi, Identifier, Payload, UID, EOF, DATa, and EOS
	 Search capability for different ISO/IEC 14443A commands like REQ, WUPA, Proprietary, SELECT, and HLTA
	 Search capability for different ISO/IEC 15693, ISO/IEC 14443B, and FeliCa commands
	Search capability for Response packets
	 Search capability for Errors like CRC, Parity
Product differentiators	 Perform NFC protocol decode and search seamlessly with a single oscilloscope instrument
	 Analyze and correlate analog RF and digital signals simultaneously for enhanced insight
	 Save transfer time and memory of large recordings with hardware DDC (digital downconverter) on each input
	 Trigger on 13.56 MHz RF envelope using RF vs. Time traces and triggers, reducing the need to trigger on other I/O signals
Recommended probing	 EMI-NF-PROBE near-field probe set for contact-less probing and manual troubleshooting
	TPP1000 probe for conducted probing
Table continued	1

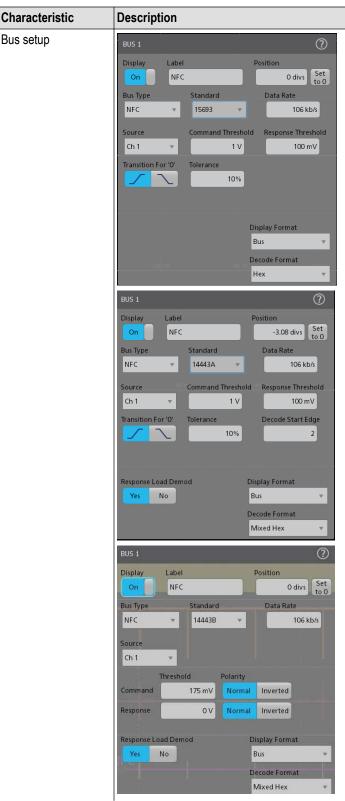


Table continued...

Characteristic	Description
	BUS 1
	Display Label Position On NFC O divs Set to 0
	Bus Type Standard Data Rate NFC ▼ FeliCa ▼
	Source Tolerance Ch 1 v 10%
	Threshold Transition For '0' Decode Start Edge Command 1 V 1 1
	Response 100 mV 1
	Display Format Bus 🔹
	Decode Format Mixed Hex
Formats available	 Hex Binary Mixed Hex

Characteristic	Description
Bus	Bus only
Result Table	Decoded packet data in a tabular view with columns containing:
	• Flag
	Command Code
	Mask Value LSB MSB
	Mask Length
	• DSFID
	Message LSB MSB
	Get Information Parameter Request
	Custom Request Parameter LSB MSB
	IC MFG Code
	Length
	Key ID
	• CSI
	• UID
	Data LSB MSB
	Optional AFI
	• AFI
	Number Of Block
	First Block
	Error Code

Characteristic	Description
	Information Flags
	VICC Memory Size
	• SEL
	• NVB
	• Each Bit RFU
	Propriety Coding
	UID Size
	• SAK
	Bit Frame AntiCollision
	Parity
	Response Code
	• PARAM
	• Data
	Pseudo Unique PICC Identifier
	Identifier
	Param1
	• Param2
	• Param3
	• Param4
	Higher Layer INF
	Attrib Info
	Higher Layer Response
	• CRC_B_APP
	Application Data
	Number of Applications
	Bit Rate Capability
	Max Frame Size
	Protocol Type From Waiting time Integer
	Frame Waiting time Integer Application Data Coding
	Application Data CodingNAD Frame Option
	CID Frame Option
	Start up Frame Guard Time
	SYNC
	• BSt
	• BRt
	• BRS
	• BSi
	• BRi
	• DIDi

Charact	teristic	Description				Characteristic	C	Description
		 DIDt FSL General E NADi NADt nfcid2t nfcid3t nfcid3i 	Byte				•	PPt PFB Payload (Polling) TO Extra Data
Bus Decode Res Bus 1 (NFC)			X 66 Packets Decoded			13.560 MHz		Add New Gellow Gellow Gallout
	tart Time Command Code 49.3056ms 26	e (h) UID (h) Data (h)	Parity (h) BC			-1.72 d8m		-16 dBm Measure Search
	49.13885ms		0 0					26 dBm Results Plant
	46.59802ms 93		10					Table
	46.30107ms	14 95 EC						-36 dBm More
	43.84868ms 93 42.98824ms	AE89056316	100110000 010					-46 dBm
	40.1741ms 26							But: NFC
	40.00734ms		0 0					- Search: Bus 🔍 - Search: Bus 🔍 Events; 33
	37.46652ms 93		10			ANIA		
	37.16955ms	14 95 EC				NV V Y VVM		
	34.71718ms 93 33.85673ms	AE89056316	010		ul	N MALA KI	Mr.	-76 dBm
	31.04259ms 26			at white out the and the second	AN/WIT	WWYY KY CARACTER STOL	T TYYWA	N P WARM WARE I. M WWARING RIPARK
	30.87582ms		0 0	LINN Milward Willie Y	11		L.I.	ee laaka ee waa laaka ka
	28.33501ms 93		10	11.05 MHz				16.06 MHz
	28.03803ms	14 95 EC		Waveform View				
	25.58568ms 93	AE89056316	010	TYY YYY YYY	YY	YYYYYYY	1-1-1	
	24.72518ms 21.91108ms 26			B1-CMD				
	21.74432ms		00					
21 -1	19.2035ms 93		10	Horizontal Zoom Scale 203.25 us/div	-20 mb	(49.20x zoom) Vertical Zoom +		1.00x zoom) X
	18.90654ms	14 95 EC				e fele fellowe here a felering her fel fennen her fel felse of eff		11011000000000000000000000000000000000
	16.45417ms 93	AE89056316	100110000					107.849 mV 71.900 mV
	15.59372ms 12.77958ms 26		010					35.950 mV
	12.6128ms		0 0	M) CMD			00000000	
	10.07199ms 93		10					394.024 mV 295.518 mV
	9.775037ms	14 95 EC						197.012 mV
	7 322668ms 93	AE89056316	100110000 -	MA OOK RSP				90.506 mV
the second s	6.462237ms		010	NFC NFC	V			
	3.648081ms 26 3.481303ms		00	B1-CMD		AE89056316h		
	940.4854µs 93		10	P1 P50				
	643 693 914 ···	14 05 87	08.44 110.01	B1-RSP -7.723576 ms -7.520324 ms	-7.317072	ms -7.113820 ms -6.910568 ms -6.707	16 ms -6.	504064 ms 5.300912 ms -6.097560 ms
K Math 5 1 V/div Bpskdemo Bus 1	Math 6 Math 7 1 V/div 1 Coeffile Bus 1 Bus 1	Bus 1 NFC	2 3 4 5 6	Add Add Add 7 8 New New New New Ref Math Ref Bus	DVM	Spectrum Horizon	100 m MSA 16 m	Trigger Acquisition rs V Marnual, Analyze ypt Sample: 12 bits 19 Mar 2023

The results table provides time-stamped, tabular view of all captured packets on the NFC bus. 33 occurrences of the event is searched on SOC on the command lane.

3 Series MDO, 4/5/6 Series MSO Serial Triggering and Analysis Applications Datasheet

File Edit Applications Utility Help										
pectrum View	× Bus Decod							×	Add N	lew
13.56 MHc12	Bus 1 (NFC)							3 Packets Decoded		
	Index	Start Time 25.72357µs		Application Family Identifier (h)	Response Code (h)	Pseudo Unique PICC Identifier (h)	Number of Applications (h)	Bit Rate Capability ()	Measure	Same
	10m 2		Slot Marker		-	-		-		Searc
	3		Slot Marker		-		-	-	Results Table	Plot
	4		Slot Marker	-		-	-	-		
	IBm 5	62.09255ms	Slot Marker	-			-	12. ()	10	More.
	6	78.81116ms	Slot Marker		-		-			
	7	95.52978ms	Slot Marker	-			-	-		
	8	112.2493ms	Slot Marker	-		-	-			
	9	128.9679ms	Slot Marker		+-)	11.		-		
	10	145.6865ms	Slot Marker	-			-	-		
			Slot Marker	-	-	-	-	-		
	12	163.1635ms		-	Basic ATQB	9C013C96		80		
	13	173.5345ms	Slot Marker	100	-		1	-		
46	Bm Waveform	View		[👸		1				
		T						<u>م ></u>		
		- T						200		
56								-200 mV		
		05	20-116	-90×ms	ថិបី ពាទ	400 ms	240 116 4	Statut generation and Statut a		
								188.814 mV		
	18m							178.877 mV 168.989 mV		
AND I WINDLE	3							159.002 mV		
and the second se	× ·							,0 77.013 ml/		
in the second	IBm M 7-R-SI	2								
and the second	Uh .							' iii -77.813 mV		
C		NFC	T T	1 1		1 1	1 1	1 1		
Maintheat to the	B1-CMD									
	B1-RSP									
8.6 Mitz 18.6 Mit Ch 1 Math 1 Math 2 Math 3	BT-RSP)				Spectrum	n Horizontal	Trigger	Acquisition		
100 mV/dw 4.968 mV/div 6.252 mV/div 1 V/div				Add Add Add	CF: 13.56	00000 MHz 20 ms/div 200	ms 🔼 🖍 1 V	Manual, And	lyze	Preview
10 dB/div Askdemo ^{coeffile 50*Fabs(^ 500 MHz * Bus 1 Bus 1 Bus 1				New New New DVM Math Ref Bus	AEG Sparc 10.0 RBW: 2.00			Sample: 12 bits Single: 0 /1		

Result table for NFC 14443B

Bus Decode					×	Spectrum View						×	Add New
Bus 1 (NFC)					3 Packets Decoded	N	13.007 MHz -49.7 dBm		13 13.559 MHz.3.	702 MHz			Cursors Callout
Index 1	Start Time 33.91879µs	Command Code (h)	Response Code (h)	SYNC (h) B24D	Payload (Polling) (h) Payload0:00 Payload1:FF Payload2:FF Paylo		-49.7 dBm		-49 22.3 dBm 49	.6 dBm		20 dBm	Measure Search
2				B24D B24D	Payload Start Bit:01 NFCID2:05FE69C1197F							10 dBm	
3	144.4999ms											10 0011	Table Plot
												0 dBm	More
												-10 dBm	
												10 000	
												-20 dBm	
												-30 dBm	
												-40 dBm	
												-50 dBm	
						h h ar i lei	باينا بالناية		what da			-60 dBm	
						MARSON AND A	<u>INTRINKAMAANI</u>	Mannam	ATT WARKS	ANNAA AMAAN AMAA AMAA AMAA AMAA AMAA AM	ha Marta Marta da	IV. MARINE WHAT	
						Waveform View							
						ET-CMJ						~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
						EI-RSP	ning states and states				tela a protoco da la		
						0 s 20 ms	40 ms 60 n		100 ms	120 ms	140 ms 160 ms		
						Horizontal Zoom Scale	2.20 ms/div +	(9.09x 2	zoom) Vertical	Zoom	(1.10x zoom)	× 5.455 V	
						needlas and as	part det de pert d		n i senti ser	u de l'estadore est	det de l'échier	1.818 V	
						•						-1.818 V	
												-5.455 V -9.091 V	
											***	2.083073 V	
								11 - 11 - 11				1.986186 V 1.889299 V	
												1.889299 V 1.792412 V	
								.				1.695525 V	
						NFC							
						B1-CMD							
						B1-RSP							
						BI-RSP COMPLET	.4 ms -2.2 ms	0-s 2	.2 ms 4.4	ms 6.6 ms	8.8 ms	11 ms	4

FeliCa decode with result table

•

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•

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Description

uid4(Cyan Packet)

RFU(Yellow Packet)

afi1(Yellow Packet)

PARAM(Yellow Packet)

Param1(Yellow Packet) Param2(Yellow Packet)

responseCode(Yellow Packet)

Characteristic

Bus decode

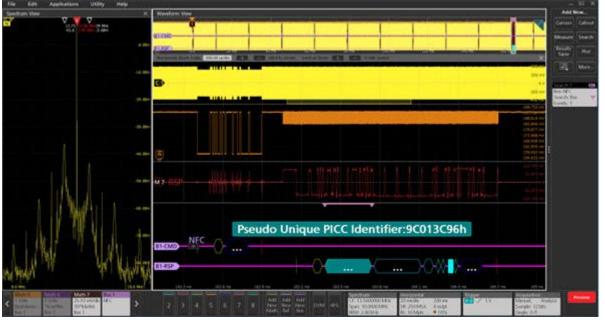
	-	Characteris
Characteristic	Description	
Maximum Data Rate	Max data rate for NFC Type B command is 1.7 Mbps	
Result table	SOF(Green Bar)	
	SOC(Green Bar)	
	SOS(Green Bar)	
	commandCode(Yellow Packet)	
	flag(Yellow Packet)	
	maskValue(Yellow Packet)	
	maskLength(Yellow Packet)	
	optionalAFI(Yellow Packet)	
	afi(Yellow Packet)	
	noOfBlock(Yellow Packet)	
	dataVariable(Cyan Packet)	
	firstBlock(Yellow Packet)	
	errorCode(Yellow Packet)	
	 infoFlags(Yellow Packet) 	
	 viccMemorySize(Yellow Packet) 	
	dsfid(Yellow Packet)	
	message(Yellow Packet)	
	Get Information Parameter Request(Yellow Packet)	
	customRequestParameter(Yellow Packet)	
	icMFGCode(Yellow Packet)	
	csi(Yellow Packet)	
	length(Yellow Packet)	
	keylD(Yellow Packet)	
	• uid(Cyan Packet)	
	Parity(BusMisc)	
	SEL(Yellow Packet)	
	NVB(Yellow Packet)	
	EachBitRFU(Yellow Packet)	
	ProprietyCoding(Yellow Packet)	
	size_UID(Yellow Packet)	
	SAK(Yellow Packet)	
	BitFrameAntiCollision(Yellow Packet)	
	• uid0(Cyan Packet)	
	• uid1(Cyan Packet)	
	• uid2(Cyan Packet)	
	• uid3(Cyan Packet)	
Table continued		Table continu

		•	Param3(Yellow Packet)
		•	Param4(Yellow Packet)
		•	INF(Yellow Packet)
		•	Data(Cyan Packet)
		•	Identifier(Cyan Packet)
		•	PUPI(Cyan Packet)
		•	APPDATA(Cyan Packet)
		•	attribInfo(Cyan Packet)
		•	higherLayerResponse(Cyan Packet)
		•	CRC_B_APP(Blue Packet)
		•	numberOfApp(Cyan Packet)
		•	BR(Cyan Packet)
		•	maxFrameSize(Cyan Packet)
		•	PROTOCOLTYPE(Cyan Packet)
		•	FWI(Cyan Packet)
/ Packet)		•	ADC(Cyan Packet)
		•	foNAD(Cyan Packet)
		•	foCID(Cyan Packet)
		•	SFGI(Cyan Packet)
		•	BSt(Cyan Packet)
		•	BRt(Cyan Packet)
		•	BRS(Cyan Packet)
		•	BSi(Cyan Packet)
		•	BRi(Cyan Packet)
		•	CMD(Yellow Packet)
		•	DIDi(Cyan Packet)
		•	DIDt(Cyan Packet)
		•	extra_data(Cyan Packet)
cket)		•	FSL(Cyan Packet)
		•	GB(Cyan Packet)
		•	NADi(Cyan Packet)
		•	NADt(Cyan Packet)
		•	nfcid2t(Cyan Packet)
	1		

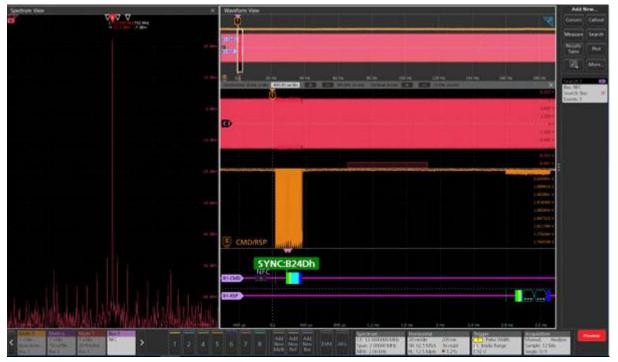
Table continued...

Table continued...

Characteristic	Description	Characteristic	Description
	nfcid3t(Cyan Packet)		EOF(Red Bar)
	nfcid3i(Cyan Packet)		EOS(Red Bar)
	PPi(Cyan Packet)		
	PPt(Cyan Packet)	Bus Search	
	PFB(Cyan Packet)		b
	 payload1(Cyan Packet) 	Characteristic	Description
	payload2(Cyan Packet)	Search ON	• SOF
	 payload3(Cyan Packet) 		• SOC
	 payload4(Cyan Packet) 		• SOS
	 payloadTSN(Cyan Packet) 		• Data
	 payloadBit(Cyan Packet) 		Payload
	NFCID2(Cyan Packet)		Command Code
	Pad(Cyan Packet)		Response Code
	RSP(Yellow Packet)		• UID
	SYNC(BusStart)		• AFI
	TO(Cyan Packet)		Identifier
	felicaData(Cyan Packet)		• PUPI
			• EOC
	crc(Blue Packet)		• EOF
	EOC(Red Bar)		• EOS
			Errors



NFC Search for PUPI



NFC Search for SYNC

NRZ Characteristics (Line encoding)

Bus setup options

Characteristic	Description		
NRZ Source(s)	Analog Channels		
	Digital Channels		
	Active Math Channels		
	Active Reference Channels		
Thresholds	Per-channel Thresholds		
Recommended Probing	Differential		
Bit Order	MSB First		
	LSB First		
Polarity	Normal		
	Invert		
Formats Available	Hex		
	Binary		

Bus search options

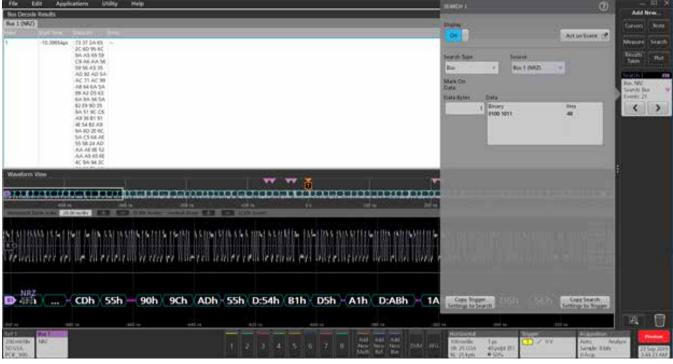
Characteristic	Description
Search On	Data Bytes [Maximum 5]

Bus decode

Characteristic	Description
Maximum Clock/Data Rate	1Gbits/sec
Decode Display	Data (cyan packet)

Display modes

Characteristic	Description
Bus	Bus Only
Bus and Waveforms	Simultaneous display of bus and digital waveforms.
Results Table	Decoded packet data in a tabular view



Searching on a specific data symbol in symbol format in the NRZ bus

	polications	Utility Help											Teltr	
lus Decode Results												×.	Abd N	- n
us 1 (NNZ)													Current	Note
-10,000	44 13.17 IA4	6										- 1	Measure	Stand
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	A8.64.6A	54											Roc NRE Solarch Ro	1
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	A8 36 81 8 40 54 82 A													
	\$A.60.2() \$A.C3-64													
	55 18 24 A	0												
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MA A					2 3 4			Bel Ste	912	10.656 80 (656)	1111 March 112	Sample Flats	135	Sep Jill

The Protocol Decode results table provides time-stamped, tabular view of all captured packets on the NRZ bus

PSI5 characteristics (Version 2.1)

PSI5 Sensor to ECU configuration



PSI5 ECU to Sensor configuration

BUS 2			?
Display On	Label PSI5	Position	0 divs Set to 0
Bus Type PSI5	•	Direction Sensor To ECU	ECU To Sensor
Source Ch 2	Threshold	Sync Bit Peri	od 60 µs
Sync Mode Pulse Too Width Ga		rte	
		Display Forr Bus	nat
1X		Decode For Hex	/load:01h mat

Bus setup options

Characteris tic	Description					
PSI5	Analog channels					
Sources	Digital channels					
	Active Math channels					
	Active Reference channels					
Thresholds	Per-channel thresholds					
Recommend ed Probing	Sensor to ECU	Current probe with minimum current rating of less than 50mA - TCP2020, TCP202A				
	ECU to Sensor	Differential Voltage probe - TDP1000, TDP1500, and TAP1500				
Direction	ECU to Sensor					
	Sensor to ECU					
Direction -	Mode	Slow (83.3 kbps)				
Sensor to ECU		Standard (125 kbps)				
		Fast (189 kbps)				
	Data A	10 - 24 bits				
	Data B	0 - 12 bits				
	Frame Control	0 - 4 bits				
	Status	0 - 3 bits				
Direction - ECU to	Sync Bit Period	1 us to 300 us				
Sensor	Sync Mode	Pulse Width				
		Tooth Gap				
	Data Format	Nibble				
		Byte				
Decode	Hex	t.				
Format	Binary					
	Mixed Hex					

Display modes

Characteristic	Description
Bus	Bus only
Bus and Waveforms	Simultaneous displays bus and digital waveforms
Results Table	Decoded packet data in a tabular view

Bus search options

Characteristic	Description	Start [Start of packet] Status Data [Region B and Region A] Block ID Sensor Status [5 different status]			
Mark On	Direction -	Status Data [Region B and Region A] Block ID			
	Sensor to ECU	Status			
		Data [Region B and Region A]			
		Block ID			
		Sensor Status [5 different status]			
		Errors [Parity CRC and any]			
	Direction - ECU	Start [Start of packet]			
	to Sensor	Status			
		Data [4 or 8 bits]			
		Function Code			
		Sensor Address			
		Register Address			
		CRC Error			



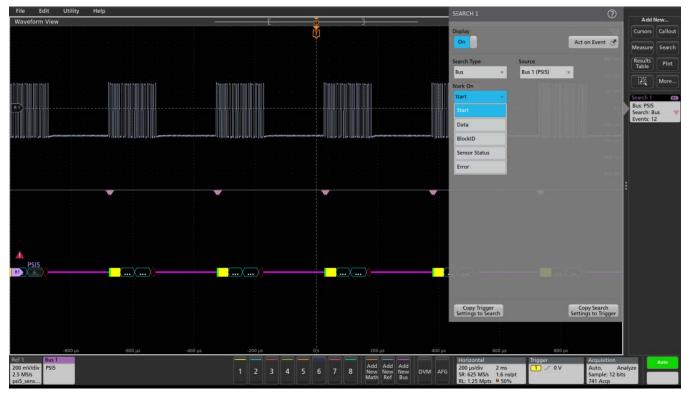
Note: Bus Search option is depend on the direction in Bus Configuration.

Bus decode

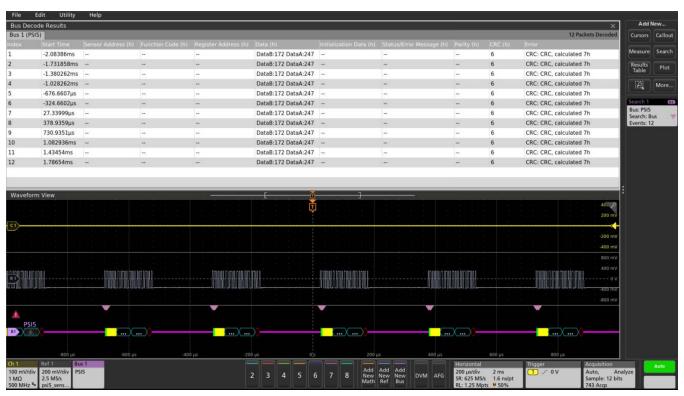
Characteristic	Description				
Decode Display	Direction - Sensor to ECU	Message Field (Yellow Field)			
	Packets	Status (Yellow Field)			
		Frame Control (Yellow Field)			
		Data B (Cyan Field)			
		Data A (Cyan Field)			
		Parity or CRC (Purple Field)			

Table continued...

Characteristic	Description	
	Direction - ECU to Sensor Packets	Sensor Address (Yellow Field) Function Code (Yellow Field)
		Register Address (Yellow Field) Data (Cyan Field) CRC (Purple Field)
Error Type		Parity CRC Response Code (Sensor to ECU)



PSI5 Search configuration

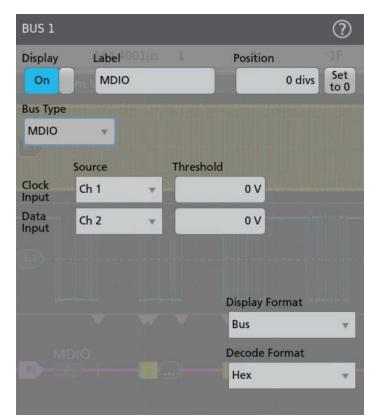


PSI5 Results table

MDIO Characteristics

Bus setup options

Characteristic	Description
MDIO Sources (Clock, Data)	Analog channels
	Digital channels
	Active Math channels
	Active Reference channels
Thresholds	Pre-channel thresholds
Recommended Probing	Single-ended
Formats Available	Hex
	Binary
	Mixed Hex

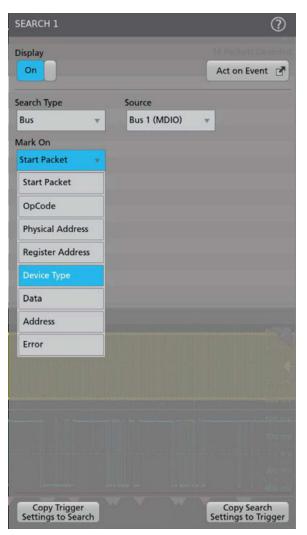


Bus configuration

Bus search options

Characteristic	Description
Search On	Start Packet
	OpCode

Characteristic	Description
	Physical Address
	Register Address
	Data
	Error: Any, OpCode Error, Device Type Error



Search configuration

Display modes

Characteristic	Description
Bus	Bus only
Bus and Waveforms	Simultaneous display of bus and digital waveforms
Result Table	Decoded packet data in tabular view

Bus decode	
------------	--

Characteristic	Description
Maximum Clock/Data Rate	Maximum frequency of up to 2.5 MHz
Decode Display	Start Packet (Green)
	Clause (Green)
	OpCode (Yellow)

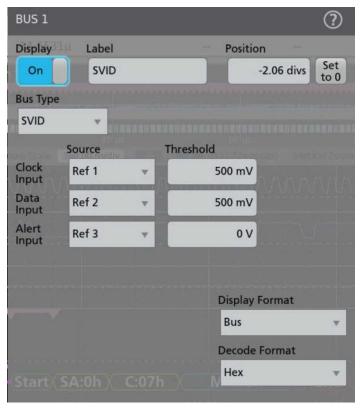
Characteristic	Description
	Physical Address (Yellow)
	Register Address (Yellow)
	Device Type (Yellow)
	Data/Address (Cyan)
	Error: Any, OpCode Error,
	Device Type Error (Red)



SVID characteristics (Version 1.9)

Bus setup options

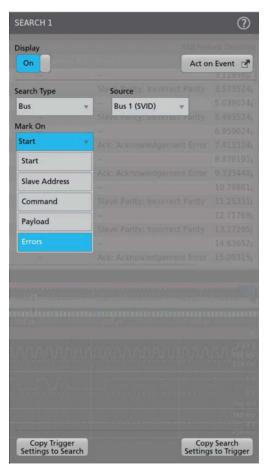
Characteristic	Description
SVID Sources (Clock, Data, Alert)	Analog channels
	Digital channels
	Active Math channels
	Active Reference channels
Thresholds	Pre-channel thresholds
Recommended Probing	Single-ended
Formats Available	Hex
	Binary
	Mixed Hex



Bus configuration

Bus search options

Characteristic	Description
Search On	Start
	Slave Address
	Command
	Payload: Master, Slave, Either
	Errors: Any, Missing Ack, Parity
	End



Search configuration

Display modes

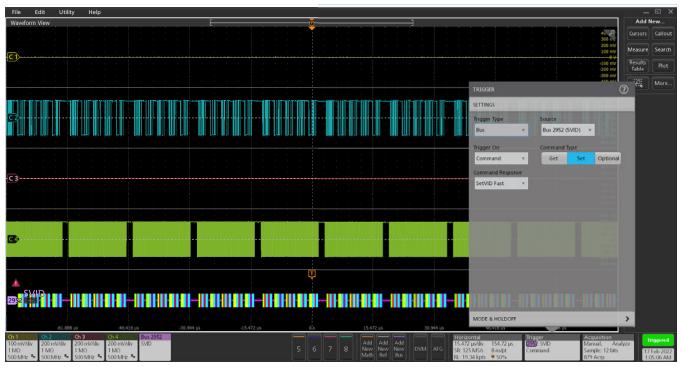
Characteristic	Description
Bus	Bus only
Bus and Waveforms	Simultaneous display of bus and digital waveforms
Result Table	Decoded packet data in tabular view

Characteristic	Description
Maximum Clock/Data Rate	Maximum frequency of 26.25 MHz
Decode Display	Start (Green)
	Slave Address (Yellow)
	Command (Yellow)
	Master Payload (Cyan)
	Master Parity (Purple)
	End (Purple)
	Turnaround (Purple)
	Ack (Purple)
	Slave Payload (Cyan)
	Slave Parity (Purple)

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	138.5833m	12	-		1			-	-					r packet; Units					Table	e
	199.6425m		47		00	1				11		-	-			C. S. Service				
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SVID (Trigger) characteristics

Characteristic	Description						
SVID Sources	 Select the SVID bus on which to trigger. Trigger On select the type of information on which to trigger. 						
Trigger On	 Start Slave Address Command Payload Errors 						



Triggering on a specific SetVID Fast command on the SVID bus

e-USB2 (Version 2.0)

Bus setup options

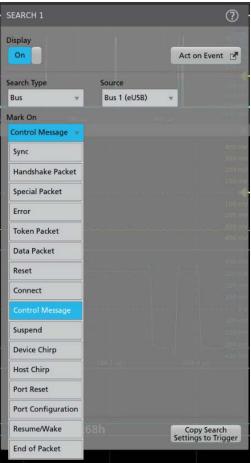
Characteristic	Description
Source(s)	Analog channels
	Digital channels(single-ended)
	Active Math channels
	Active Reference channels
Thresholds	Pre-channel thresholds
Speeds	Speed High Speed (480 Mb/s)
	Full Speed (12 Mb/s)
	Low Speed (1.5 Mb/s)
Recommended Probing, HS, LS, and FS	Single-ended [Active Single Ended TAP1500]
Formats Available	Mixed Hex
	Hex
	Binary
	Mixed ASCII

BUS 1						?
Display On	Label		-	Pos	ition 0 c	divs Set to 0
Bus Type		Spee	d	N	Лode	
eUSB		Lov	v (1.5	¥.	Native	Repeater
	Source		Threshold			
D+ Input	Ch 1	Ŧ		0 V		
D- Input	Ch 2			0 V		
el						
				Disp	lay Forma	t
				Bus	6:	
				Deco	ode Forma	t
				Miz	ed Hex	

Bus configuration

Bus search options

Characteristic	Description
Search On	Characteristic Description
	Search On Sync
	Reset
	Suspend
	Resume/Wake
	Connect
	Control Message
	Port Reset
	Port Configuration
	Device Chirp
	Host Chirp
	End of Packet
	Token (address) Packet
	Data Packet
	Handshake Packet: ACK, NAK, STALL, NYET (HS only)
	Special Packet: PRE (FS only), ERR, SPLIT, PING
	Reserved
	Error: PID check, CRC5 or CRC16, Bit stuffing (LS and FS only)



Search configuration

Bus decode

Characteristic	Description
Decode Display	Start of packet (green bar)
	Sync (green packet)
	PID (yellow packet)
	Token (address) (yellow packet)
	Data (cyan packet)
	CRC (purple packet)
	Error (red packet)
	End of packet (red bar)
	Control Message (Yellow packet)
	Zeros (Blue packet)
	Ack (Purple packet)
	Port Reset (Red Bar)
	Port Configuration(Green Bar)
	Connect (Green Bar)
	Resume/Wake(Green Bar)
	Device Chirp(Green Bar)
	I

Characteristic	Description				
	Host Chirp (Green Bar)				
	End Of reset(Red Bar)				

Results & other features

Characteristic	Description				
Table view	View more than 10000* points				
* Depends on the Model					
Save	Save Result table as CSV				
Sessions	Save sessions of your protocol setup				
Simultaneous Buses	Load multiple Buses				
* Depends on the Model	simultaneously*				
Upcoming Future addition	Timing Measurements for Protocols				
Search Table	Displays the Search hits along with Delta time difference between hits				

Cursors	96 Packets Decoded									2 (eUSB- IPHERA		
Measure	Data (h) CR									Packet Identifier (h)	Contract of the local division of the local	
	18 01 66 58 E6 17 A2 0A 6D 7F 8A F									DATA0	-99.08332µs	
Results Table	18 01 66 58 E6 17 A2 0A 6D 7F 8A F						**		**	DATAO	-98.67706µs	
(T150) (18 01 66 58 E6 17 A2 0A 6D 7F 8A F									DATA0	-98.27081µs	
	18 01 66 58 E6 17 A2 0A 6D 7F 8A F	-						-		DATA0	-97.86456µs	
	18 01 66 58 E6 17 A2 0A 6D 7F 8A F						**	-		DATA0	-97.45831µs	
	18 01 66 58 E6 17 A2 0A 6D 7F 8A F								**	DATA0	-97.05206µs	
	18 01 66 58 E6 17 A2 0A 6D 7F 8A F							-		DATA0	-96.6458µs	
	18 01 66 58 E6 17 A2 0A 6D 7F 8A F									DATA0	-96.23956µs	
	18 01 66 58 E6 17 A2 0A 6D 7F 8A F	-	-					-		DATA0	-95.8333µs	
	18 01 66 58 E6 17 A2 0A 6D 7F 8A F			**		-				DATA0	-95.42707µs	
			-			-	-	-	-		-94.84372µs	
			**						**		-85.92705µs	
	18 01 66 58 E6 17 A2 0A 6D 7F 8A F		-	-				-		DATA0	171.2468µs	
	11 1/910km 11 ×	II I III.568 ms	i III 1.344 ma II	1.120 /11	lld µs III	-	(1.00x 200n	tertical Zoom	I2.00x zoom) V	astdiv + — (S	II 0¦s I Zoom Scale 7.00 (onzonta
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										*AL	ANGUSEPERIPERE	DI
							me/Wake	Resu		L-REPEATER	SB-PERPIPHERA	al

Results table with decoded waveform

Manchester Characteristics (Line encoding)

Bus setup options

Characteristic	Description
Manchester Sources	Analog channels Digital channels(single-ended) Active Math channels Active Reference channels
Bus Setup: Threshold Idle Bits Transition For '0' Tolerance	BUS 1 Image: Constraint of the second se
Recommended Probing	Differential/Single ended
Formats Available	Hex Binary
Packet View	BUS 1 Image: Constraint of the second se

Bus search options

Characteristic	Description
Search On	Characteristic Description
	Search On Sync
	Reset
	Suspend
	Resume/Wake
	Connect
	Control Message
	Port Reset
	Port Configuration
	Device Chirp
	Host Chirp
	End of Packet
	Token (address) Packet
	Data Packet
	Handshake Packet: ACK, NAK, STALL, NYET (HS only)
	Special Packet: PRE (FS only), ERR, SPLIT, PING
	Reserved
	Error: PID check, CRC5 or CRC16, Bit stuffing (LS and FS only)

Display modes

Characteristic	Description
Bus	Bus Only
Bus and Waveforms	Simultaneous display of bus and digital waveforms
Results Table	Decoded packet data in a tabular view with columns containing:
	Sync Pattern
	Packet Header
	Packet Data
	Packet Trailer
	Error

Characteristic	Description
Maximum Clock/Data Rate	1Gbps
Decode Display	Control Field (yellow packet)
	Payload Field (cyan packet)
Error Handling	Parity
	Manchester
Search On	When Packet View is ON
	Sync Bits
	Header
	Data
	Trailer
	Errors
	When Packet View is OFF
	Data
	Errors

Bus decode

Character istic	Description	
Search On	Data	Mark On
(Packet View	Errors	Data 👻
OFF)		[Data
		Errors

Results & other features

Characteristic	Description
Table view	View more than 10000* points
* Depends on the Model	
Save	Save Result table as CSV
Results Table	Sessions
Simultaneous Buses	Load multiple Buses
* Depends on the Model	simultaneously*
Upcoming Future addition	Timing Measurements for Protocols
Search Table	Displays the Search hits along with Delta time difference between hits

Bus search options

Character istic	Description	
Search On (Packet View ON)	Sync Bits Header Data Trailer Errors	Mark On Sync Bits Sync Bits Header Data Trailer Errors
Table contin	ued	

DPHY(DSI2.0/CSI2.0) Characteristics (Version 2.0)

Bus setup options

Characteristic	Description
DPHY Sources	Analog channels Math channels Active Reference channels
Salient Features	Decode capability in for CSI/DSI protocols. Decode capability for Escape mode. Decode capability for High speed burst mode. Decode capability for 8b9b line encoding in LPDT and HS mode. Search capability for SoT/EoT Search capability for long and short packets Search capability for Escape mode Search capability for Errors like ECC, CRC, and Any
Bus Setup	BUS 1
Recommended Probing	Clock – Single Ended/Differential Data – Single Ended Single ended probe: No. of probes: 3 (D+ and D- by default) Differential probe: No. of probes: Not supported
8b9b encoding mode Formats Available	Select line encoding in LPDT and HS mode. Hex Binary Mixed Hex

Display modes

Characteristic	Description
Bus	Bus Only
Bus and Waveforms	Simultaneous display of bus and digital waveforms
Result Table	Decoded packet data in a tabular view with columns containing:
	Mode
	Data Type
	Virtual Identifier
	ECC
	Data
	CRC
	End
	Error

Characteristic	Description
Maximum Clock/Data Rate	2.5 Gbps
Decode Display	Control Field (yellow)
	ECC/CRC (Green)
	Pixel Fields (Red,Green,Blue,Yellow)
	Data Symbol (cyan)
	Raw Fields (Cyan)
Error Handling	ECC
	CRC
	SOT Sync

Bus search options

Characteristic	Description
Search On (CSI/DSI)	SoT – It searches SoT of each transmission in HS mode
	EoT – It searches EoT of each transmission in HS mode.
	Data – Data search (HS/LP)
	Scrambling – Search for scrambling mode command
	Compression – Search for Compression mode command.
	**Packets – Searches for Short and long packets
	Escape – Search for Escape entry mode
	STOP – Search for Escape mode exit
	Errors – Search for CRC and ECC errors.
	**Can select from the list of standard packet names

S	EARCH 1									?
C	Display									coded
	On						Ac	t on	Even	t 🛃
m	plete packet(2); Unfrar earch Type	ned: U	Inreco							_
	earch lype Bus v]	Sourc	:e 1 (DP		-		_		
l			Bus	T (DP	,	-	-	×		
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	SoT 🔻									
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m	Data	hed: U								
i	Scrambling									
	Compression									
	Packets									400-001
1	BusTurnAround									200
l	Escape									-200 mV -400 mV
l										800 mV
	Stop									400 mV
	Errors									-400 mV -800 mV
		J								800 mV
										400 mV 0 V
										-400 mV
										800 mV
										400 mV

Bus search options

Result & other features

Characteristic	Description			
Table view	View more than 10000* points			
* Depends on the Model				
Save	Save Result table as CSV			
Sessions	Save sessions of your protocol setup			
Simultaneous Buses	Load multiple Buses simultaneously*			
* Depends on the Model	Sinutaneously			
Upcoming Future addition	Timing Measurements for Protocols			
Search Table	Displays the Search hits along with Delta time difference between hits			

SDLC Characteristics (Version GA27-3093-3)

Bus setup options

Characteristic	Description
SDLC Source(s)	Analog channels
	Digital channels
	Active Math channels
	Active Reference channels
Thresholds	Pre-channel thresholds
Recommended Probing	Differential
Modulo	8 [8-bit Control Word]
	128 [16-bit Control Word]
Encoding	Discrete Transmission [NRZ] Invert On Zero [Inverted NRZi]
Formats Available	Hex
	Binary
	Mixed Hex



Display modes

Characteristic	Description
Bus	Bus Only
Result Table	Decoded packet data in a tabular view

Characteristic	Description
Maximum Clock/Data Rate	1 Gbits/sec
Decode Display	Start (green vertical line)
	Address (yellow field)
	Frame Type (yellow field)
	Code (yellow field)
	Ns(yellow field) [Sequence number sent]
	Nr(yellow field) [Sequence number received]
	Poll/Final (yellow field)
	Data(cyan field)
	FCS(purple field)
	Abort (red vertical line)
Error handling	FCS [Frame Check Sequence Errors]

Bus search options

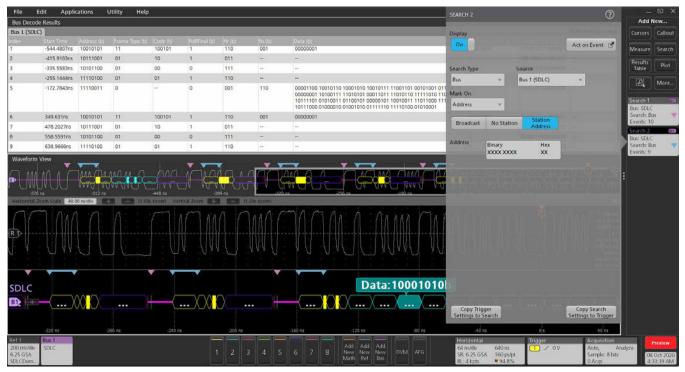
Characteristic	Description
Search On	Start [Searches for Start event]
	Data [Searches for Payload Data]
	Abort [Searches for Abort]
	Address
	Broadcast [Broadcast Packets]
	No Station [Packets not pertaining to secondary]
	Station [Valid Station Address]
	Unnumbered
	Commands [Searches for Primary Commands]
	Responses [Searches for Secondary Responses]
	Both Information [Searches for information frames]
	Supervisory [Searches for different receiver status]
	Receive Frame Ready
	Receive Frame Not Ready
	Reject frame
	Errors
	FCS [Searches for Frame Check Sequence errorrs]
	Out of Numeric Order [Searches for this frame]
	Stop
	I



Bus search options



The Protocol Decode Results Table provides a time-stamped, tabular view of all captured packets on the SDLC bus.



Searching on a station address on the SDLC bus.

CPHY Characteristics (Version 2.0)

Bus setup options

Characteristic	Description
CPHY Sources	Analog channels
	Digital channels
	Math channels
	Active reference channels
Salient Features	Decode capability in for CSI/DSI protocols. Decode capability for Escape mode.
	Decode capability for High speed burst mode.
	Decode capability for Word/Symbol Mode.
	Decode capability in single ended and differential mode
	Search capability for SoT/EoT
	Search capability for long and short packets Search capability for Escape mode
	Search capability for CRC Errors
	Search capability on Pixel value and Pixel number in CSI/DSI packet search
Sub Type	CSI
	DSI
	Word (16 Bit data word decode)
	Symbol (Symbol level decode of cphy data)
Signal Type	Single Ended: No. of probes: 3
	Differential: No. of probes: 5
	Minimum BW of probe: As minimum bitrate of HS is set to 4 Mbps, almost all probe should work. But considering the general CPHY HS speed is about 1 GHz and speed can vary depending on customer, the probe need to based on what speed the end customer want to test.
Formats Available	Hex
	Binary
	Mixed Hex
	1

Display modes

Characteristic	Description		
Bus	Bus Only		
Result Table	Decoded packet data in a tabular view with columns containing:		
	Mode Data Type		
	Virtual Identifier		
	PHCCRC		
	Data CRC		
	Symbols		
	End		
	Error		

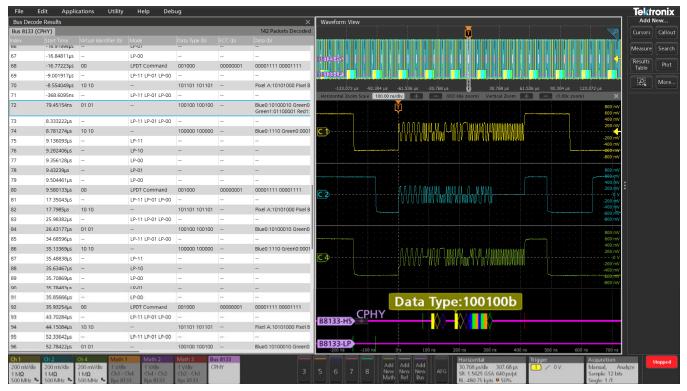
Bus decode

Characteristic	Description
Maximum Clock/Data Rate	10 Gbps
Decode Display	Control Field (yellow) ECC/CRC (Green) Pixel Fields (Red, Green, Blue, Yellow)
	Data Symbol (cyan) Raw Fields (Cyan)
	Word and Symbol Decode (cyan)
Error Handling	PHCRC CRC SOT Sync
Sub type	
	CSI (CSI packet decode) DSI (DSI packet decode in HS/LP) Word (16 bit word decode) Symbol Decode

Bus search options

Characteristic	Description
Search On (CSI/DSI)	SoT – Searches SoT of each transmission in HS mode
	EoT – Searches EoT of each transmission in HS mode.
	Data – Data search (HS/LP)
	Scrambling – Search for scrambling mode command
	Compression – Search for Compression mode command.

Characteristic	Description			
	**Packets – Searches for Short and long packets			
	Escape – Search for Escape entry mode			
	Errors – Search for CRC and PHCRC errors.			
	**Can select from the list of standard packet names			
Word / Symbols Decode	Search for Words/Symbols respectively			



The protocol decode results table provides a time-stamped, tabular view of all captured pixel packets on the CPHY bus

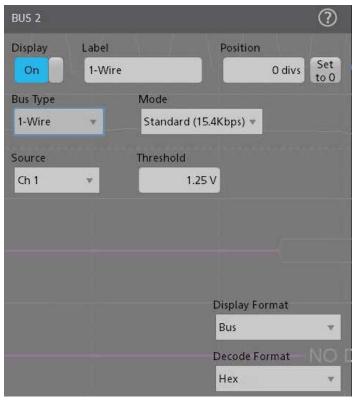


CPHY search results display

ONEWIRE Characteristics

Bus setup options

Characteristic	Description			
1-WIRE Sources	Analog channels			
	Digital Channels			
	Active Math channels			
	Active Reference channels			
Salient Features	Decode capability in for 1-WIRE protocol.			
	Decode capability for Standard mode.			
	Decode capability for Overdrive mode.			
	Search capability for Reset, Presence events			
	Search capability for Command, Data			
	Search capability for different ROM packets such as Read/Match/Skip/Search ROM and Alarm based on the Standard or Overdrive mode chosen.			
	Search capability for CRC Error			
Formats Available	Hex			
	Binary			
	Mixed Hex			
Mode	Specifies the mode of operation – Standard (15.4 kbits/s) or Overdrive (125 kbits/s).			
Recommended Probing	Single Ended passive probe			
	Differential passive probe			



Bus setup

Display modes

Characteristic	Description
Bus	Bus Only
Result Table	Decoded packet data in a tabular view with columns containing:
	Initialization
	ROM Command
	ROM Code
	CRC
	Command
	Data
	Error

Bus decode

Characteristic	Description
Decode Display	ROM Command/ROM Code/ Command (yellow) CRC (purple)
	Reset/Presence event (Green)
	End event (Red)
Error Handling	CRC

Bus search options

Characteristic	Description
Search On 1-WIRE	Reset – Searches for the Reset event. Reset is the default trigger on condition.
	Presence – Searches for the Presence event.
	Command – Searches for Command.
	Data – Searches for the Data.
	Read ROM – Searches for the Family code and Serial number of Read ROM.
	Match ROM – Searches for the Family code and Serial number of Match ROM.
	Overdrive Match ROM – Searches for the Family code and Serial number of Match ROM.
	Skip ROM – Searches for Skip ROM packet.
	Overdrive Skip ROM – Searches for the Overdrive Skip ROM packet.
	Search ROM – Searches for the ROM code.
	Alarm Search – Searches for the Alarm packet.
	CRC Error specifies the search condition as CRC Error.

SEARCH 1				?
Display On			Act or	Event 🗹
Search Type		Source		
Bus 💌		Bus 2 (1-Wire)		
Mark On				
Search ROM 🛛 👻				X
F Reset				8581192 mV
Presence		Hex XX XX XX XX		636.364 reV
Command	XX	XX XX XX XX		499,942 mV
Data	XX			145465 V
Read ROM				197 969 (H)
Match ROM				381.826
Skip ROM				12/278/m/
Search ROM				363,636 mV
Alarm Search				18 <u>1.818</u> mV
CRC Error				-181,818 mV
				SEC AND WAR



Search on 1-WIRE

File E	dit Applic	ations Utility	Help Debug							— 🖬 X
Bus Decod	Results								×	Add New
Bus 1 (1-Wi	e)								46 Packets Decoded	Cursors Callout
Index										
1	-1.291216ms	Reset:-1.291216ms								Measure Search
2	-775.2975µs	Presence:-775.2975µs	Search ROM	ROM Code:340000054A73910						Results Plot
3	15.0041ms	Reset:15.0041ms								Table
4	15.52066ms	Presence:15.52066ms	Match ROM	Family Code:10 Serial Number:00000054A739	2C	44				More
5	1.022878s	Reset:1.022878s							1	
6	1.023387s	Presence:1.023387s	Match ROM	Family Code:10 Serial Number:00000054A739	2C	BE	2D 00 E8 80 FF FF 18 54 8E			Search 1 B1
7	1.060963s	Reset:1.060963s		-						Bus: 1-Wire Search: Bus
8	1.061473s	Presence:1.061473s	Search ROM	ROM Code:CE0000045CFFBD28						Events: 15
9	1.108843s	Reset:1.108843s								
10	1.109358s	Presence:1.109358s	Match ROM	Family Code:28 Serial Number:0000045CFFBD	73	44		-		
11	2.11666s	Reset:2.11666s								
12	2.11717s	Presence:2.11717s	Match ROM	Family Code:28 Serial Number:0000045CFFBD	73	BE	78 01 4B 46 7F FF 08 10 51			
13	2.4268125	Reset:2.426812s								
14	2.427328s	Presence:2.427328s	Search ROM	ROM Code:340000054A73910						
Waveform	/iew									
40 ms - 30 ms - 20 ms - 10 ms 0/s 10 ms 20 ms - 30 ms - 40 ms										
Horizontal Zoom Scale 4000 Obcdiv 🖝 🧰 (25.00x.200m) Vertical Zoom 🚺 👘 (160x.200m)										
									6.25 V	
		······							3.79 V	
									2.50V	
R 1			ـ الأسماء ـ ـ المسماء ـ ـ الا	hand haad haad ka ay ka ah a barahaan haad b	ـ 4 المحمد المحمد ال	المنابعة المنابعة			-1.25 v	
									-3.75 V	
1.000										
B1 +	ire		Aatch ROM	Family Code:10h			Sorial Numbe	er:00000054A739h		
			Natch Kolvi	raining code. ron			Senarmumb	en.000000004A755m		
	15.6 ms	16 ms	16.4 ms	16.8 ms 17	1.2 ma	17.6 ms	18 ms	18.4 ms	18.8 ms 19.2 ms	
Ref 1	Bus 1			ا سے اسے اسم ا			dd Add Add		Trigger Acquisition	Preview
2 V/div 1 MS/s	1-Wire							10 ms/div 100 ms SR: 12.5 MS/s 80 ns/pt	OV Auto, Ar Sample: 12 bits	ahyze
1-wire_10				الالالا	_ال_ال_		ath Ref Bus	RL: 1.25 Mpts 9 50%	0 Acqs	10 Feb 2021 12:53:58 AM

File	Edit Applic	cations Utility	Help Debug					SEARCH 1	(?)	- 🗉 ×
	ode Results									Add New
Bus 1 (1	and the second sec							Display	All franking Computer L	Cursors Callout
Index	Post of the local data	Initialization	ROM Command (h)	Matter constant.	CRC (h)	Command (h)		On	Act on Event 🖪	Measure Search
1	-1.291216ms			-						Measure Search
2	-775.2975µs	Presence:-775.2975µs	Search ROM	ROM Code:3400000054A73910	**	**	**	Search Type Source		Results Table Plot
3	15.0041ms	Reset:15.0041ms		**		**		Bus v Bus 1 (1-Wire)		
4	15.52066ms	Presence:15.52066ms	Match ROM	Family Code:10 Serial Number:00000054A739		44				More
5	1.0228785	Reset: 1.022878s		**	**	**		Mark On		
6	1.0233875	Presence:1.023387s	Match ROM	Family Code:10 Serial Number:00000054A739	2C	BE	2D 00 E8 80 FF FF 18 54 8E	Match ROM v		Search I OD Bus: 1-Wire
7	1.0609635	Reset: 1.060963s		-	2	77		Family Code		Search: Bus 💎
8	1.061473s	Presence:1.061473s	Search ROM	ROM Code:CE0000045CFFBD28	2		**	Binary Hex		Events: 15
9	1.108843s	Reset:1.108843s		-		-		XXXX XXXX XX		
10	1.1093585	Presence:1.109358s	Match ROM	Family Code:28 Serial Number:0000045CFFBD	73	44				
11	2.116665	Reset:2.11666s	-	44 -	-	**		Serial Number		
12	2.117175	Presence:2.11717s	Match ROM	Family Code:28 Serial Number:0000045CFFBD	73	BE	78 01 48 46 7F FF 08 10 51	Binary Hex		
13	2.4268125	Reset 2.426812s		-				XXXXX XXXXX XXXX XXX XXX XXX XXX XXX X		
14	2.427328s	Presence:2.427328s	Search ROM	ROM Code:340000054A73910	**	8.0	**			:
Horizont	-49 ms al Zoom scale 400.		rs) (25.00x 200m) Ver	-20 ms -10 ms tical Zoom +1 = (1.60x zoom)		ROM Code: 34000000	54A 73910			
R1)										
B) 1	Wire	16 ms	Match ROM		1.2 ms	17.6 ms		Copy Trigger Settings to Search DET:000000054A/39N	Copy Search Settings to Trigger	
Ref 1 2 V/div 1 MS/S 1-wire_1	Bus 1 1-Wire	10116	1031		5 6	7 8 A	dd Add Add New DVM A	Horizontal Trigger	Acquisition	ahyze Preview 10 Feb 2021 12:55:28 AM

Searching on a MATCH ROM packet with Family Code and Serial Number on the 1-WIRE bus.

The protocol decode results table provides a time-stamped, tabular view of all captured pixel packets on the 1-WIRE bus.

CXPI characteristics (Version: JASO D 015-3: 2014/ J3076_201510)

Bus setup options

Characteristic	Description			
CXPI sources (signal source)	 Analog channels- 1 Active Reference channels- 1 Digital channels Math channels 			
Recommended Probes	It is a low speed protocol with voltage between 1.8 V-3.3 V			
	Active Probes P7240 TPP1500			
	Low Voltage Single Ended Probes			
Product differentiator	Display IBS bits on decoded bus for Inter byte spacing clarity.			
Salient features	CXPI source has recessive threshold level for signal decode. i.e. TH(rec) is 70% peak-to- peak of the signal.			
	Transmitting node transmits data to the communication bus, it transmits to encoding circuit after converting the data to UART format.			
Formats available	Hex			
	Binary			
	Mixed Hex			
Bit rate	Specifies the data rate up to 20 kbs for CXPI bus decode.			

Display modes

Characteristic	Description
Bus	Bus only
Result table	Decoded packet data in a tabular view with columns containing:
	Start
	Frame type
	Frame ID
	PTYPE ID
Table continued	1

Characteristic	Description
	• Sleep
Result table	 Wakeup Counter DLC EXTDLC Data Frame Parity Ptype parity CRC Errors

Bus decode

Characteristic	Description			
Maximum Clock/Data Rate	20 kbs			
Decode Display	 IFS (start event-vertical), Start bit and stop bit (Green) Frame ID (Yellow) IBS: (Dark blue) Data, Counter, wakeup, sleep, DLC, and EXTDLC (cyan) Parity and CRC (Purple) 			
Error Handling	 CRC Parity IBS Frame error 			

Bus search options

Characteristic	Description
Search On	StartFrame

Characteristic	Description				
	 Frame ID PTYPE DLC ExtDLC Network management: Wakeup and sleep Counter Data Errors: Parity, CRC, IBS, Frame. 				

File Ed	lit Applicatio	ns Utility	Help									
Bus Decode A	Results									×	Add	New
Bus 1 (CXPI)										20 Packets Decoded	Cursors	Callout
1	13.08841ms	Normal Polling	00	04	1	1	0	6		64 07 C6 9D 51 63	Measure	Search
2	57.75939ms	Long		52	0	1	0	F	26	09 F9 15 63 82 FF E2 16 DF A2 9B 16 D7 4B 41 85 81 DF F4	Results Table	Plot
3	199.0121ms	Long Polling	00	38	0	1	1	F	3D	7E 17 6F A1 87 68 45 AE CD / E5 3A 5C 0D EB 55 3A F8 FD 6 2D 95 6E D3		More
4	410.5061ms	Normal Polling	00	15	з	1	1	с		CC ED D2 E6 7B 39 E7 85 B6 7		
5	472.7374ms	Normal Polling	00	64	з	1	1	7		C7 7F 8D 05 3C 0C 9F	Search 1 Bus: CXPI	BI
6	520.3351ms	Long		4C	0	1	1	F	03	8E 4A 01	Search: Bus	•
7	559.1527ms	Normal Polling	00	31	0	0	1	6		E8 4E CA 6E 38 61	Events: 20 Search 2	
8	603.8237ms	Long		09	0	1	0	F	41	43 F4 E4 24 4E 6E C5 95 37 AI F1 FA ED 7E 39 11 8B 85 29 94 7B 86 A6 1F 3A 06 C9	Bus: CXPI Search: Bus Events: 3	▼
9	824.0978ms	Normal		SF	2	1	1	6	-	5C F9 68 1C FD 73		
10	865.8421ms	Long Polling	00	01	0	0	0	F	4B	63 F5 C1 93 CC 4C 29 92 B7 5 45 9B 6C 44 D7 A2 64 94 36 (
Waveform Vi	m Scale 3.80 msdiv		(2.63x zoom) Vert	ical Zeom	(1.00x zox	sm) (111111111111111111111111111111111111						
Ref 1 125 mV/div 103.8706 kS/s CXPL demo.w.	Bus 1 CXPI	19 MS	1 2	3 4 5	6 7 8	Add	Add	H orizonta 10 ms/div AFG SR: 12.5 M	1 100 ms	45.6 ms Trigger Acquisit C V Auto, Sample: 0 Acros	Analyze 12 bits	Preview 09 Aug 2022 3:37:21 AM

The Protocol Decode Results Table provides a time-stamped, tabular view of all captured packets with frame type along with supported errors on the CXPI bus.



Searching on a DLC field in packets with value 6(110) on the CXPI bus.

Enhanced serial peripheral interface (eSPI) characteristics (Version 1.0)

Bus setup options

Characteristic	Description
eSPI Sources	 Analog channels Digital Channels Active Math channels Active Reference channels
Salient features	 Decode capability for eSPI protocol. Decode capability for Single I/O mode with Alert as optional. Decode capability for Dual I/O mode with Alert as optional. Search capability for Start and End events Search capability for Status and Wait state Search capability for different channels: Channel Independent, Peripheral, OOB, Virtual Wire, and Flash Access based on command or response phase.
	Further, search capability for Command phase based on different channel related command opcodes and Response phase based on with/ without header. Both phases support sub field search based on corresponding cycle type.
	Search capability for Errors based on the phase: CRC/Cycle type/Command opcode/ Defer/Fatal/Non-Fatal/No Response.
Formats Available	Hex Binary Mixed Hex
I/O Mode	 Specifies the mode of operation: Single mode (CMD and RSP on different lanes) Dual Mode (CMD and RSP on same lane)
Alert	Optional Alert channel- off by default
Polarity	Specifies the polarity of the input sources
Channels required for decode	4+1 (Clock, Chip Select, Command Input, Response Input + Alert)

Characteristic	Description
Recommended Probes	It is a low speed protocol with voltage between 1.8 V-3.3 V $$
	 Active Probes P7240 TPP1500 Low Voltage Single Ended Probes
Differentiators	Protocol Search options (additional search options available under protocol decode):
	 Start and End Events Wait States Data
	 Errors – Invalid command type, Invalid cycle type, Fatal/Non-Fatal Errors. Decode formats in MIXED HEX.

Bus setup

Characteristic	Description
Single Mode (Default)	BUS 1 Image: Constraint of the second seco
Dual Mode	Input Clain OV High Low Display Bus • Decode Mixed Hex • BUS 1 ? Display Label Position On eSPI O divs Set to 0
	Bus Type UO Mode Alert eSPI v Single Dual Off SCLK Gn 1 v OV Construction Input Gn 2 v OV Active IO[0] Gn 3 v OV Active IO[1] Gn 4 v OV Active
	Display Format Bus v Decode Format Mixed Hex v

Display modes

Characteristic	Description
Bus	Bus only
Result Table	Decoded packet data in a tabular view with columns containing:
	Command OpCode
	Cycle Type
	Header
	Address
	• Data
	Response
	Status
	• CRC
	Error
	• PEC

Bus decode

Characteristic	Description
Decode Display	Start (Green)
	Command OpCode, Response, Virtual Wire Count/Group/Index, Cycle Type, Tag, Length, Message Code, SMBus Slave address/ Source address/Destination address/Source slave address/OpCode, Byte Count, MCTP, Destination Point, Source Point, SOM, EOM, PEC, Latency Scale, Message Tag, TO, PktSeq, Wait (Yellow)
	Data, Double Word, Virtual Wire Data (Cyan)
	CRC (Purple)
	Stop, Response error, Unframed (Red)
Error Handling	CRC, Defer, Fatal, Non-Fatal, No Response, Command OpCode, Cycle type

Bus search options

Characteristic	Description
Search On eSPI	Start : Enables to search the start event of the packet decode.
	Channel Independent: Enables search on Channel Independent command and responses packets.

Table continued...

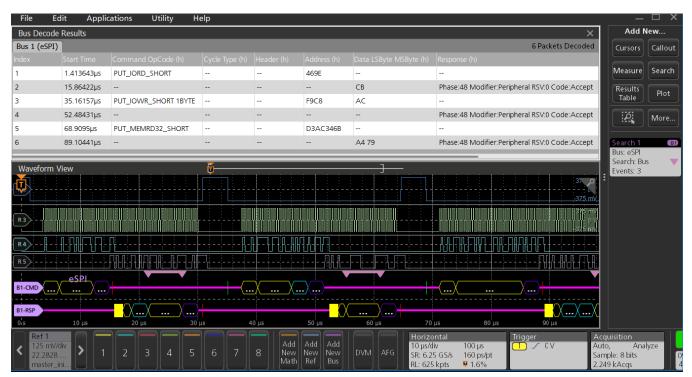
Characteristic	Description
Search On eSPI	Peripheral Channel : Enables search on different types of Peripheral channel command and responses packets.
	OOB Channel : Enables search on different Out-Of-Band (OOB) channel command and Responses packets.
	Virtual Wire Channel: Enables search on different Virtual Wire channel command and responses packets.
	Flash Access Channel: Enables search on different Flash access channel command and responses packets.
	Wait : Enables to search on the wait state that appears after the TAR window.
	End : Enables to search on the End events when the packet decode ends.
	Phase : Select the type of phase between command and response for which to search.
	Command : Enables search on the command opcode of different channels specified under the mark on.
	Response : Enables to search on the response field.
	Response With Header : Enables to search on the RSP opcode that consists of a Response Code and a Response Modifier.
	Response Without Header : Enables to search on the RSP opcode that consists of a Response Code and a Response Modifier.
	Command Opcode : Enables search on the command opcode of different channels.
	Cycle Type : Enables search under command and response with header based on different cycle types for different channels.
	Address: Enables search on the address field for different channels based on different commands and response with header classified based on cycle types.
	Tag : Enables search on the tag field for different channels based on different commands and response with header classified based on cycle types.

Characteristic	Description				
Search On eSPI	Length: Enables search on the length field for different channels based on different commands and response with header classified based on cycle types.				
	SMBus Slave Address: Enables search on SMBus Slave address under the OOB channel.				
	Virtual Wire Count: Enables search on Virtual Wire Count for command and response with header under the virtual wire channel.				
	Virtual Wire Index : Enables search on Virtual Wire index for command and response with header under the virtual wire channel.				
	Virtual Wire Data: Enables search on Virtual Wire Data for command and response with header under the virtual wire channel.				
	Data Bytes : Sets the number of data bytes for which to search.				
	Data : Sets the data value for which to search. Searches based on command and response.				
	Status : Enables search on the status field of the response packets.				
	Error Type : Sets the error type for which to search based on command or response phase.				
Mark On and Channel Independent	SEARCH 2 Diplay On Act on Event C Search Type Bus Source Bus Source Bus Bus 1 (eSPI) * Mark On Start Channel Independent Peripheral Channel Virtual Wire Channel Flash Access Channel Data Status Errors Wait				

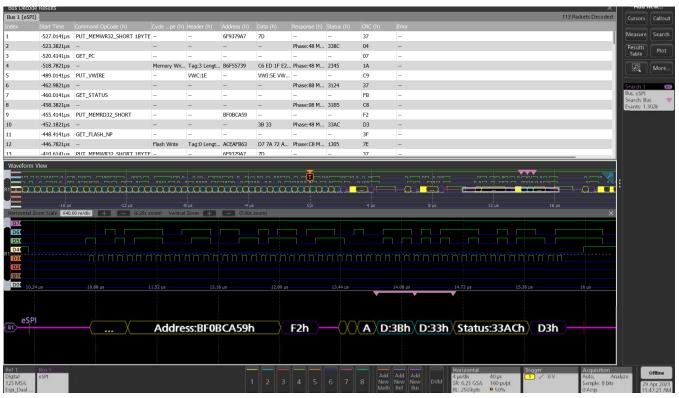


Characteristic	Descriptio	on		
Mark On and Channel Independent	SEARCH 2			0
macpenaent	Display On		[Act on Event
	Search Type	_	Source	and the second
	Bus	Y	Bus 1 (eSPI)	v
	Mark On	_		
	OOB Channel	*		-1.00 (mt)
	Phase			and the second second
	Command	Response		-300 [m]
	Tag	Binary XXXX	Hex X	200.005
	Length	Binary XXXX XXXX XX	Hex xx x xx	-00.00
	SMBus Slave Address	Binary XXXX XXXX	Hex XX	
	SEARCH 2			0
	Display On		(Act on Event
	Search Type		Source	The second second
	Bus	×	Bus 1 (eSPI)	*
	Mark On	_		100
	Virtual Wire Ch	annel 👻		A GOL CITY
	Phase	Response Wit	Development of the second	AND A DECK
	Command	Header	th Response Without He	eader
	Command Opco	de		200
	PUT_VWIRE	. v.		Bergin .
	Virtual Wire Count	Binary XXXX XXXX	Hex XX	400 mV
	Virtual Wire Index	Binary XXXX XXXX	Hex XX	
		Binary XXXX XXXX	Hex XX	

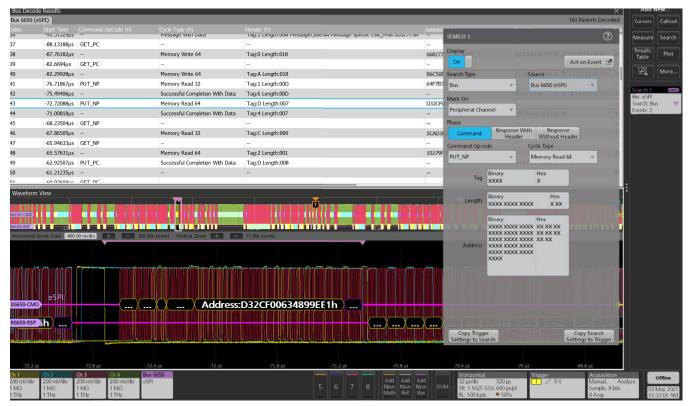
Characteristic	Description
	SCARCH 2 Display On Act on Event Search Type Bus Source Bus 1 (eSPI) Mark On Virtual Wire Channel Phase Command Response With Header Without Header
	Peripheral, OOB, and Virtual Wire Channel
Mark On and Channel Independent	SEARCH 2 Display On Act on Event Search Type Bus V Bus 1 (cSPI) Mark On Flash Access Channel Phase Command Opcode Cycle Type PUT_FLASH_C Tag Binary XXXX SUCCESSful Completion Tag Sinary Successful Completion With Data Binary Unsuccessful Completion With Data Binary Successful Completion With Data Binary Successful Completion With Data Binary Successful Completion With Data Binary Successful Completion Successful Completion



The Protocol Decode Results Table provides a time-stamped, tabular view of all captured pixel packets on the eSPI bus. (Single I/O Mode)



The Protocol Decode Results Table provides a time-stamped, tabular view of all captured pixel packets on the eSPI bus. (Dual I/O Mode)



Searching on a Peripheral Channel packet with command OpCode as PUT_NP and cycle type as Memory Read 64 on the eSPI bus. (Single I/O Mode)

File Ed	lit Utility	Help							-	ω×
Bus Decode	Results							×	Add N	lew
Bus 1 (eSPI)							113 Pac	kets Decoded	Cursors	Callout
Index	Start Time	Command OpCode (h)	Cycle Type (h)	Header (h)	Address (h)	Data LSByte MSByte (h)	Response (h)	Status (h)		
53	-23.41408µs	PUT_VWIRE		VWC:1E		VWI:5E VWD:EF VWI:68 VWD:24 VWI:0F VWD:96 VWI:EA VWD:F1 VWI:D	-		Measure	Search
54	2.617915µs					-	Phase:88 Modifier:Virtual Wire RSV:0 Code:Accept	3124	Results Table	Plot
55	5.585915µs	GET_STATUS				**				
56	7.217915µs					-	Phase:08 Modifier:No Append RSV:0 Code:Accept	3185	P.	More
57	10.18592µs	PUT_MEMRD32_SHORT			BF0BCA59	-		-		
58	13.41792µs					38 33	Phase:48 Modifier:Peripheral RSV:0 Code:Accept	33AC	Search 1 Bus: eSPI	B1
59	17.18592µs	GET_FLASH_NP				-			Search: Bu	
60	18.81792µs		Flash Write	Tag:0 Length:04C	ACEAFB63	D7 7A 72 A5 0C 9D 0A 03 09 03 CA 39 E5 96 EB 55 3D 5B 0D CB 2F 7E B	Phase:C8 Modifier:Flash Access RSV:0 Code:Accept	1305	Events: 56	
61	54.98592µs	PUT_MEMVVR32_SHORT 1BYTE			6F9379A7	7D				
62	58.61792µs				 Full-so	réen Soin	Phase:48 Modifier:Peripheral RSV:0 Code:Accept	338C		
63	61.58592µs	GET_PC			••			•		
64	63.21792µs		Memory Write 32	Tag:3 Length:03C	B6F55739	C6 ED 1F E2 DE 32 1B 5A C6 0F A4 95 2E 0B 6B 12 EE FA 01 3C 04 DC B5	Phase:48 Modifier:Peripheral RSV:0 Code:Accept	2345		
	umnum 26 µ91 om Scale 920.	00 ns/div + (4.35x :	zoom) Vertical Zoor		rfiµsinn minn 2.20x zoom)	มาาา ก - าาใร่าา มนาาา ม น 4)มรา ม , าาา ม +8 มรามเาา	ᇌᅳᡶ ² ᢧᢄᡢᡢᢇ᠇᠂ᡣ᠆ᠬᡣ᠆᠆ᠷᡊ᠄ᠯ᠖ᡃᡅ᠍	×		
R1								ممسم		
eSP						End				
B)	X X		KFFh	< <u></u>)—(XX A X <u>S</u> :	:3124h	()(XXAX	31B5h		
	0,5	920 na	1.84 µs	2	.76 µs	3.68 µs 4.60 µs 5.52 µs	6.44 µs 7.36 µs			
	Bus 1 eSPI			1	2 3 4	4 5 6 7 8 New New New DvM AFG SR	orizontal Trigger zkłów 40 µs 1 7 0 V 6.25 GS/s 160 ps/pt 2.250 kpts 9 50%	Acquisition Auto, An Sample: 8 bits 0 Acqs	ilyze 09.	Preview Aug 2022 58:44 PM
1 <i>S</i>		XX 📄						~ 🖸 📖	ENG	1:58 PM /9/2022

Searching on the Start/End event on the eSPI bus (Dual I/O Mode)

EtherCAT characteristics

Bus setup options

Characteristic	Description
Ethernet sources	Analog channels Digital channels Active math channels Active reference channels
Salient features	Decode capability for EtherCAT protocol in both single ended and differential modes
Bus setup (Single- Ended)	BUS 2 Display Label Position On EtherCAT O divs Set Do divs Set O divs Set
Bus setup (Differential)	BUS 2 () Display Label Position On EtherCAT O divs Set to 0 Bus Type Signal Type EtherCAT Single Diff. Source Threshold Ch 1 V OV Display Format Bus V Decode Format Hex V
Formats available	Hex Binary Mixed Hex
Signal Type	Single ended (default) Differential

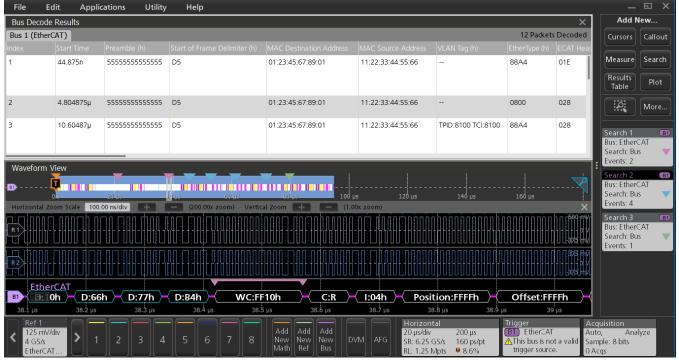
Display modes

	Description			
Characteristic	Description			
Bus	Bus only			
Results table	Decoded packet data in a tabular view with columns containing:			
	 MAC Destination Address MAC Source Address VLAN Tag EtherType ECAT Header Length Protocol Type IP Source Address IP Destination Address IP Destination Address Datagram Header Network Variable Header Network Variable Header Mailbox Header Data Working Counter Service Data Detail Frame Check Sequence 			
Decode display	Green: Start of frame Yellow: MAC source address, MAC destination address, EtherType Gray: TPID, TCI, UDP Source Port, UDP Destination Port, Length, Checksum, Command, Index, Position, Offset, Address, Reserved, Circulating Frame, More EtherCAT datagrams, IRQ, Working Counter, PublisherID, Network Variable Count, Channel, Priority, Type Dark Pink: IP VersionHL, IP Service, IP Total Length, IP Identification, IP Flags, IP Fragment Offset, IP Time To Live , IP Protocol, IP Header Checksum, IP Source Address, IP Destination Address, Length, Reserved, Type, Padding, Hash, Quality Cyan: Data, Detail, Publisher Header Red: End			
Error handling	FCS error			

Bus search options

Characteristic	Description
Search On	Start: Select to search on Start of Frame.
	Protocol: Select to search on Protocol Types and then Frame type of each Protocol respectively.
	IP Header: Select to search on IP Header based on Identification, Source, and Destination Address Values.
	UDP Header: Set the 16-bit Source Port that you want to search.
	MAC Address: Select to search on Packets having the combination of Source and Destination Address Values.
	Tag Control Information: Sets the 16-bit tag control information that you want to search.

	Characteristic	Description
		EtherCAT Header Length: Sets the 11-bit ethercat header length that you want to search.
es		Datagram: Select to search on sub-fields of datagram including Datagram Header, Data, and Working Counter.
d		Network Variable: Select to Search on sub- fields of network variable including Publisher Header, NV Header, and Data.
at s		Mailbox: Select to search on sub-fields of mailbox including Mailbox Header, Service Data, and Error Reply Service Data.
		FCS Error: Select to search on FCS Error if any.
ag		End of Frame: Select to search on end of frames.



Protocol Decode Results table provides a time-stamped, tabular view of all captured packets on the EtherCAT bus

File	DEMO	-	ы ×
Bus Dec	IN APARTS	Add I	lew
Bus 1 (Et Index	 Summary EtherCAT (Ethernet for Control Automation Technology) is an Ethernet-based field bussystem. EtherCAT is a way to communicate between a computer and motor drives and all sorts of analog/digital IO. Advantage over other ways like USB, RS232 and CAN to do the same type of communication is that, this type of 	lursors	Callout
1	communication is Industrial Ethernet and can achieve real time communication. With EtherCAT the standard Ethernet packet (containing data) is no longer received, interpreted and copied at every slave, instead, slave devices process frames on the fly, reading and inserting data while the frames are passing through the device.	leasure tesults	Search
	Procedures	Table	Plot
2	 Notice several aspects of the display that have to do with the decoded EtherCAT bus. First, the bus waveform displayed at the bottom of the graticule shows you decoded packet content time aligned with other signals you may be looking at. Next, the bus decode results table on the top of the display provides a tabular listing of all decoded packets in the acquisition. Finally, there are three search badges, Search badge 1 indicates that there are 2 occurrences of the 	10 <u>1</u>	More
3	Use the front panel Navigate button (<- and ->) to move through the search results.	earch 1 is: Ether earch: Bu rents: 2	
Wavefor		ents. 2	(6)
- B)		is: Ether earch: Bu rents: 4	CAT
		arch 3 Is: Ether arch: Burents: 1	
R2	Connection Details		
B1 Et	MISCELLANEOUS		
38.1 µs	SERIAL BUS		
Ref 1251			Preview
4 GS Ethe	Image: Spin (Section 1) Image: Spin (S		Aug 2021 15:16 AM

The DEMO file content provides the information of the EtherCAT bus

SMBus characteristics

Bus setup options

Characteristic	Description
SMBus sources	Analog channels
	Digital channels
	Active math channels
	Active reference channels
Salient features	Decode capability for SMBus protocol with PEC Byte as optional.
	Search capability for Start, Repeated Start, Stop, and Idle events.
	Search capability for addresses such as Host Address, Device Address, and Address.
	Search capability for Command Code, Data and UDID Data.
	Search capability for Errors – Any, ACK, NACK.
Bus setup	BUS 1 Display Label Position On SMBus PEC Byte SMBus Source Threshold SMBCLK Ch 1 Ch 2 OV SMBDAT Ch 2 OV OV
	Display Format Bus

Description Characteristic PEC Byte as True Label SMBus Display 0 divs Set to 0 On Bus Type PEC Byte SMBus ٣ Source SMBCLK Input Ch 1 ov w SMBDAT Ch 2 οv ۷ **Display Forma** Bus Decode For Hex . Formats available Hex Binary Mixed PEC Optional PEC Byte – False as default

Display modes

Characteristic	Description				
Bus	Bus only				
Results table	Decoded packet data in a tabular view with columns containing:				
	1. Protocol Type				
	2. Address				
	3. Read/Write				
	4. Command Code				
	5. Byte Count				
	6. Data				
	7. Acknowledgement				
	PEC				
Table continued					

Characteristic	Description	Characteristic	Description
Decode Display	Green: Start, Repeated Start Yellow: Address, Host Address, Device Address, Slave Address, Device Slave Address, Assigned Address, Targeted Slave Address, Read, Write, Read/Write, Command Code, Byte Count, Bit, Idle Cyan: Data, Device Capabilities, Version Revision, Interface, Vendor ID, Device ID, Subsystem Vendor ID, Subsystem Device ID, Vendor Specific ID Purple: PEC Dada End		 Host Address: Select to search on the host address. Device Address: Set the 7-bit device address that you want to search. Command Code: Sets the 8-bit command code that you want to search. Data: Sets the data pattern that you want to search. Data Bytes: Sets the number of data bytes that you want to search (1 to 8 bytes). Field Bytes: Sets the field bytes as 1, 2, or 4
Error Handling	Red: End Any, ACK, NACK		for UDID Data . UDID Data: Sets the UDID data that you want to search.
Bus search options Characteristic Search On	Description Start: Select to search on the start events. Repeated Start: Select to search on the		Error Type: Sets the error bytes that you want to search. You can search on ANY, ACK, NACK, and PEC errors (PEC error search is available only when the PEC Byte in SMBus bus configuration is set as True).
	repeated start events.		Stop: Select to search on the stop events.

Address: Sets the 7-bit address pattern that you want to search.

Idle: Select to search on the idle events.

		1	Ι				1		
	ecode Results						×	Add N	ew
Bus 1 ((SMBus)					311 Packe	ets Decoded	Cursors	Callou
Index	Start Time	Protocol Type	Address (h)	RD/WR (h)	Command Code (h)	Byte Count (h)	Data_LSB_N		
1	-108.4425ms	BlockWrite BlockRead Process Call Command	03	WR:0	AD	04	8D FC 7F	Measure	Search
2	-107.8005ms	BlockWrite BlockRead Process Call Response	03	RD:1		13	C8 13 D6	Results	Plot
3	-105.8765ms	Host Notify Protocol	Host Address:08	WR:0	Device Address:5		A4 6B	Table	
4	-105.4725ms	Write 32	37	WR:0	E4		FF 9E A4 F		More
5	-104.9035ms	Write 64	77	WR:0	D7		2F FF C5 E		
6	-103.9515ms	Read 32 Command	27	WR:0	16			Search 1	e
7	-103.7585ms	Read 32 Response	27	RD:1			39 07 08 1	Bus: SMBus Search: Bus	
8	-103.2675ms	Read 64 Command	3D	WR:0	9E			Events: 225	
9	-103.0755ms	Read 64 Response	3D	RD:1			0F 9E 9E C		
10	-102.2325ms	Prepare To ARP	61	WR:0	01				
Waveform View Image: Provide the second sec									
	-104.9 ms	-104.8 ms -104.7 ms -104.6	ms -104.5 ms -104.4 ms	-104.3 ms	-104.2 ms	-104.1 ms			
< 25 1 I	ef 2 i0 mV/div MS/s /Bus_ch	1 2 3 4 5 6	Asta Dof Duc		ns/pt	OV A S	Acquisition Auto, Ana ample: 12 bits) Acqs	yze 27 /	review Aug 20. 3:06 Al

The Protocol Decode Results Table provides a time-stamped, tabular view of all captured packets on the SMBus bus. (PEC Byte set to False)

File								
Bus	Decode Results					×	Add	New
us	(SMBus)				311 Pa	kets Decoded	Cursors	Callou
siex	DEMO					\bigcirc		
		0.5	10/01/0	20	n#	18209C/1	Measure	Searc
1Ê	 Summary To debug a design problem, first you must know it exist 	to This assillarsana offars EastAss	a fact waveform ca	unturo mode ca	nable of acquiring by	ndrade of	Results	
Т	thousands of waveforms per second, radically increasin						Table	Plot
d,	FastAcq's high waveform capture rate can find glitches	and other infrequent anomalies qu	uickly and display th	hem with color-	grading or gray-scale			
ų	Procedures					The Stroter	0	More
	 Attach a TPP passive probe to Channel 1. 					22.77 (25.7		
1	 Connect Channel 1 to the Rare Anomaly signal loop on Press the front panel Run / Stop button to start acquisit 					-	Search 1	
1	 The oscilloscope is set to display items with one second 		see the intermitten	t anomalies as t	they appear. The runt	pulses you	Bus: SMBu	IS
d	see are only occurring about one time per second yet th			c arrentarios as .	ing appears include	. pointes you	Search: Bu	
	 Explore the FastAcq Palette choices in the Horizontal control 	onfiguration menu.					Events: 22	5
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1	Connection				R	ecall Demo		
1	Details 🦉					Session		
f		and the second				and the second	auisition	1

The DEMO file content provides the information of the SMBus bus

Ordering information

Protocol Bundles

Specially designed SW bundles with 1 year renewable and perpetual to suit your Design and validation needs.

Validate your Protocols with our industry standard Serial analysis software available for over 30 technologies.

Pro bundle for Serial Analysis teams. Our standards expertise and Integrated Protocol Decoders help you shorten your design cycle, gain greater technical insight and improve team productivity to bring new products and services to market much faster.

Serial Decode	Description	4 Series MSO	5 Series MSO	6 Series MSO
4-RL-1	Record length enhancement to 62.5 million sample points .	 ✓ 	*	*
5-RL-125M	Record length enhancement to 125 million sample points .	*	 ✓ 	*
6-RL-2	Record length enhancement to 250 million sample points .	*	*	v
SRAUDIO	Audio Serial Triggering and Analysis (I2S, LI, RJ, TDM). Enables triggering on packet-level information on serial audio buses.	~	V	~
SRAUTO	Automotive Serial Triggering and Analysis (CAN, CAN FD, CAN XL, LIN, FlexRay). Enables triggering on packet-level information on CAN/CAN FD/CAN XL/LIN/FelxRay.	V	V	V
SRNET	Ethernet Serial Triggering and Analysis (10BASE-T, 100BASE-T). Enables decoding and analysis on Ethernet buses.	~	V	~
SRI3C	I3C Serial Decoding and Analysis. Enables decoding and searching on packet-level information on MPI I3C.	~	V	~
SRNRZ	NRZ Serial Decoding and Analysis. Supports NRZ with normal and inverted polarity with Bit order (MSB or LSB first).	normal and		~
SRPM	Power Management Serial Triggering and Analysis. Enables triggering on packet-level information on SPMI buses.	V V		~
SRUSB2	USB 2.0 Serial Triggering and Analysis. Enables triggering on packet- level information on USB 2.0 buses.	~	~	~
SRUSB3	USB3.0 Serial Decoding and Analysis. Extensive search options.	*	*	v
SRMDIO	MDIO Protocol Decoder and Search. Extensive search options.	V	 ✓ 	v
SRSVID	SVID Protocol Decider and Search. Supports version rev.1.92. Extensive search options	~	V	~
SR8B10B	8B10B Serial Decoding and Analysis. Finds and displays parity error if found in 4-bit or 6-bit for the 10-bit symbol in 8b10b	*	V	~
SRETHERCAT	ETHERCAT Protocol Decoder and search. Enables decoding and analysis on EtherCAT buses.	v	V	~
SRSMBUS	SMBUS Protocol Decoder and search. Enables decoding and analysis on SMbus buses.	V	v	V
1 Year License		4-PRO- SERIAL-1Y	5-PRO- SERIAL-1Y	6-PRO- SERIAL-1Y
Perpetual Licens	e	4-PRO-SERIAL- PER	5-PRO-SERIAL- PER	6-PRO-SERIAL- PER

Pro Bundle for Military and Aerospace designers. Our Software design tools help you shorten your design cycle, gain greater technical insight and improve team productivity to bring new products and services to market much faster.

Serial Decode	Description	4 Series MSO	5 Series MSO	6 Series MSO
4-RL-1	Record length enhancement to 62.5 million sample points.	~	×	×
5-RI-125M	Record length enhancement to 125 million sample points.	×	~	×
6-RL-2	Record length enhancement to 250 million sample points.	×	×	~
SRAERO	Aerospace Serial Triggering and Analysis (MIL-STD-1553, ARINC429). Enables triggering on packet-level information.	~	~	~
SRSPACEWIRE	SpaceWire serial analysis. Enables decoding and analysis on SpaceWire buses.	~	~	~
MTM		~	~	~
SRNRZ	NRZ Serial Decoding and Analysis. Supports NRZ with normal and inverted polarity with Bit order (MSB or LSB first).	*	~	~
DJA	Jitter Analysis Package including TIE, Eye diagram, Histogram and other advanced analysis measurements.	~	~	v
1 Year License Perpetual License		4-PRO- MILGOV-1Y	5-PRO- MILGOV-1Y	6-PRO- MILGOV-1Y
		4-PRO-MILGOV- PER	5-PRO-MILGOV- PER	6-PRO-MILGOV- PER

To add to an instrument at purchase

Serial bus type	3 Series MDO Option	4 Series MSO Option	5 Series MSO Option	6 Series MSO Option	Description
MIL-STD-1553, ARINC 429	3-SRAERO	4-SRAERO	5-SRAERO	6-SRAERO	Aerospace Serial Triggering and Analysis (MIL-STD-1553, ARINC 429). Enables triggering on packet-level information on MIL-STD-1553 and ARINC 429 buses as well as analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time stamp information.
I ² S, LJ, RJ, TDM	3-SRAUDIO	4-SRAUDIO	5-SRAUDIO	6-SRAUDIO	Audio Serial Triggering and Analysis (I ² S, LJ, RJ, TDM). Enables triggering on packet-level information on serial audio buses as well as analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time stamp information.
8b10b	N/A	N/A	5-SR8B10B	5-SR8B10B	8B10B Serial Decoding and Analysis. Enables decoding and searching the packet-level information on buses with analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time stamp information. Finds and displays parity error if found in 4-bit or 6-bit for the 10-bit symbol in 8b10b.
NRZ	N/A	4-SRNRZ	5-SRNRZ	6-SRNRZ	NRZ Serial Decoding and Analysis. Enables decoding and searching the packet-level information on buses with analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time stamp information. Variants like NRZ-I, NRZ-M, NRZ-S, and NRZ-C are not supported currently. Supports only NRZ with normal and inverted polarity with Bit Order (MSB or LSB First).

Serial bus type	3 Series MDO Option	4 Series MSO Option	5 Series MSO Option	6 Series MSO Option	Description
CAN, CAN FD, CAN XL, LIN, FlexRay	3-SRAUTO (Except CAN XL)	4-SRAUTO	5-SRAUTO	6-SRAUTO	Automotive Serial Triggering and Analysis (CAN, CAN FD, CAN XL, LIN, FlexRay). Enables triggering on packet-level information on CAN/CAN FD/CAN XL/LIN/FlexRay buses as well as analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time stamp information.
Automotive 100BASE-T1	N/A	N/A	5-SRAUTOEN1	6-SRAUTOEN1	100BASE-T1 Automotive Ethernet serial analysis.
SENT	N/A	4-SRAUTOSEN	5-SRAUTOSEN	6-SRAUTOSEN	Automotive Sensor Serial Triggering and Analysis (SENT). Enables triggering on packet-level information on SENT buses as well as analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time stamp information.
RS-232/422/485, UART	3-SRCOMP	4-SRCOMP	5-SRCOMP	6-SRCOMP	Computer Serial Triggering and Analysis (RS-232, RS-422, RS-485, UART). Enables triggering on packet-level information on RS-232/422/485 and UART buses as well as analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time stamp information.
I ² C, SPI	3-SREMBD	4-SREMBD	5-SREMBD	6-SREMBD	Embedded Serial Triggering and Analysis (I ² C, SPI). Enables triggering on packet-level information on I ² C and SPI buses as well as analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time stamp information.
Ethernet	N/A	4-SRENET	5-SRENET	6-SRENET	Ethernet Serial Triggering and Analysis (10BASE-T, 100BASE-T). Enables triggering on packet-level information on Ethernet buses as well as analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time stamp information.
13C	N/A	4-SRI3C	5-SRI3C	6-SRI3C	I3C Serial Decoding and Analysis. Enables decoding and searching on packet-level information on MIPI I3C buses with analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time stamp information.
SPMI	N/A	4-SRPM	5-SRPM	6-SRPM	Power Management Serial Triggering and Analysis (SPMI). Enables triggering on packet-level information on SPMI buses as well as analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time stamp information.
Spacewire	N/A	4-SRSPACEWIRE	5-SRSPACEWIRE	6-SRSPACEWIRE	Spacewire serial analysis. Enables decoding and analysis on Spacewire buses.
USB 2.0	3-SRUSB2	4-SRUSB2	5-SRUSB2	6-SRUSB2	USB 2.0 Serial Triggering and Analysis. Enables triggering on packet-level information on USB 2.0 buses as well as analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time stamp information.
USB 3.0	N/A	N/A	N/A	6-SRUSB3	USB serial triggering and analysis (USB 3.0, 3.1 (Gen 1, 2*), 3.2 (Gen 1,2*)) for 6 Series oscilloscopes, * appears when upgrade is available
Serial options bundle	3-BND	N/A	N/A	N/A	Adds all serial analysis options and the power analysis option available for an instrument.

Serial bus type	3 Series MDO Option	4 Series MSO Option	5 Series MSO Option	6 Series MSO Option	Description
PSI5	N/A	4-SRPSI5	5-SRPSI5	6-SRPSI5	PSI5 Serial Decoding (v1.3 and 2.1) and analysis. Enables decoding and Search Packet level information with analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time stamp information.
MDIO	N/A	4-SRMDIO	5-SRMDIO	6-SRMDIO	MDIO Protocol Decoder and Search, No Hardware Trigger; Node locked
SVID	N/A	4-SRSVID	5-SRSVID	6-SRSVID	SVID Protocol Decoder and Search, No Hardware Trigger; Node locked
e-USB2	N/A	4-SREUSB2	5-SREUSB2	6-SREUSB2	eUSB2 Protocol Decoder and Search; Node locked
DPHY	N/A	N/A	5- SRDPY	6- SRDPY	DPHY CSI/DSI (DSI2.0 /CSI2.0 protocols decoder. Supports HS data transmission burst, and escape mode functionality.
					Data transmission can be with 8-bit raw data or using 8b9b encoded symbol
MANCHESTER	N/A	4-SRMANCH	5-SRMANCH	6-SRMANCH	Supports Generic Manchester decode. Decode of packets as per packet structure defined. Decode of Errors like Sync, Parity, Manchester
SDLC		4-SRSDLC	5-SRSDLC	6-SRSDLC	SDLC decoder and Search. Extensive search options on captured waveforms like unnumbered , Supervisory, address etc
CPHY 1.2	N/A	N/A	5-SRCPHY	6-SRCPHY	MIPI C-PHY CSI/DSI Protocol Decoder and Search
1-Wire	N/A	4-SRONEWIRE	5-SRONEWIRE	6-SRONEWIRE	1-Wire Protocol Decoder and search
eSPI	N/A	4-SRESPI	5-SRESPI	6-SRESPI	eSPI Protocol Decoder and search
СХРІ	N/A	4-SRCXPI	5-SRCXPI	6-SRCXPI	CXPI Protocol Decoder and search
ETHERCAT	N/A	4-SRETHERCAT	5-SRETHERCAT	6-SRETHERCAT	ETHERCAT Protocol Decoder and search
SMBUS	N/A	4-SRSMBUS	5- SRSMBUS	6- SRSMBUS	SMBUS Protocol Decoder and search
NFC	N/A	4-RFNFC	5-RFNFC	6-RFNFC	NFC protocol decode and search

To upgrade an already purchased instrument

Serial bus ³	3 Series MDO Node-Locked	4 Series MSO Node-Locked/	5 Series MSO Node-Locked/	6 Series MSO Node-Locked/
	License ⁴	Floating License	Floating License	Floating License
MIL-STD-1553, ARINC 429	SUP3 SRAERO	SUP4-SRAERO SUP4-SRAERO-FL	SUP5-SRAERO SUP5-SRAERO-FL	SUP6-SRAERO SUP6-SRAERO-FL
I ² S, LJ, RJ, TDM	SUP3 SRAUDIO	SUP4-SRAUDIO SUP4-SRAUDIO-FL	SUP5-SRAUDIO SUP5-SRAUDIO-FL	SUP6-SRAUDIO SUP6-SRAUDIO-FL
CAN, CAN FD, CAN XL, LIN,	SUP3 SRAUTO	SUP4-SRAUTO	SUP5-SRAUTO	SUP6-SRAUTO
FlexRay	(Except CAN XL)	SUP4-SRAUTO-FL	SUP5-SRAUTO-FL	SUP6-SRAUTO-FL

³ Software is supplied with the instrument firmware. Always download and install the latest version of the firmware. Option documentation is part of the application Help.

 $^{^{\}rm 4}$ $\,$ 3 Series MDO option license names do not have a dash in the option number.

Serial bus ³	3 Series MDO Node-Locked License ⁴	4 Series MSO Node-Locked/ Floating License	5 Series MSO Node-Locked/ Floating License	6 Series MSO Node-Locked/ Floating License
8B10B	N/A	N/A	SUP5-SR8B10B	SUP6-SR8B10B
			SUP5-SR8B10B-FL	SUP6-SR8B10B-FL
NRZ	N/A	SUP4-SRNRZ	SUP5-SRNRZ	SUP6-SRNRZ
		SUP4-SRNRZ-FL	SUP5-SRNRZ-FL	SUP6-SRNRZ-FL
100BASE-T1 Automotive	N/A	N/A	SUP5-SRAUTOEN1	SUP6-SRAUTOEN1
Ethernet			SUP5-SRAUTOEN1-FL	SUP6-SRAUTOEN1-FL
SENT	N/A	SUP4-SRAUTOSEN	SUP5-SRAUTOSEN	SUP6-SRAUTOSEN
		SUP4-SRAUTOSEN-FL	SUP5-SRAUTOSEN-FL	SUP6-SRAUTOSEN-FL
RS-232/422/485, UART	SUP3 SRCOMP	SUP4-SRCOMP	SUP5-SRCOMP	SUP6-SRCOMP
		SUP4-SRCOMP-FL	SUP5-SRCOMP-FL	SUP6-SRCOMP-FL
I ² C, SPI	SUP3 SREMBD	SUP4-SREMBD	SUP5-SREMBD	SUP6-SREMBD
		SUP4-SREMBD-FL	SUP5-SREMBD-FL	SUP6-SREMBD-FL
Ethernet	N/A	SUP4-SRENET	SUP5-SRENET	SUP6-SRENET
		SUP4-SRENET-FL	SUP5-SRENET-FL	SUP6-SRENET-FL
I3C	N/A	SUP4-SRI3C	SUP5-SRI3C	SUP6-SRI3C
		SUP4-SRI3C-FL	SUP5-SRI3C-FL	SUP6-SRI3C-FL
SPMI	N/A	SUP4-SRPM	SUP5-SRPM	SUP6-SRPM
		SUP4-SRPM-FL	SUP5-SRPM-FL	SUP6-SRPM-FL
Spacewire	N/A	SUP4-SRSPACEWIRE	SUP5-SRSPACEWIRE	SUP6-SRSPACEWIRE
		SUP4-SRSPACEWIRE	SUP5-SRSPACEWIRE-FL	SUP6-SRSPACEWIRE-FL
USB 2.0	SUP3 SRUSB2	SUP4-SRUSB2	SUP5-SRUSB2	SUP6-SRUSB2
		SUP4-SRUSB2-FL	SUP5-SRUSB2-FL	SUP6-SRUSB2-FL
USB 3.0	N/A	N/A	N/A	SUP6-SRUSB3
				SUP6-SRUSB3-FL
Serial analysis bundle ⁵	SUP3 BND	N/A	N/A	N/A
PSI5	N/A	SUP4-SRPSI5	SUP5-SRPSI5	SUP6-SRPSI5
		SUP4-SRPSI5-FL	SUP5-SRPSI5-FL	SUP6-SRPSI5-FL
MDIO	N/A	SUP4-SRMDIO	SUP5-SRMDIO	SUP6-SRMDIO
		SUP4-SRMDIO-FL	SUP5-SRMDIO-FL	SUP6-SRMDIO-FL
SVID	N/A	SUP4-SRSVID	SUP5-SRSVID	SUP6-SRSVID
		SUP4-SRSVID-FL	SUP5-SRSVID-FL	SUP6-SRSVID-FL

³ Software is supplied with the instrument firmware. Always download and install the latest version of the firmware. Option documentation is part of the application Help.

⁴ 3 Series MDO option license names do not have a dash in the option number.

⁵ All serial bus and power analysis options that are available for an instrument.

Serial bus ³	3 Series MDO Node-Locked License ⁴	4 Series MSO Node-Locked/ Floating License	5 Series MSO Node-Locked/ Floating License	6 Series MSO Node-Locked/ Floating License
e-USB2	N/A	SUP4-SREUSB2	SUP5-SREUSB2	SUP6-SREUSB2
		SUP4-SREUSB2-FL	SUP5-SREUSB2-FL	SUP6-SREUSB2-FL
DPHY	N/A	N/A	SUP5-SRDPHY	SUP6-SRDPHY
			SUP5-SRDPHY -FL	SUP6-SRDPHY-FL
MANCHESTER	N/A	SUP4-SRMANCH	SUP5-SRMANCH	SUP6- SRMANCH
		SUP4-SRMANCH-FL	SUP5-SRMANCH-FL	SUP6- SRMANCH -FL
SDLC	N/A	SUP4-SRSDLC	SUP5- SRSDLC	SUP6- SRSDLC
		SUP4- SRSDLC -FL	SUP5- SRSDLC -FL	SUP6- SRSDLC -FL
CPHY 1.2	N/A	N/A	SUP5-SRCPHY	SUP6-SRCPHY
1-Wire	N/A	SUP4-SRONEWIRE	SUP5-SRONEWIRE	SUP6-SRONEWIRE
eSPI	N/A	SUP4-SRESPI	SUP5-SRESPI	SUP6-SRESPI
		SUP4-SRESPI-FL	SUP5-SRESPI-FL	SUP6-SRESPI-FL
CXPI	N/A	SUP4-SRCXPI	SUP5-SRCXPI	SUP6-SRCXPI
		SUP4-SRCXPI-FL	SUP5-SRCXPI-FL	SUP6-SRCXPI-FL
ETHERCAT	N/A	SUP4-SRETHERCAT	SUP5-SRETHERCAT	SUP6-SRETHERCAT
		SUP4-SRETHERCAT-FL	SUP5-SRETHERCAT-FL	SUP6-SRETHERCAT-FL
SMBUS	N/A	SUP4-SRSMBUS	SUP5-SRSMBUS	SUP6-SRSMBUS
		SUP4-SRSMBUS-FL	SUP5-SRSMBUS-FL	SUP6-SRSMBUS-FL
NFC	N/A	SUP4-RFNFC	SUP5-RFNFC	SUP6-RFNFC
		SUP4-RFNFC-FL	SUP5-RFNFC-FL	SUP6-RFNFC-FL

Recommended probes

Please refer to www.tek.com/probes for further information on the recommended models of probes and any necessary probe adapters.

Partner Products Ordering information

Brief Description of Partner

To add to an instrument at purchase (Supports Windows Option)

Serial bus type	Minimum Bandwidth	Recommended Probes		6 Series/6B Series MSO Option	Description
PGY-eMMC (Windows Option Only)	2 GHz	Standard probes of MSO5/6 series	PGY-eMMC	PGY-eMMC	eMMC and SD (UHS-I) electrical measurements and Protocol decoding. software conforms to eMMC version 4.41,4.51,5.0, 5.1 specification. Supports Boot, SDR, DDR, HS200 and HS400 mode for electrical measurement and protocol Decode

³ Software is supplied with the instrument firmware. Always download and install the latest version of the firmware. Option documentation is part of the application Help.

^{4 3} Series MDO option license names do not have a dash in the option number.

Serial bus type	Minimum Bandwidth	Recommended Probes		6 Series/6B Series MSO Option	Description
PGY- SDIO(Windows Option Only)	2 GHz	Standard probes of MSO5/6 series	PGY-I2C	PGY-I2C	I2C Electrical Validation and Protocol decode SW
PGY-QSPI(Windows Option Only)	500 MHz	Standard probes of MSO5/6 series	PGY-SPI	PGY-SPI	Electrical measurements compliance testing and protocol decoding as specified in QSPI specification. Supports Single and Dual Transfer rate (STR/DTR), electrical measurements and compliance testing for Ext SPI, Dual SPI and Quad SPI. Supports Triggering on command index and on S# falling edge. Supports Analog and Digital Channels of Tektronix MSO Series

Reference Selling of List of protocols supported on MSO series (please note: Windows only)

Serial bus type	Minimum Bandwidth	Recommended Probes	Ordering	5 Series MSO Option	6 Series/6B Series MSO Option	Description
RFFE	500 MHz	Standard probes of MSO5/6 series	Reference Selling. Contact: contact@prodigytec hno.com	PGY-RFFE	PGY-RFFE	RFFE Protocol Trigger & Decode Analysis Software. PGY-RFFE utilizes the hardware based real-time RFFE protocol aware trigger, protocol analysis of long acquisition record length up to 125MB to provide superior RFFE Protocol Analysis result at press of button.
12S	500 MHx and above	standard probes	Reference Selling. Contact: contact@prodigytec hno.com	PGY-I2S	PGY-I2S	I2S Electrical, Audio and Protocol Testing SW
12C	500 MHz and above	standard probes	Reference Selling. Contact: contact@prodigytec hno.com	PGY-I2C	PGY-I2C	I2C Electrical Validation and Protocol decode SW
SPI	500 MHz and above	standard probes	Reference Selling. Contact: contact@prodigytec hno.com	PGY-SPI	PGY-SPI	SPI Electrical Validation and Protocol decode SW
I3C	500 MHz and above	standard probes	Reference Selling. Contact: contact@prodigytec hno.com	PGY-I3C	PGY-I3C	I3C Electrical Validation, Protocol trigger and Decode software
JTAG	500 MHz and above	standard probes	Reference Selling. Contact: contact@prodigytec hno.com	PGY-JTAG	PGY-JTAG	JTAG Protocol decode Software
ONFI	4 GHz and above	Contact Prodigy	Reference Selling. Contact: contact@prodigytec hno.com	PGY-ONFI	PGY-ONFI	ONFI Electrical Timing Analysis Sw

Serial bus type	Minimum Bandwidth	Recommended Probes	Ordering	5 Series MSO Option	6 Series/6B Series MSO Option	Description
SPMI	500 MHz and above	standard probes	Reference Selling. Contact: contact@prodigytec hno.com	PGY-SPMI	PGY-SPMI	SPMI Protocol Decode Software
MPHY	16 GHz and above	Contact Prodigy	Reference Selling. Contact: contact@prodigytec hno.com	PGY-UPRO PGY-LLI PGY-UFS(needs PGY-UPRO)	PGY-UPRO PGY-LLI PGY-UFS(needs PGY-UPRO)	MIPI MPHY -UniPro/LLI/UFS Protocol Decode Sw
USB 2.0	2 GHz	Contact Prodigy	Reference Selling. Contact: contact@prodigytec hno.com	PGY-USB	PGY-USB	USB 2.0 Protocol Decode Sw
USB-PD	500 MHz and above	Standard probes	Reference Selling. Contact: contact@prodigytec hno.com	PGY-PD	PGY-PD	USB PD (CC) Protocol Analysis Sw
UART	500 MHz and above	Standard probes	Reference Selling. Contact: contact@prodigytec hno.com	PGY-UART	PGY-UART	UART Electrical Validation and Protocol Decode Software
KX/KR	12 GHz and above	Contact Prodigy	Reference Selling. Contact: contact@prodigytec hno.com	PGY-NEGO	PGY-NEGO	KX/KR DME and Line Training Analysis Sw
100Base-T1	2 GHz and above	Standard probes	Reference Selling. Contact: contact@prodigytec hno.com	PGY-100Base T1	PGY-100Base T1	100 Base-T1 Protocol Decode Sw
SVID	500 MHz and above	Standard probes	Reference Selling. Contact: contact@prodigytec hno.com	PGY-SVID	PGY-SVID	SVID Protocol Decode Sw
USB3 Gen 1	23 GHz and above	Contact Prodigy	Reference Selling. Contact: contact@prodigytec hno.com	PGY-USB3 Gen1	PGY-USB3 Gen1	USB3 Gen 1 5 Gbps Protocol Decode Sw
USB3 Gen 2	23 GHz and above	Contact Prodigy	Reference Selling. Contact: contact@prodigytec hno.com	PGY-USB3 Gen1	PGY-USB3 Gen1	USB3 Gen 2 Protocol Decode Sw
8B10B	4 GHz and above	Contact Prodigy	Reference Selling. Contact: contact@prodigytec hno.com	PGY-8B10B	PGY-8B10B	8B10B Protocol Decode Sw
1000T1-LT	4 GHz and above	Contact Prodigy	Reference Selling. Contact: contact@prodigytec hno.com	PGY-1000T1-LT	PGY-1000T1-LT	1000BaseT1 Line Training Decode Software

Terms and Conditions

Lead time of 2-3 Weeks ARO.



Tektronix is ISO 14001:2015 and ISO 9001:2015 certified by DEKRA.



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