

In an emerging technology, engineers test and debug UniPRO/LLI/UFS designs with easy-to-use instruments such as oscilloscopes. But oscilloscopes normally provide extensive details about electrical characteristics of the signal. But engineers need more information such as protocol content at different protocol layer. Manually interpreting the protocol layer information using oscilloscope data is time consuming and prone to human error.

The PGY-UPRO/LLI/UFS Protocol Decode Software offers extensive protocol decoding for MIPI-MPHY-UniPRO, LLI, and UFS protocol standards. This software offers Real-time hardware based UniPRO/UFS Protocol aware trigger for PWM, NRZ and 8B/10B data type. Now design and test engineers can automatically make accurate and reliable decode of multi-lane UniPRO/LLI/UFS using PGY-UPro/LLI/UFS software using data acquired by Tektronix, DPO/DSA/MSO70000 oscilloscope series to reduce the development and test cycle.



Seamless Integration with Tektronix Oscilloscope



PGY-UPRO/LLI/UFS runs inside the Tektronix oscilloscopes and decodes protocols and displays the decoded data of multiple lanes. This software links the decoded data to the electrical signal in the oscilloscope display. UniPRO/LLI Protocol-based trigger can be set up using the built-in high speed serial trigger capabilities in Tektronix oscilloscopes.



UniPRO Protocol Aware Trigger

🐼 PGY-UFS Protocol Decode Software Beta Version About							
Configure		Trigger Event	Trigger	<u>Setup</u> <u>Trigger Description</u>		Run	
	Trigger Source:	CH1 -	PWM -	LSS Phase:	Set Trigger	Single	
Trigger	Data Rate:	PWM-G1-A 🔻		Trigger on LSS Phase 1 (TRG_UPR_0)			
	Trigger On:	Link Startup Seque	ence (LSS) 🔻				
						Analyze	
						Export	
						Report	
Version :1.0.4							

PGY-UPRO/LLI/UFS software provides protocol aware trigger conditions such as link start-up sequence, PHY adapter layer content and data link layer content. The unique capabilities in this software allow trigger data type such as PWM, NRZ or 8B/10B serial data of the protocol. PGY-UPRO supports following Protocol Aware Trigger capabilities.

Trigger Event	Trigger Content		
	Trigger on LSS Phase 1 (TRG_UPR_0)		
	Trigger on LSS Phase 2 (TRG_UPR_1)		
Link Start up Sequence (LSS)	Trigger on LSS Phase 3 (TRG_UPR_2)		
	PACP_PWR_req		
	PACP_PWR_cnf		
	PACP_cap_ind		
	PACP_EPR_ind		
	PACP_TEST_MODE_req		
	PACP_GET_req		
	PACP_GET_cnf		
	PACP_SET_req		
	PACP_SET_cnf		
PHY Adapter layer Content	PACP_Test_Data		
	Data_SOF		
	Data_COF		
	AFC (Acknowledgement)		
Data Link layer Content	NAC (No Acknowledgement)		



Protocol View	Acres 1						-					
						D. D						
Timestamp	Direction	Packet	Lane	-	31 30 29 28 27 26 25 24	23 22 21 20 19 18 17 16	15 14 13 12 11 10 9 8	7 6 5 4 3 2 1 0 🔺				
245.63 µS	Tx 🗪 Rx	Start_Of_Burst	0		ESC_DL = 0xbc	SOF = 0x0 TC0 = Reserved =	DestDeviceID_Enc (L3s=1) = 0x81	DestCPortID_Enc (L4s=1 FCT=0 EO				
249.47 μS	Tx 🗪 Rx	WRITE_6 Command	0		Command-Code, (HD=0 DD=0 T=0) =.	Flags, (F=0 R=0 W=0 ATTR=Simple)	LUN, (WLUN_ID=0) = 0x00	Task Tag = 0x14				
326.27 µS	Tx 🗪 Rx	FILLER	0		Reserved[31:28], Command Set Type[.	. Reserved = 0x00	Reserved = 0x00	Reserved = 0x00				
372.35 µS	Tx 🗪 Rx	End_Of_Burst	0	E	Total EHS Length = 0x00	Reserved = 0x00	Data Segment Le	ngth = 0x1000				
376.19 µS	Tx 🗪 Rx	FILLER	0		Data Buffer offset[31:24] = 0x00	Data Buffer offset[23:16] = 0x00	Data Buffer offset[15:8] = 0x00	Data Buffer offset[7:0] = 0x00				
485.04 µS	Tx 🖛 Rx	Start_Of_Burst	0		Reserved = 0x00001000							
487.40 µS	Tx 🖛 Rx	DL_AFC	0		Reserved = 0x00000000							
494.49 µS	Tx 🖛 Rx	FILLER	0		Reserved = 0x00000000							
546.49 µS	Tx 🖛 Rx	End_Of_Burst	0		Reserved = 0x0000000							
548.85 µS	Tx 🖛 Rx	FILLER	0		DATA0 = 0x00	DATA1 = 0x00	DATA2 = 0x00	DATA3 = 0x00				
793.73 µS	Tx 🖛 Rx	Start_Of_Burst	0		DATA4 = 0xaf	DATA5 = 0xbe	DATA6 = 0xad	DATA7 = 0xde				
796.09 μS	Tx 🖛 Rx	Ready To Transfer	0		DATA8 = 0x01	DATA9 = 0x00	DATA10 = 0x00	DATA11 = 0x00				
843.37 µS	Ix 🖛 Hx	FILLER	U		DATA12 = 0xaf	DATA13 = 0xbe	DATA14 = 0xad	DATA15 = 0xde				
895.39 µS	Tx 🖛 Rx	End_Of_Burst	0		DATA16 = 0x02	DATA17 = 0x00	DATA18 = 0x00	DATA19 = 0x00				
897.76 μS	Tx 🖛 Rx	FILLER	0		DATA20 = 0xaf	DATA21 = 0xbe	DATA22 = 0xad	DATA23 = 0xde				
1.2287 mS	Tx 🗪 Rx	Start_Of_Burst	0		DATA24 = 0x03	DATA25 = 0x00	DATA26 = 0x00	DATA27 = 0x00				
1.2325 mS	Tx 🗪 Rx	DL_AFC	0		DATA28 = 0xaf	DATA29 = 0xbe	DATA30 = 0xad	DATA31 = 0xde				
1.2440 mS	Tx 🗪 Rx	Data OUT	0		DATA32 = 0x04	DATA33 = 0x00	DATA34 = 0x00	DATA35 = 0x00				
1.9611 mS	Tx 🖛 Rx	Start_Of_Burst	0		DATA36 = 0xaf	DATA37 = 0xbe	DATA38 = 0xad	DATA39 = 0xde				
1.9635 mS	Tx 🖛 Rx	DL_AFC	0		DATA40 = 0x05	DATA41 = 0x00	DATA42 = 0x00	DATA43 = 0x00				
1.9706 mS	Tx 🖛 Rx	FILLER	0		DATA44 = 0xaf	DATA45 = 0xbe	DATA46 = 0xad	DATA47 = 0xde				
2.0226 mS	Tx 🖛 Rx	End_Of_Burst	0		DATA48 = 0x06	DATA49 = 0x00	DATA50 = 0x00	DATA51 = 0x00				
2.0250 mS	Tx 🖛 Rx	FILLER	0		DATA52 = 0xaf	DATA53 = 0xbe	DATA54 = 0xad	DATA55 = 0xde				
2.4942 mS	Tx 🖛 Rx	Start_Of_Burst	0		DATA56 = 0x07	DATA57 = 0x00	DATA58 = 0x00	DATA59 = 0x00				
2.4966 mS	Tx 🖛 Rx	DL_AFC	0		DATA60 = 0xaf	DATA61 = 0xbe	DATA62 = 0xad	DATA63 = 0xde				
2.5037 mS	Tx 🖛 Rx	FILLER	0		DATA64 = 0x08	DATA65 = 0x00	DATA66 = 0x00	DATA67 = 0x00				
2.5558 mS	Tx 🖛 Rx	End_Of_Burst	0		DATA68 = 0xaf	DATA69 = 0xbe	DATA70 = 0xad	DATA71 = 0xde				
2.5581 mS	Tx 🗰 Rx	FILLER	0		DATA72 = 0x09	DATA73 = 0x00	DATA74 = 0x00	DATA75 = 0x00				
3.0317 mS	Tx 🖛 Rx	Start Of Burst	0	~	DATA76 = 0xaf	DATA77 = 0xbe	DATA78 = 0xad	DATA79 = 0xde				

UFS Protocol Decode view

PGY-UFS is module is optional module to PGY-UPRO software, which provides protocol decode of UFS content present in Data Link layer packet. PGY-UFS software extracts UFS information present in data link packet and displays in UFS Protocol Information Unit (UPIU). PGY-UFS has flexibility of displaying only UFS protocol content or UFS and UniPRO data for easy debugging purpose.

Features

- UniPro and LLI Protocol Decoder enables faster system level protocol debugging
- Conforms to UniPro Protocol Specification version 1.6and LLI Protocol version 1.0
- Conforms to UFS Protocol Specification Version 2.0
- Supports NRZ (Non-Return-to-Zero) and PWM (Pulse Width Modulation) signalling schemes
- Configurable four lane simultaneous protocol decode helps to correlate the lane to lane events
- Autolink of decoded data from list table to oscilloscope waveform for easy protocol debug at phy layer
- Powerful UniPRO/LLI Protocol aware trigger fearures using Option ST6G serial trigger feature of oscilloscopes
- Triggering supports PWM, NRZ and 8b/10B encoded data schemes
- Detail view provides a comprehensive protocol and physical layer data correlation
- Frame listing and frame description provides comprehensive protocol layer information
- Each frame is displayed in detail as per UniPro and LLI Standard specification document
- Automated CRC computation to monitor CRC errors in protocol packet
- Markers enables time measurement between messages in different lanes
- Software automatically identifies the signalling scheme and gear for hassle free protocol analysis
- Bus diagram functions such as zoom, un-zoom, pan, fit to screen, synchronize functions enables easy data analysis



- Supports oscilloscope live channels, Tektronix .wfm waveform files
- Generates comprehensive and customizable reports
- Ability to export the protocol details to txt and csv file formats

Oscilloscopes Supported

The following Tektronix oscilloscopes are supported: DPO/MSO/DSA 70000 Series

Ordering Information

PGY-UPRO MIPI-MPHY-UniPro Protocol Decode Software PGY-LLI MIPI-MPHY-LLI Protocol Decode Software PGY-UFS MIPI-UFS Protocol decode Software (Pre-requisite PGY-UPRO) (Shipment includes CD with PGY- software and license key)

About Prodigy Technovations Pvt Ltd

Prodigy Technovations Pvt Ltd (www.prodigytechno.com) is a leading global technology provider of Protocol Decode, and PHY layer testing solutions on test and measurement equipment. The company's ongoing efforts include successful implementation of innovative and comprehensive protocol decode and PHY Layer testing solutions that span the serial data, telecommunications, automotive, and defence electronics sectors worldwide.

Contacts:

Prodigy Technovations Pvt. Ltd.; 2145, 2nd Cross, 17th Main, HAL II Stage, Indiranagar, Bangalore, India 560008 Phone number: +91 80 32553020/ +91 9880027949; Email: contact@prodigytechno.com

Other products

- I2C/SPI/eMMC/SD/SDIO Electrical Measurement and Protocol Decode Software
- HDMI/MHL Protocol Compliance Test Software
- SPI Protocol Analysis Software
- UART/RS232 Protocol Decode Solution
- FlexRay Protocol and SI Analysis Software
- I2S Electrical, Audio, and Protocol Testing Software
- USB2.0 Protocol Decode Software
- HSIC Protocol Analysis Software
- RFFE Protocol Analysis Software

