

Key Features

Supports USB-PD 2.0 and 3.0

Comprehensive USB-PD Triggering

Decode Power Delivery Objects (PDOs)

Time correlate USB-PD protocol with V_{BUS} and I_{LOAD} measurements

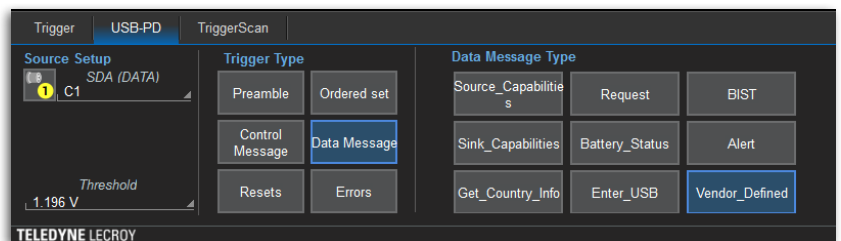
Measure $V_{BUS@PS_RDY}$ automatically

Time correlate USB-PD with AUX and USB4-SB protocols



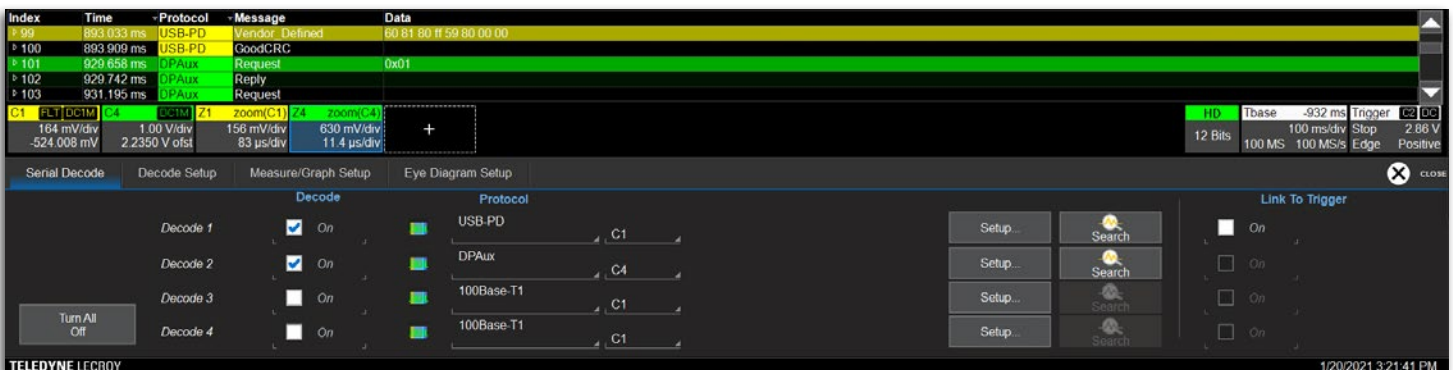
Comprehensive USB-PD Triggering

Debug power delivery compliance failures by using the same trigger selection types (Preamble, Ordered Set, Control Message, Data Message, Resets, and Errors) as found in the Teledyne LeCroy Voyager USB-PD compliance tester.



Time Correlate all USB Type-C Signals and Protocols

Validate USB-PD specified timing requirements using USB-PD TDME to correlate USB-PD messages with the measurements of V_{BUS} and I_{LOAD} (the load current on V_{BUS}). For example, the V_{BUS} voltage when the PS_RDY message occurs is automatically measured as ' $V_{BUS@PS_RDY}$ '. USB-PD protocol can also be time correlated to other 'Alt Mode' protocols such as DPAUX (Manchester based) or USB4-SBU (UART based).



SPECIFICATIONS

USB-PD TD and USB-PD TDME	
Definition	
Source and Protocol Setup	Select Channel Source for CC1/CC2 Signals.
Trigger Capability	
Format	Set Source and Threshold voltage for CC1/CC2.
Trigger Setup	Comprehensive Trigger selections equivalent to the Teledyne LeCroy Voyager USB PD Compliance Tester for debugging compliance failures: Trigger on Preamble, Ordered Set, Control Message, Data Message, Resets, or Errors with selections for each as follows: Ordered Sets: SOP, SOP', SOP", SOP'_Debug, or SOP"_Debug. Control Messages: GoodCRC, PS-RDY, VCONN_Swap, Not_Supported, Get_Country_Codes, GotoMin, Get_Source_Cap, Wait, Get_Source_Cap_Extended, Get_Sink_Cap_Extended, Accept, Get_Sink_Cap, Soft_Reset, Get_Status, Reject, DR_Swap, Data_Reset, FR_Swap, Ping, PR_Swap, Data_Reset_Complete, or Get_PPS_Status. Data Message: Source_Capabilities, Sink_Capabilities, Get_Country_Info, Request, Battery_Status, Enter_USB, BIST, Alert, Vendor Defined Resets: Soft_Reset, Data_Reset, or Cable_Reset. Errors: 5b Symbol Error, Ordered Set Error, CRC Error, EOP Error, Reserved Message Error, Invalid Message Error, or Packet Length Error.
Trigger Design	Internal to oscilloscope, settable like any other oscilloscope trigger.
Decode + Search Capability	
Format	Hexadecimal or Binary.
Decode Setup	Source Setup for CC1/CC2.
Decode Input	Any analog Channel, Memory, Math, or Digital trace.
# of Decodes	Up to 4 buses may be decoded at one time. In addition, zooms can be displayed (with decoded information).
Location	Overlaid on acquired DATA waveform, on Grid.
Visual Aid	Color Coding of Message Type, Preamble, SOP, Data Role (UFP/DFP), Power Role (Source/Sink), Msg ID, Obj Count, Extended, Data, CRC, and EOP. Decode information is intelligently annotated based on timebase setting, and overlaid on acquired waveform.
Table Configure, Export Table	Display 1 to 20 rows of decoded information for up to four different protocols or decodes in time order in a single table. Displayed information includes Index, Timestamp, and other various protocol-specific information. Table permits scrolling, touch to zoom, export to .csv file, and special display of long data or other patterns.
Pattern Search	Search for previous or next: Index, Time, SOP, Msg Type, Data Role, Power Role, Msg ID, Obj Count, Extended, Data, CRC, Status. Advanced search of a combination of up to the three Table Columns using AND/OR operation and specified Values.

USB-PD TDME Only	
Definition	
Source and Protocol Setup	Typical Setup for USB-PD Specific Measurements: Select Channel Source for CC1 or CC2 Signals (required) Select Channel Source for Vbus Signal (required for USB-PD Specific Measurements) Select Channel Source for Iload Signal (optional) Select Channel for other side band protocols such as DPAUX (Manchester) , USB4-SBU (UART), or other Alt Modes (required if time correlating with USB PD).
Measure / Graph Capability	
USB-PD Specific Measurements	PS_RDY_Level - Measures VBUS@PS_RDY
Timing Measurements	Message to Analog, Analog to Message, Message to Message, ΔMessage Time (identical message on same decoder), Time@Message (time from trigger). Serial Message may be defined by "ID =" (where applicable) and user-defined DATA with condition <=, <, =, >, >=, <>, IN RANGE, or OUT OF RANGE in any location in up to 2048 bits of data. Analog Signal may be defined by Slope (pos, neg), Level (abs or %) with Hysteresis setting. Holdoff may be set on the Analog Signal by either Time or Events (up to 1000) to preclude unwanted measurements.
Eye Diagram Capability	
Setup	Create up to four simultaneous Eye Diagrams (one per Serial Decoder) of the physical layer signal(s). Eye Style selectable as color- or analog-persisted. Eye Saturation adjustable from 0 to 100%.
Eye Parameters	Eye Height, Eye Width, (Number of) Mask Hits.
Eye Mask	Create a custom Mask using the free Teledyne LeCroy MaskMaker software utility. Store custom masks for later recall and use.
Failure Indication and Location	Mask Failure Indication ON or OFF (ON = indicated with a red circle). Mask Failure Location trace waveform displayed and interactive with Eye Mask failure table. Supports STOP trigger on Mask Failure.