

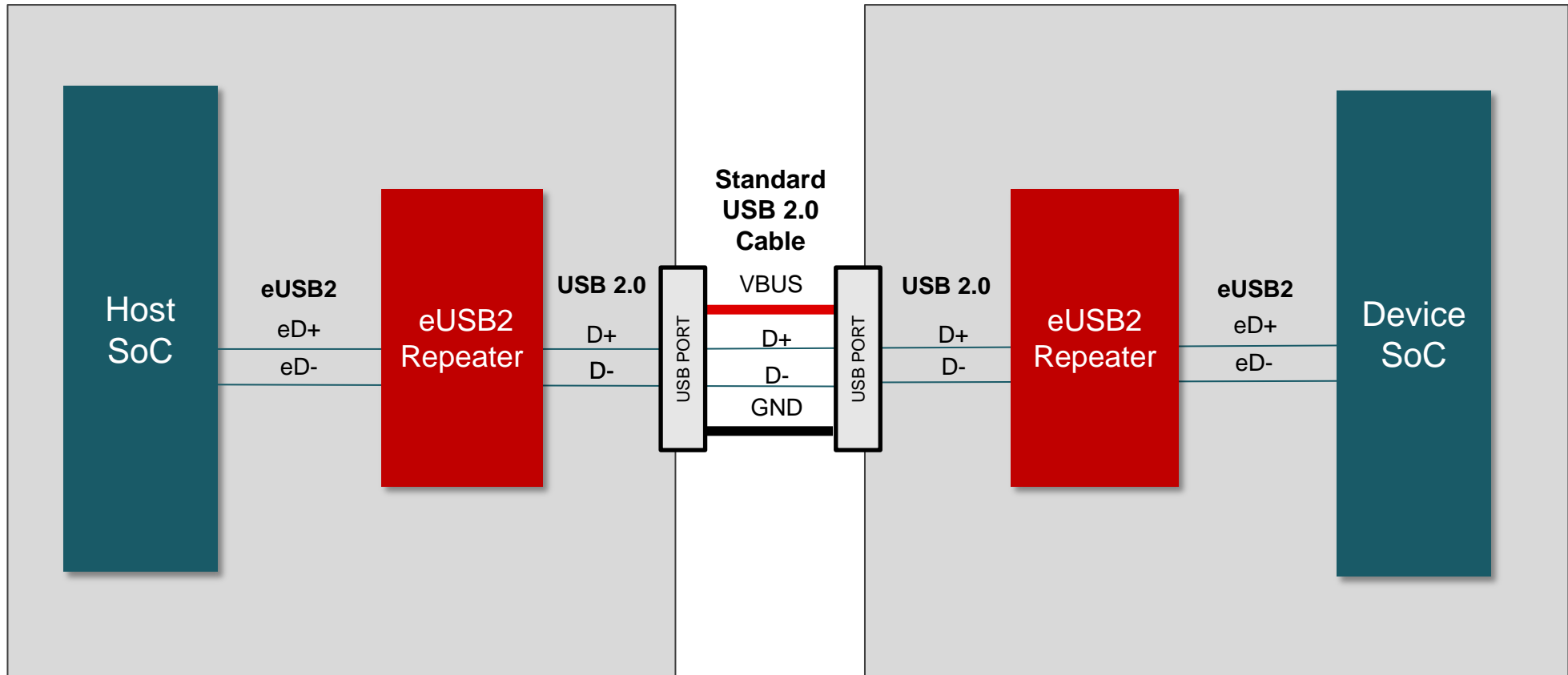
What is embedded USB 2.0 (eUSB2)? TI Precision Labs – USB

Prepared by Julie Nirchi

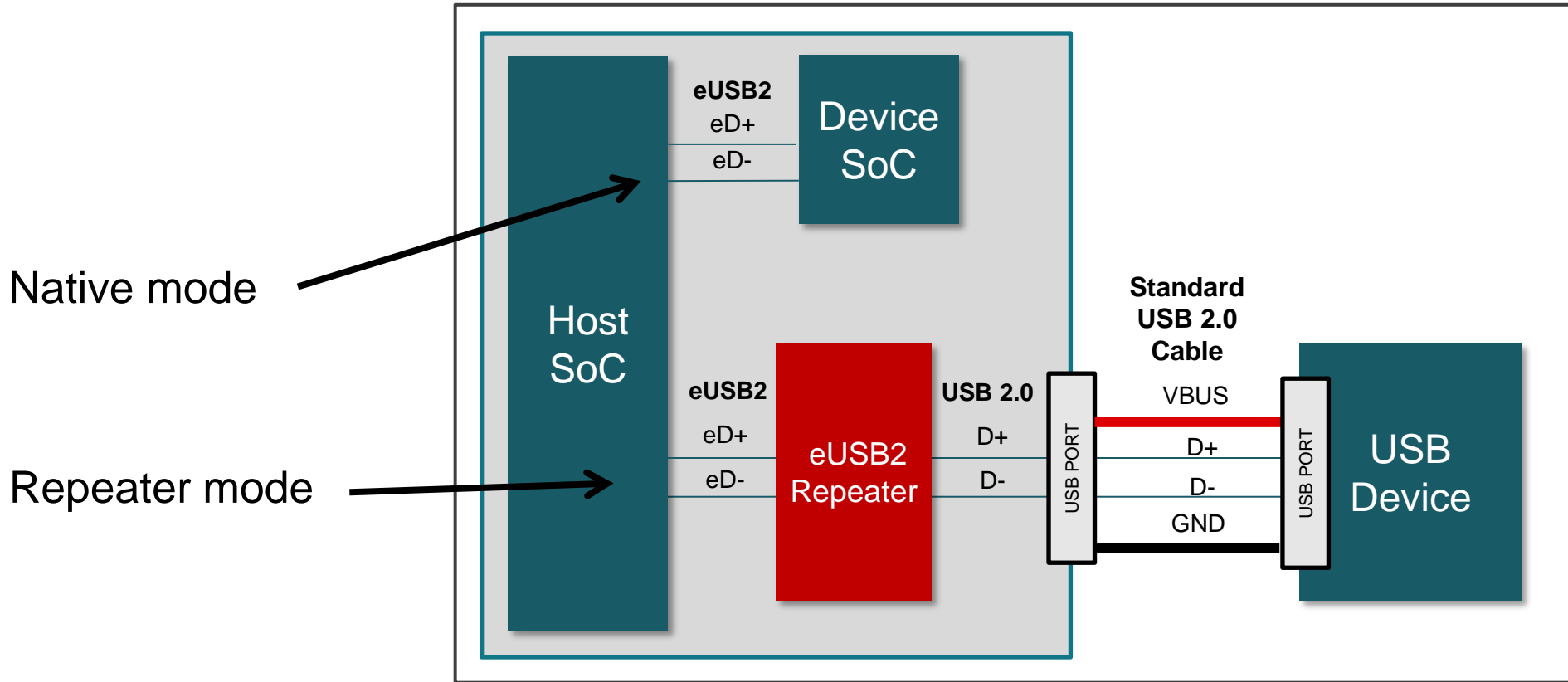
Presented by Nicholas Malone



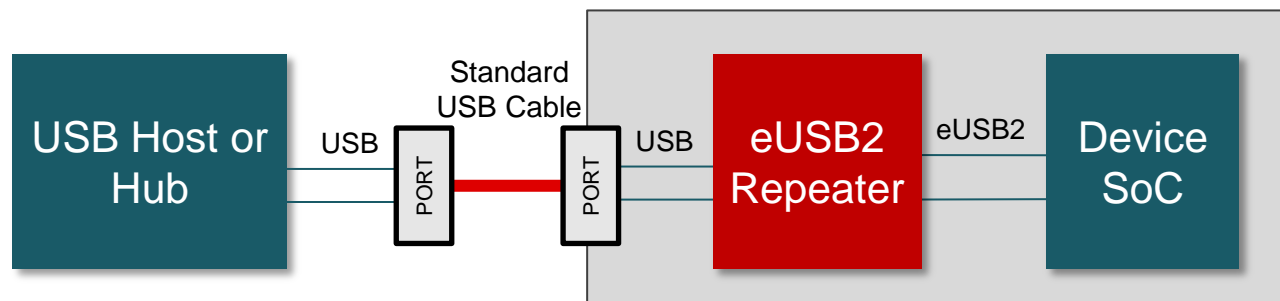
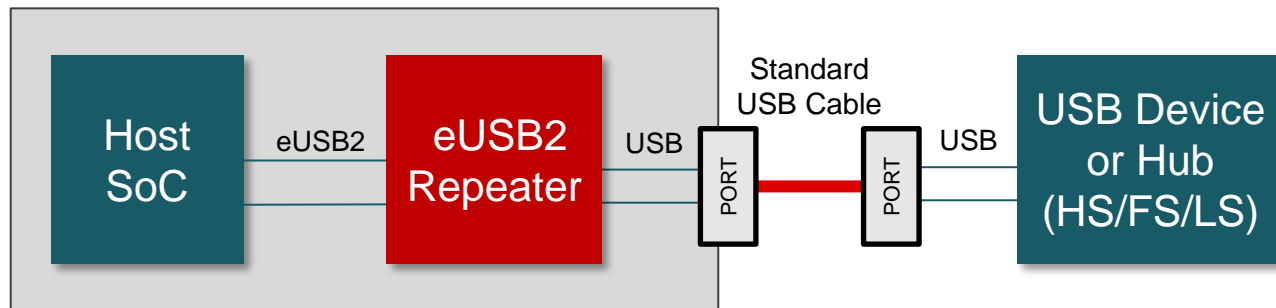
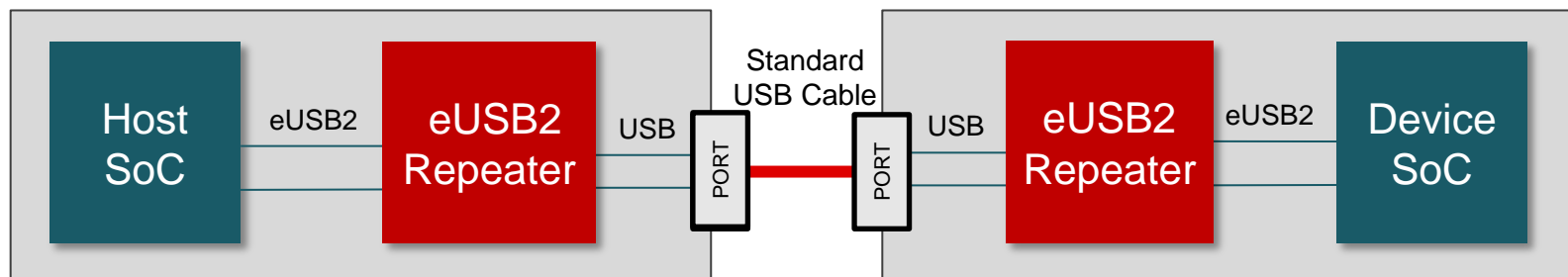
eUSB2 was created to bring USB 2.0 to small process nodes



eUSB2 has two operational modes

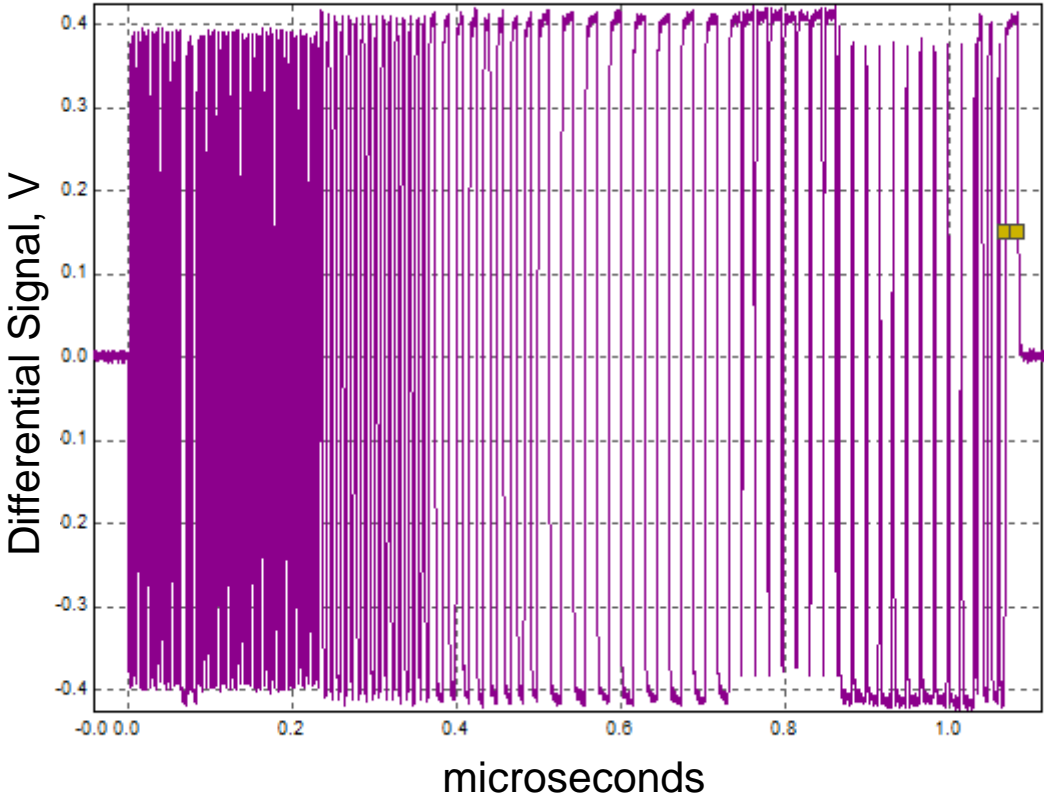


eUSB2 repeater mode examples

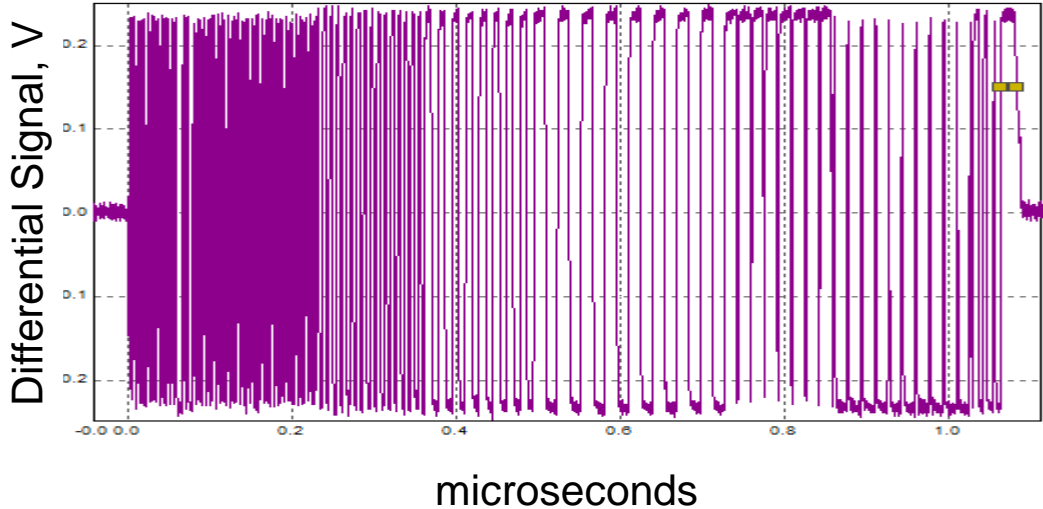


USB 2.0 and eUSB2 high-speed test packets

USB 2.0

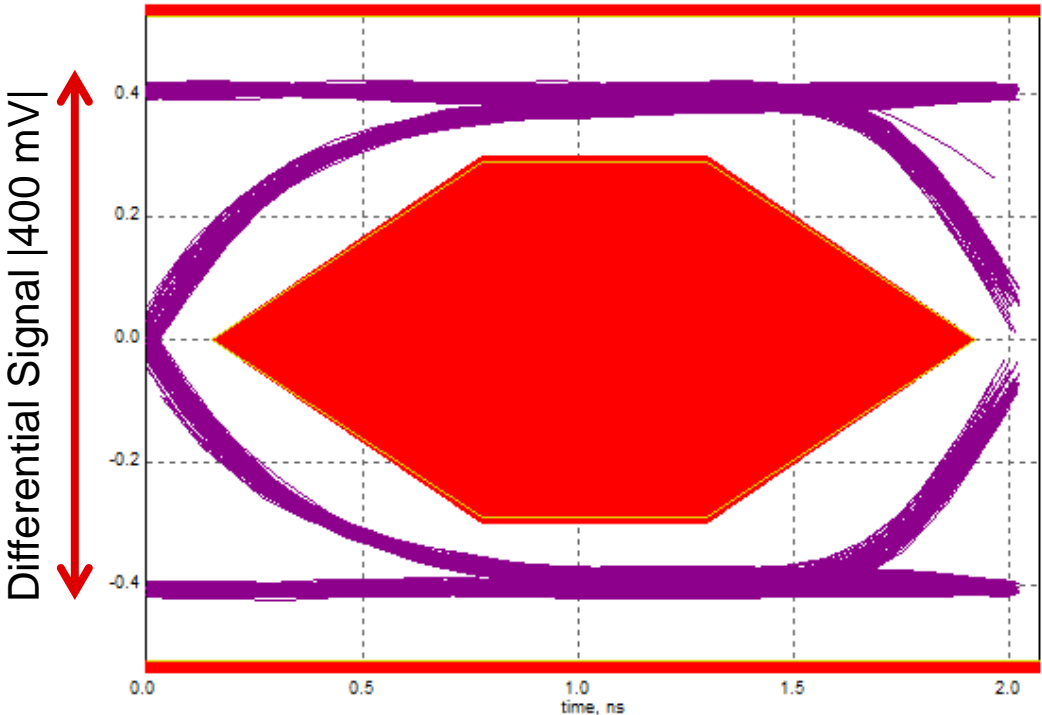


eUSB2

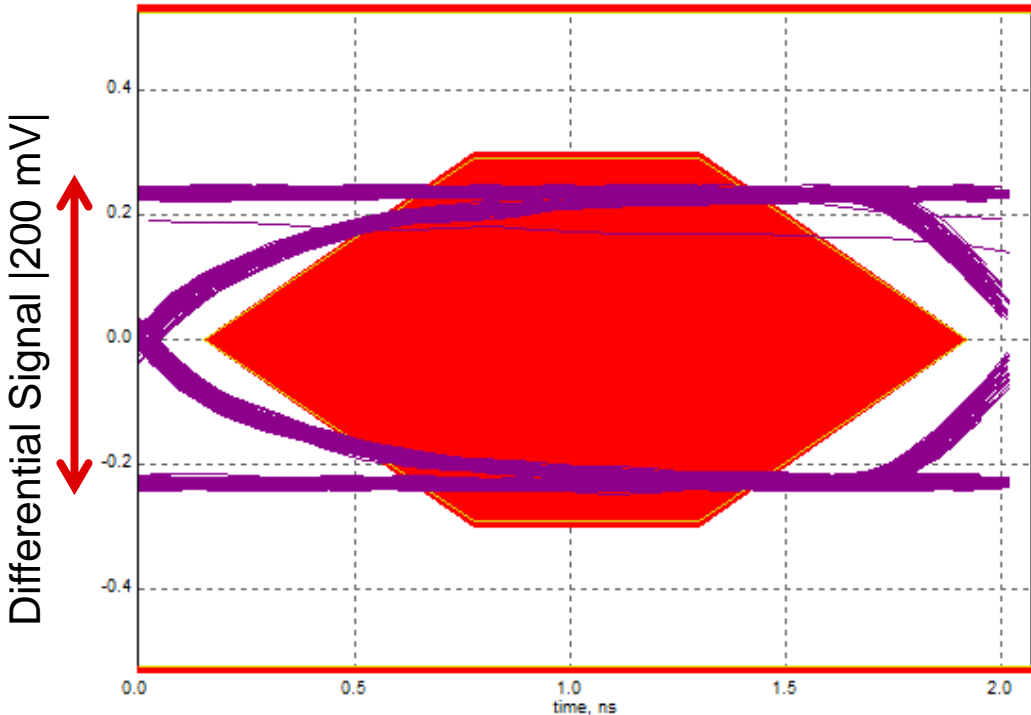


USB 2.0 and eUSB2 high-speed eye diagrams

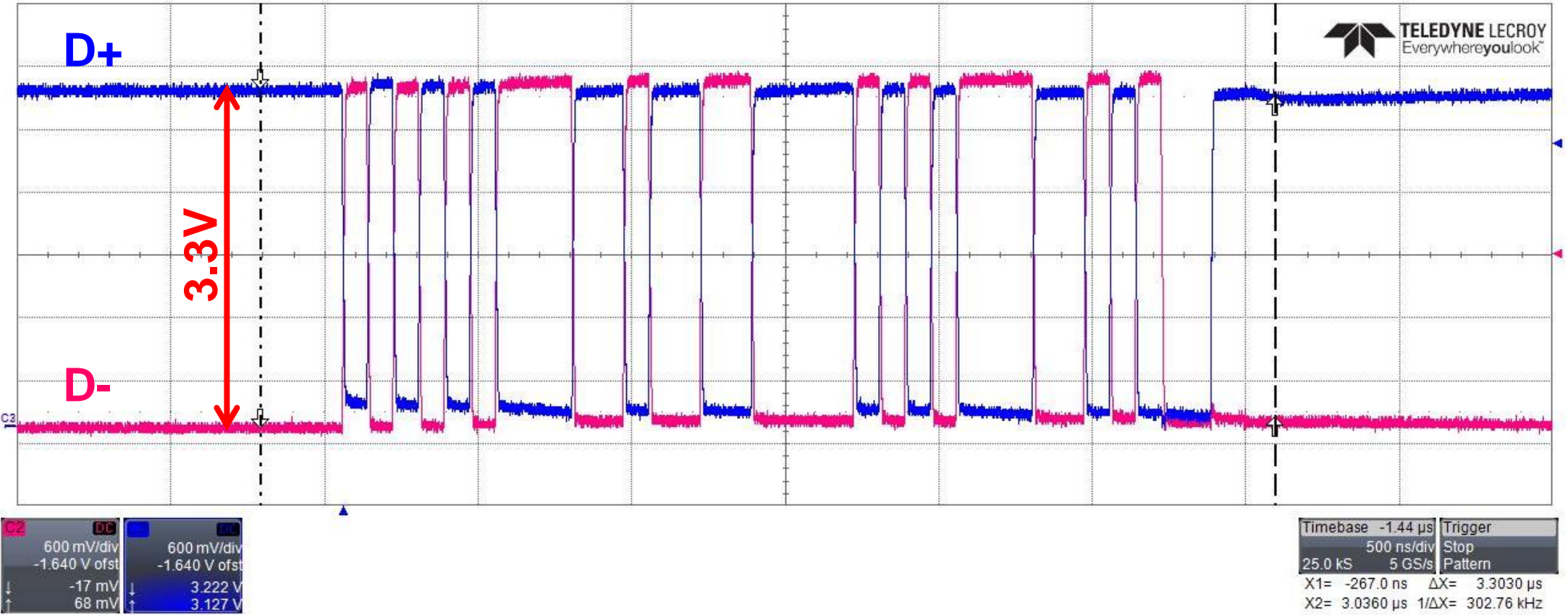
USB 2.0



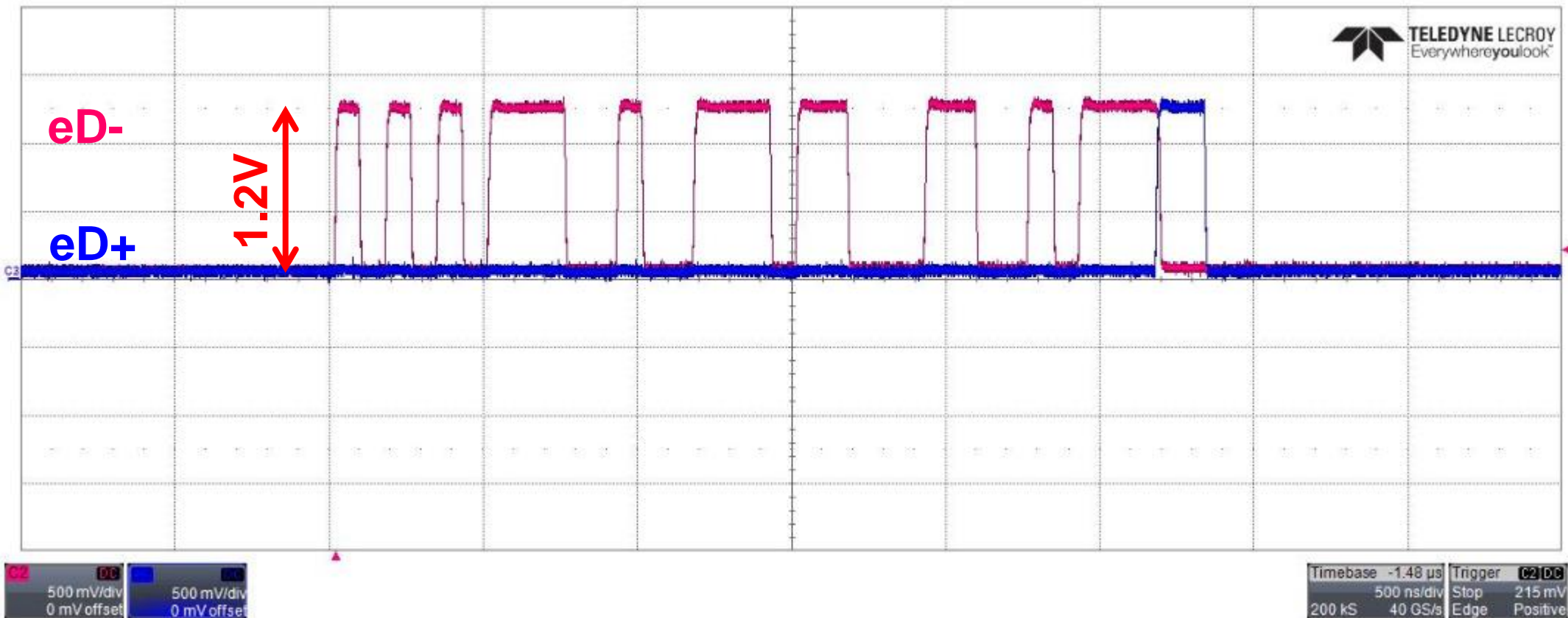
eUSB2



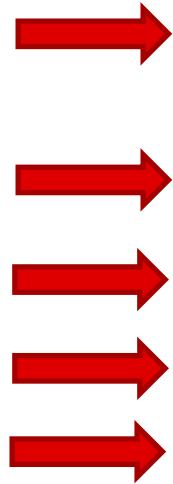
USB 2.0 full speed packet - differential



eUSB2 full speed packet – single ended

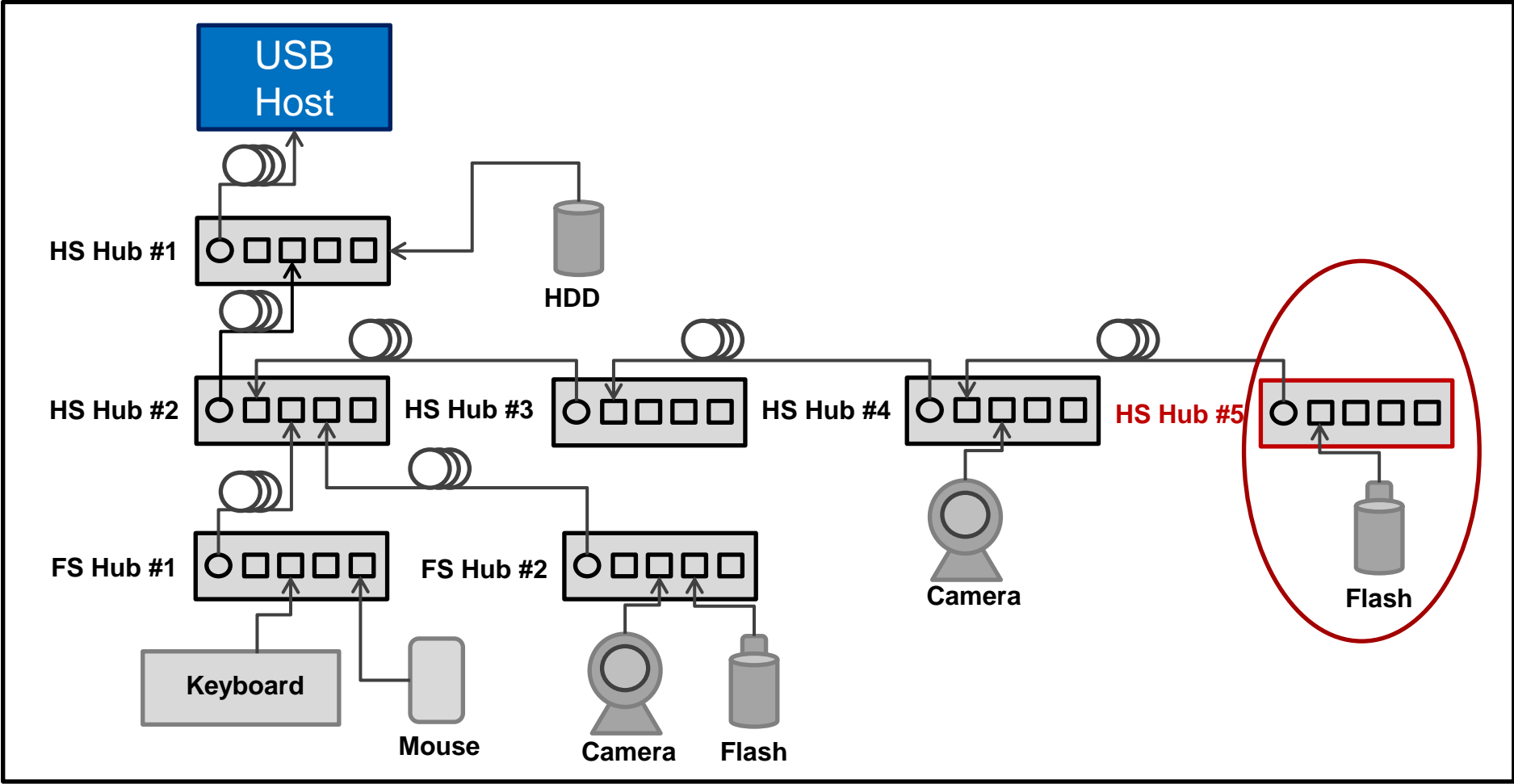


eUSB2 control messages – in-band signaling

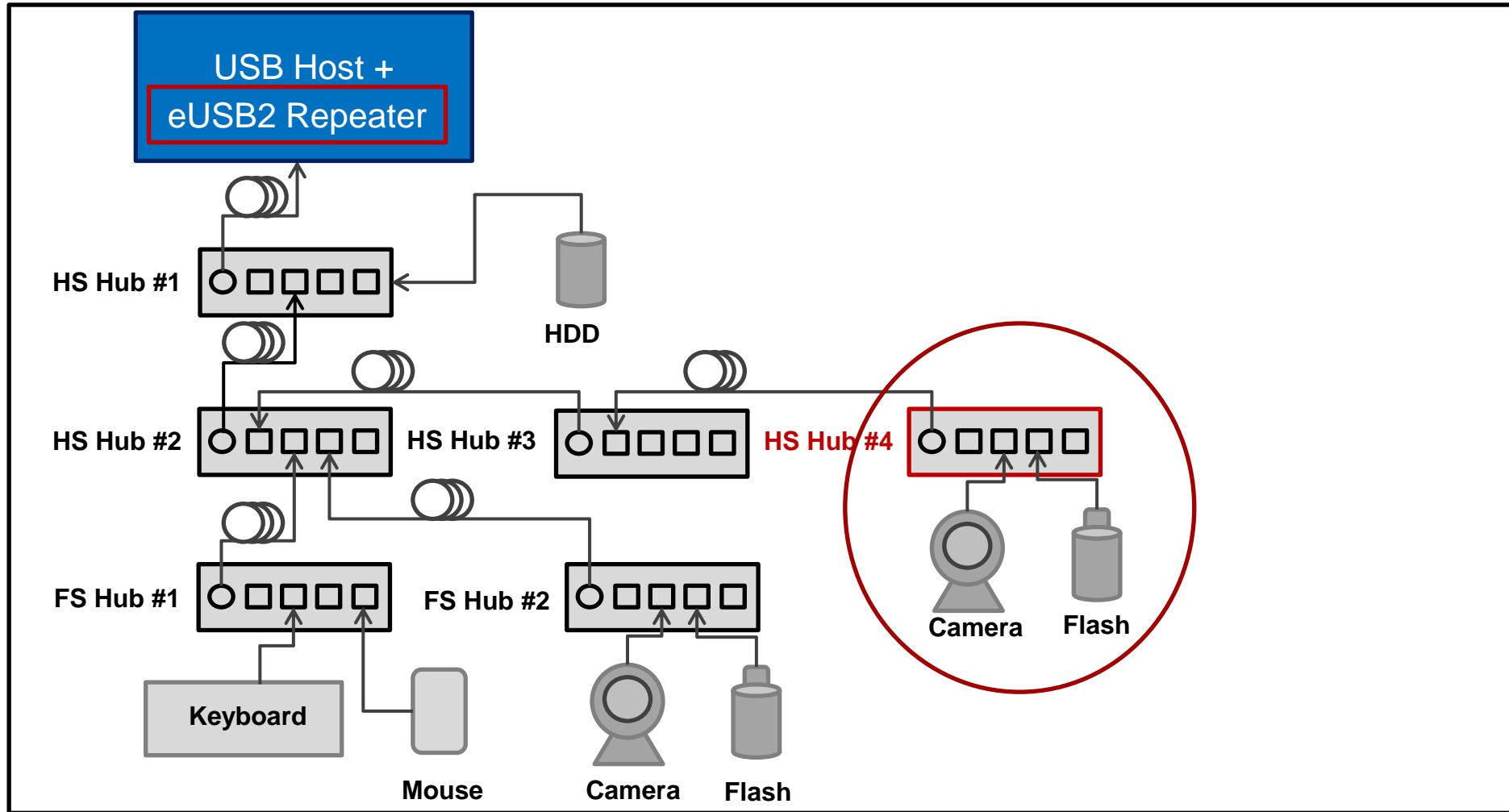


Control Message Name	Description	Usage Cases
CM.FS	HS Host: Enter FS terminations and enter L1 power state	Repeater mode only
	HS Peripheral: Enter FS terminations	
CM.L1	FS/LS: Enter L1 power state	
CM.L2	Enter lowest physical power state	Repeater mode only
CM.Reset	USB2.0 Bus Reset	Repeater mode only
CM.Test	Enable HS terminations without enumeration (Test Mode)	Repeater mode only, for compliance use.
CM.RAP	Start of register access	Native mode / Repeater mode - to access register space.

USB 2.0 compliance and interoperability

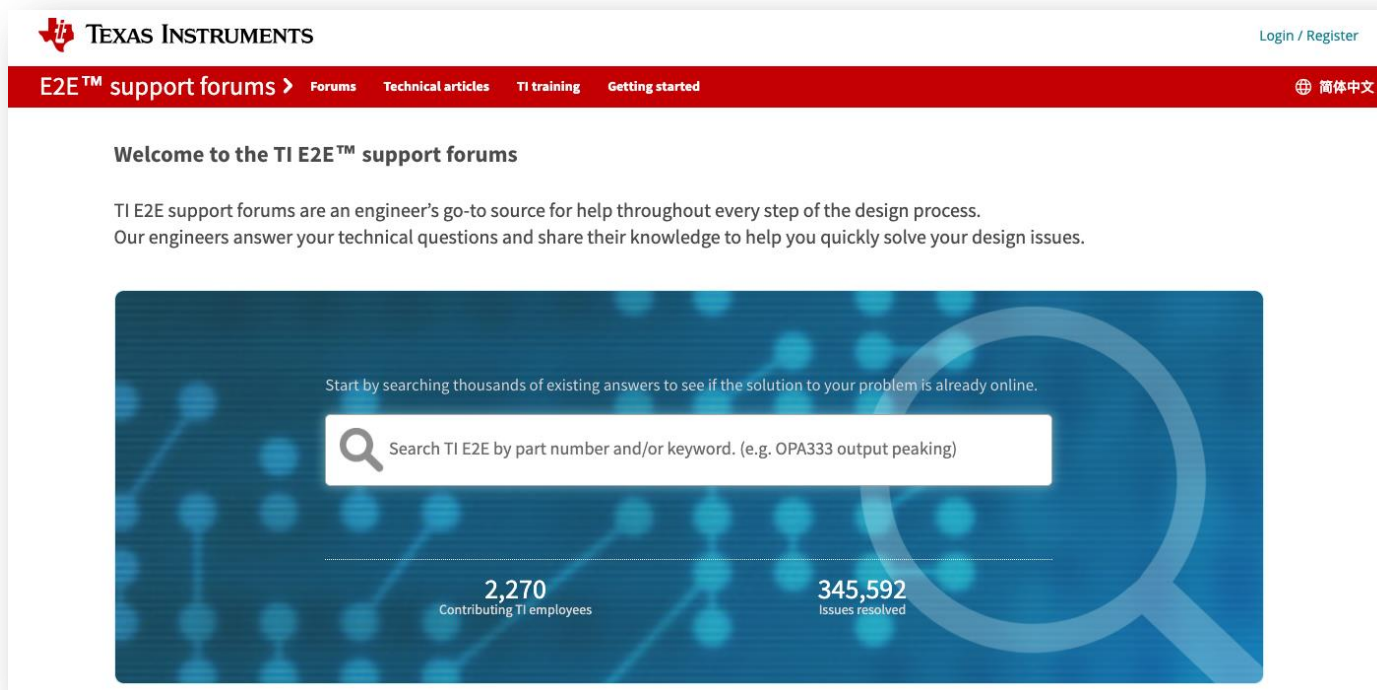


eUSB2 compliance and interoperability



Thank you

- [TI Precision Labs - What is an Eye Diagram?](#)
- [TI Precision Labs – Layout Basics for USB Designs](#)



The screenshot shows the TI E2E support forums homepage. At the top left is the Texas Instruments logo and the text "TEXAS INSTRUMENTS". At the top right are links for "Login / Register". Below this is a red navigation bar with "E2E™ support forums >" and sub-links for "Forums", "Technical articles", "TI training", and "Getting started". On the far right of the navigation bar is a globe icon and the text "简体中文".

The main content area starts with the heading "Welcome to the TI E2E™ support forums". Below this is a paragraph: "TI E2E support forums are an engineer's go-to source for help throughout every step of the design process. Our engineers answer your technical questions and share their knowledge to help you quickly solve your design issues."

Below the paragraph is a search bar with the text: "Start by searching thousands of existing answers to see if the solution to your problem is already online." The search bar contains a magnifying glass icon and the placeholder text: "Search TI E2E by part number and/or keyword. (e.g. OPA333 output peaking)".

At the bottom of the search area, there are two statistics: "2,270 Contributing TI employees" and "345,592 Issues resolved".



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Short quiz

True or false: eUSB2 supports the same speeds as USB 2.0.

Short quiz



True or false: eUSB2 supports the same speeds as USB 2.0.

True. eUSB2 supports high speed, full speed and low speed operation.

Short quiz

True or false: eUSB2 can be connected to external connectors.

Short quiz

FALSE

True or false: eUSB2 can be connected to external connectors.

False. eUSB2 is an inter chip interconnect and it requires an eUSB2 repeater to support external connectors.

Short quiz

True or false: eUSB2 repeaters are just level shifting redrivers.

Short quiz

FALSE

True or false: eUSB2 repeaters are just level shifting redrivers.

False. eUSB2 repeaters not only level shift high speed signaling, they support differential to single ended translation for full speed and low speed as well as in-band signaling.

Short quiz

True or false: eUSB2 allows SoCs to use lower voltage IO cells.

Short quiz



True or false: eUSB2 allows SoCs to use lower voltage IO cells.

True. eUSB2 is designed to run at 1.2V or lower instead of 3.3V.