

Testing SpaceWire Systems Across the Full Range of Protocol Levels with the SpaceWire Physical Layer Tester (SPLT)

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STAR-Dundee

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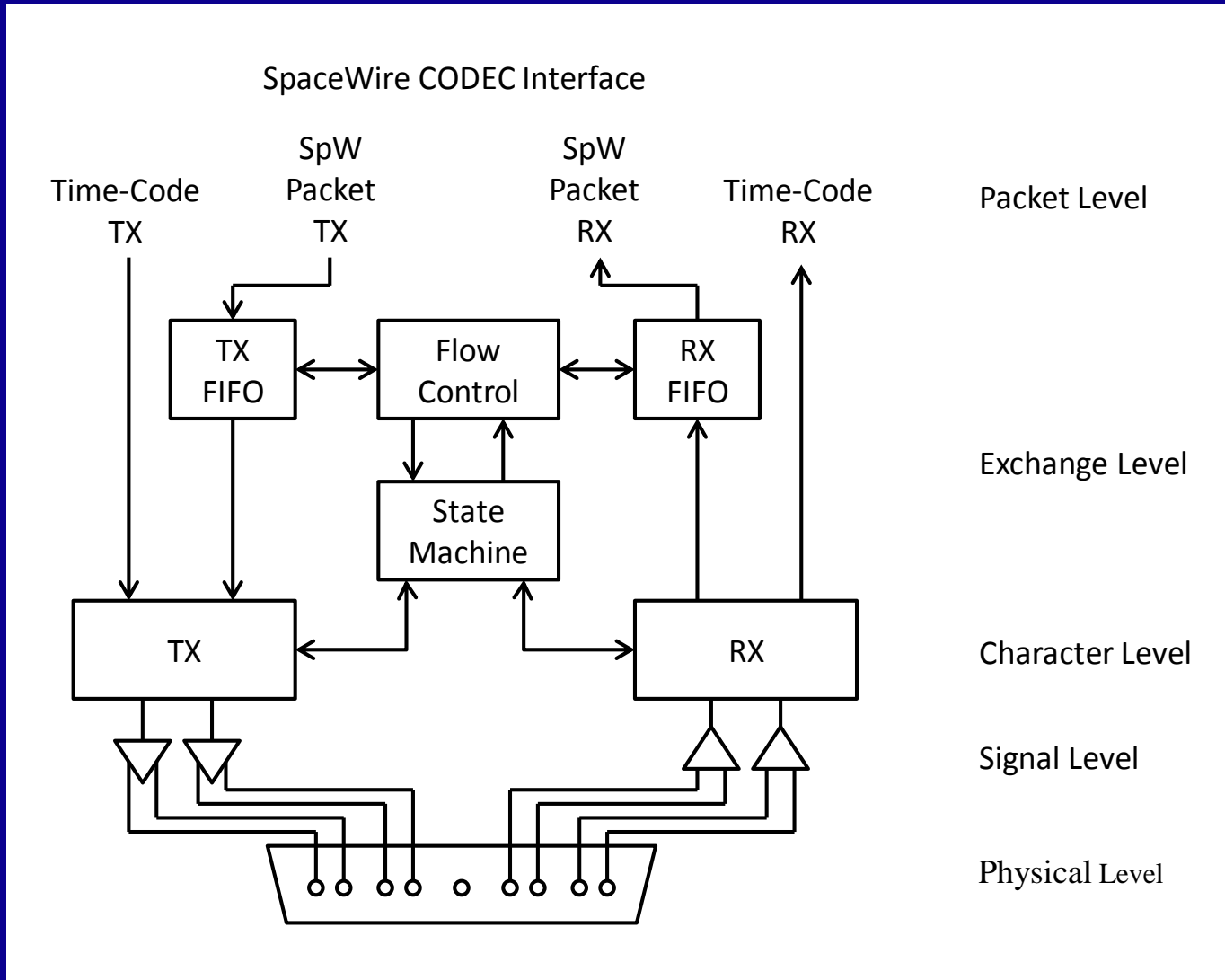


STAR-Dundee Overview

- Layers of the SpaceWire Standard
- Existing STAR-Dundee test equipment
- Capabilities of the SPLT
- Manipulating the physical & signal layer
- Measurements of the SPLT manipulations
- Summary & time for questions

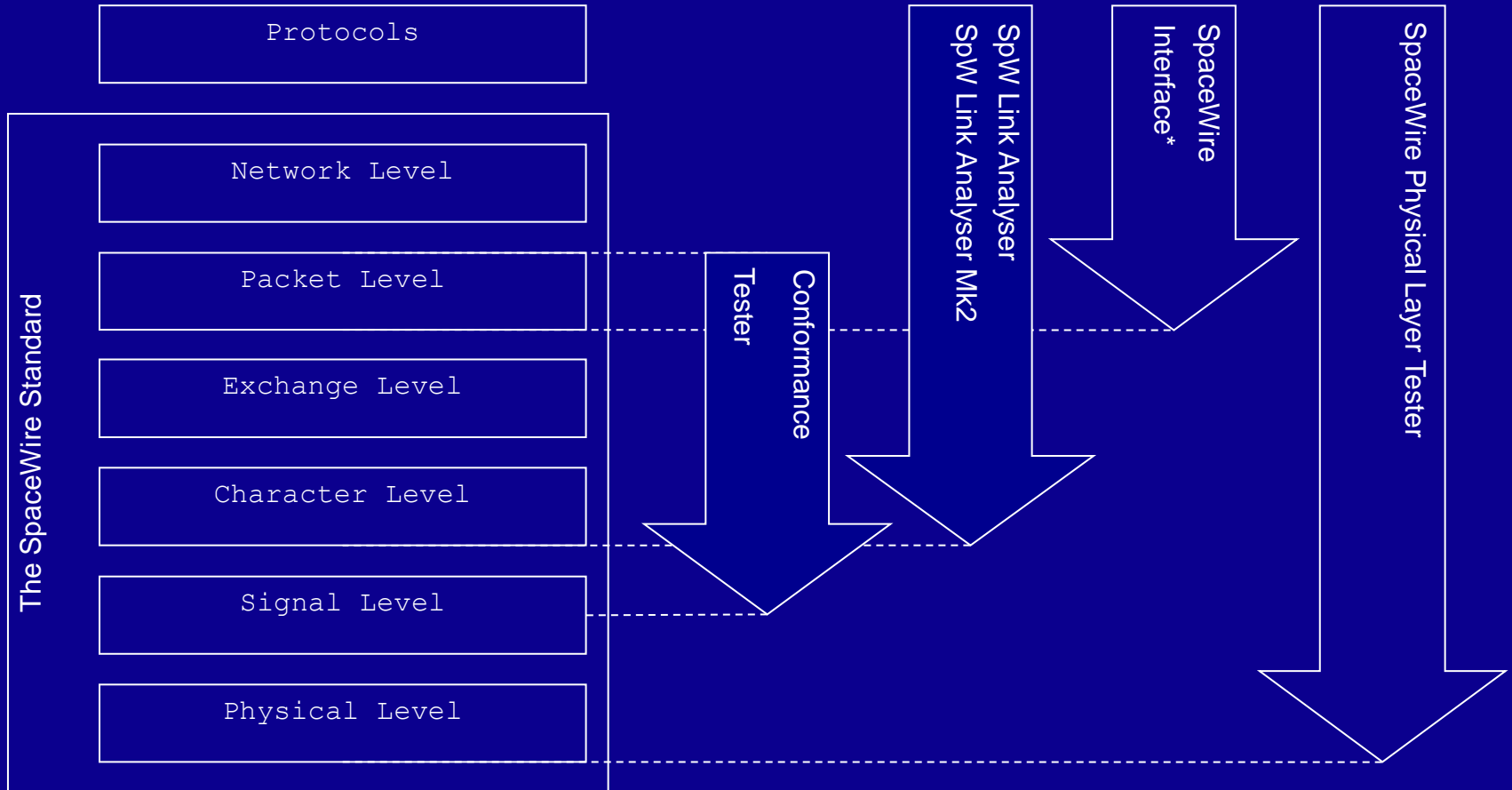


STAR-Dundee Levels of the SpaceWire Standard





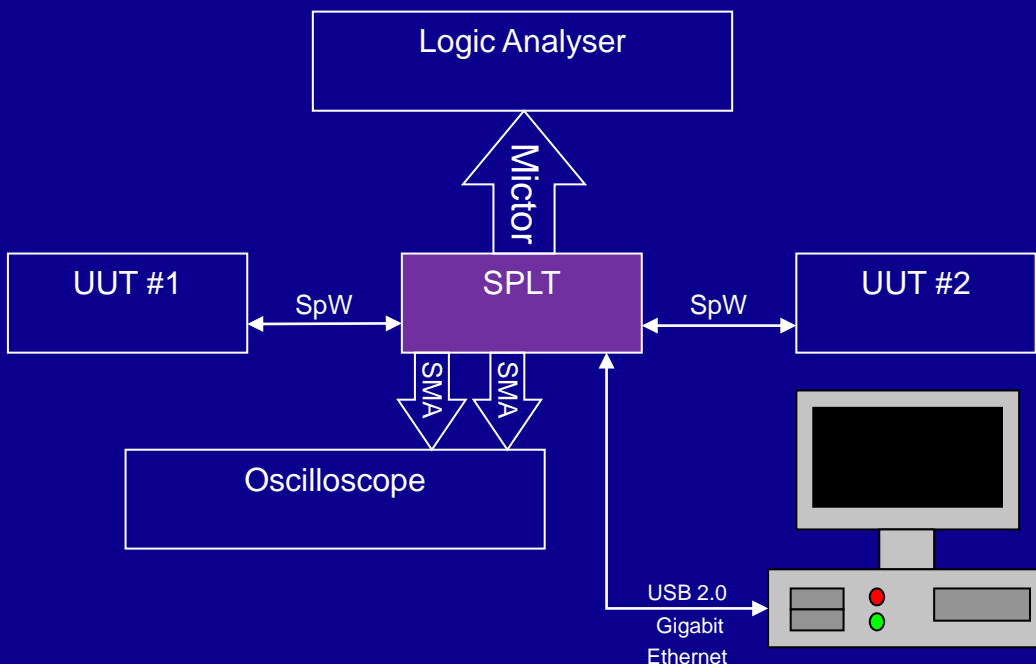
STAR-Dundee Testing across the SpW Standard



*Includes EGSE, SpW Brick, SpW PCI Mk2, SpW cPCI Mk2, SpW PMC Mk2, SpW PCI Express and SpW Router Mk2.



STAR-Dundee In-line margin analysis

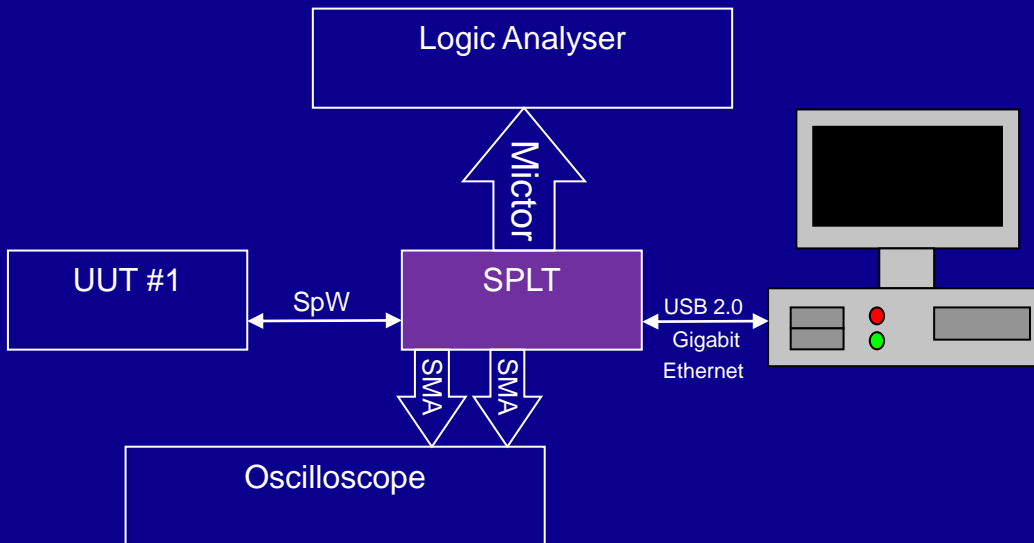


- Link Analyser Mk2
 - SpW data stored in SPLT
 - Logic Analyser interface
 - External triggers
 - Protocol Analysis
 - Fault Injection
- Analogue data buffered to SMA
- Link speed manipulation
- Physical Layer manipulation



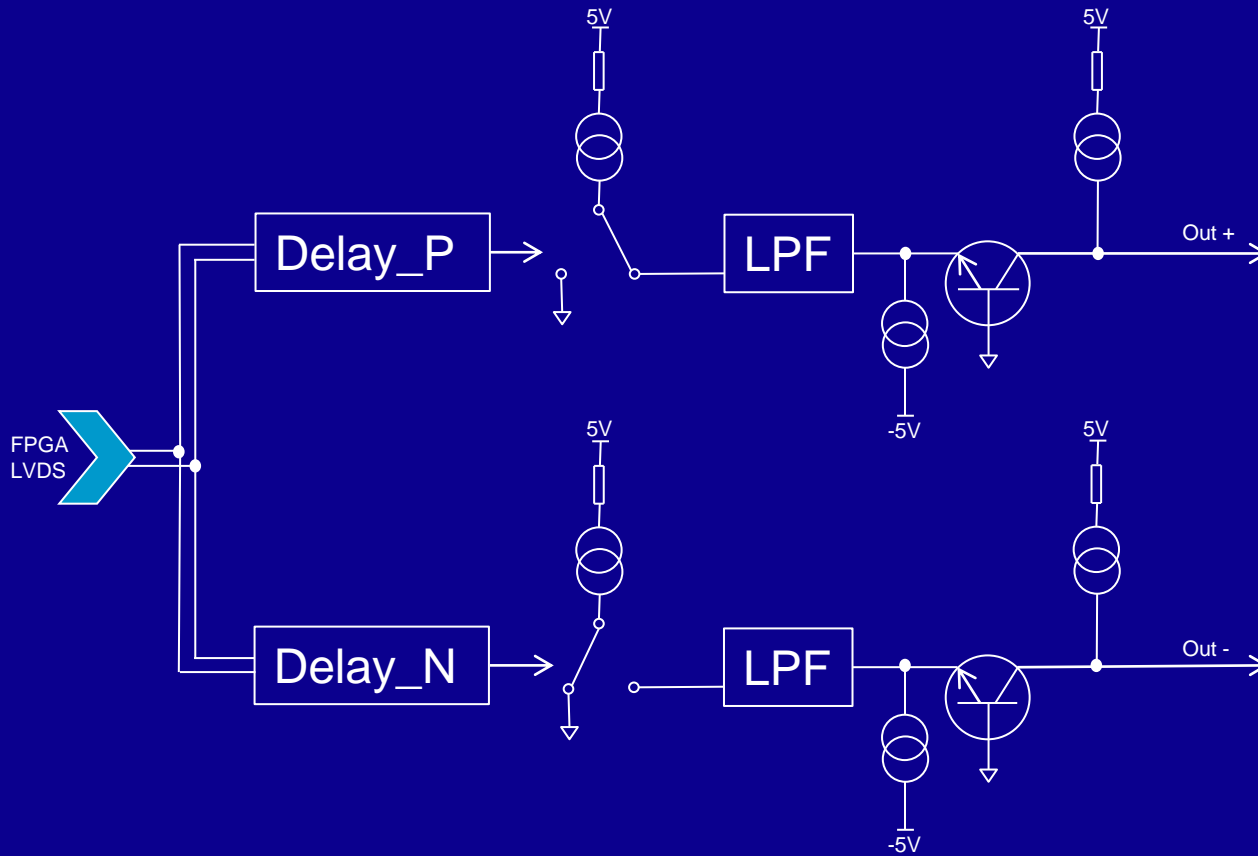
STAR-Dundee Device margin analysis

- SpW Interface
- Loop-back Analysis
- Packet Generation & Checking
- Conformance Testing
- RMAP Test Scripts
- Link Analyser Mk2
- Physical Layer manipulation



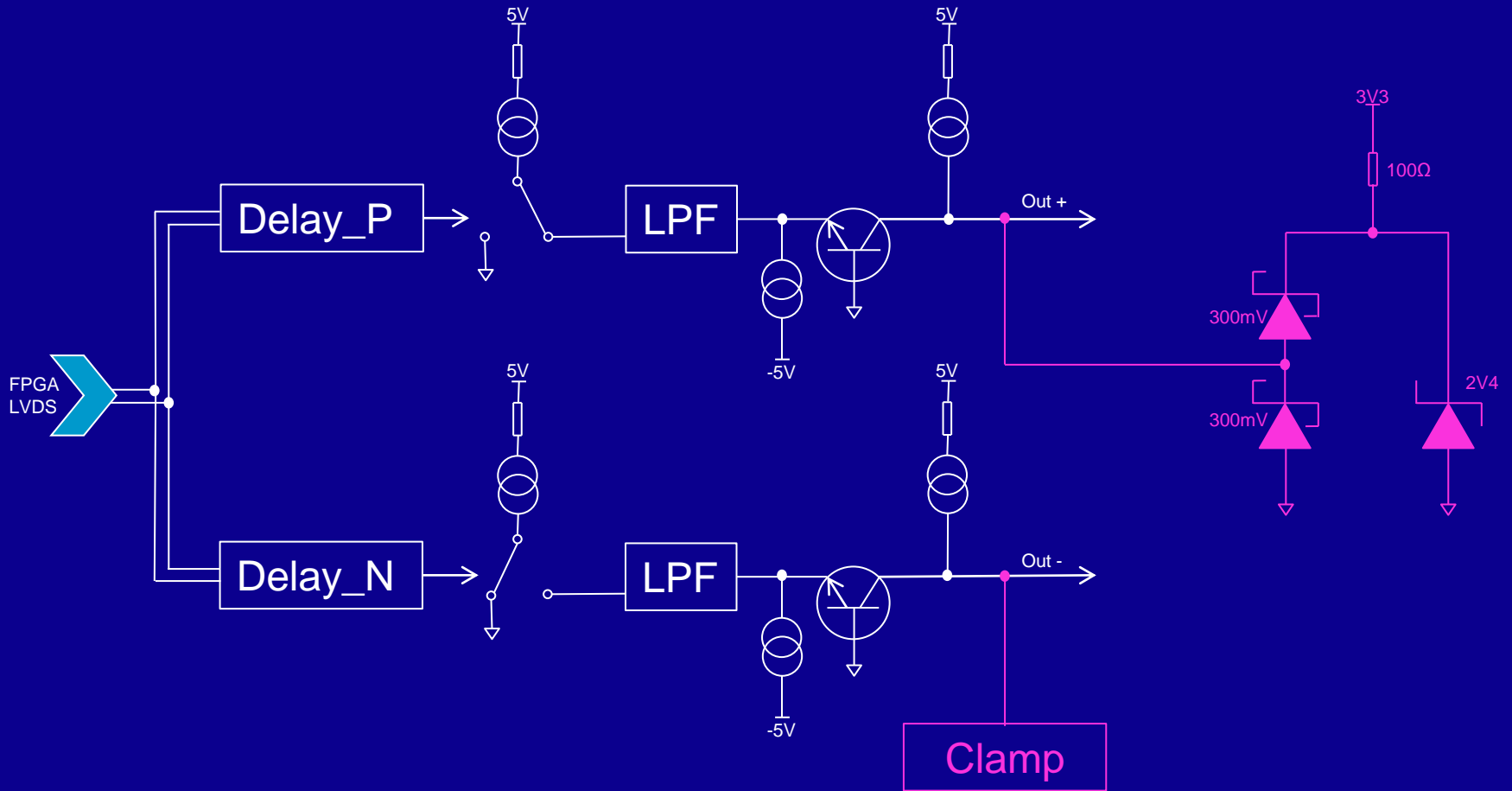


STAR-Dundee Analog Chain: Overview



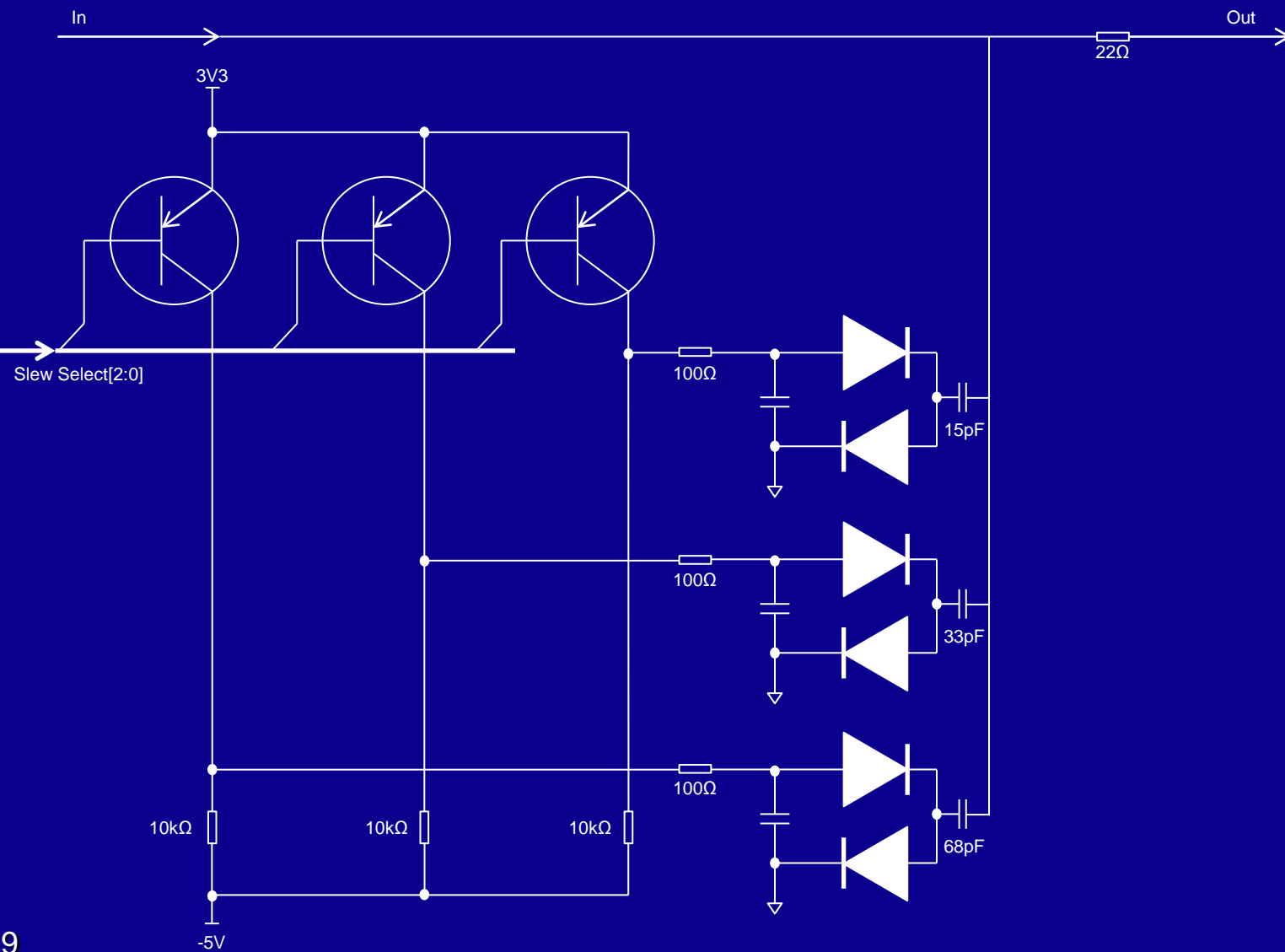


STAR-Dundee Analog Chain: Voltage Clamps



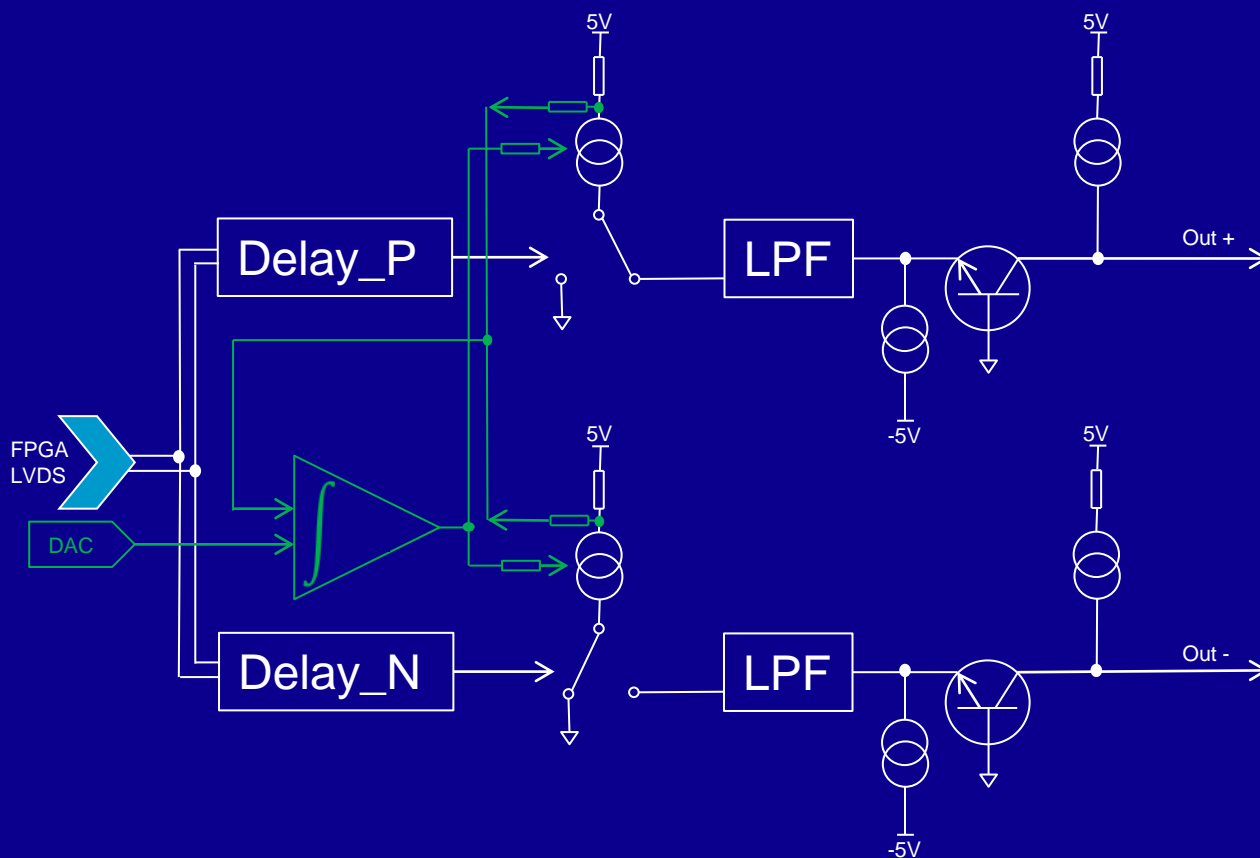


STAR-Dundee Analog Chain: Low Pass Filter



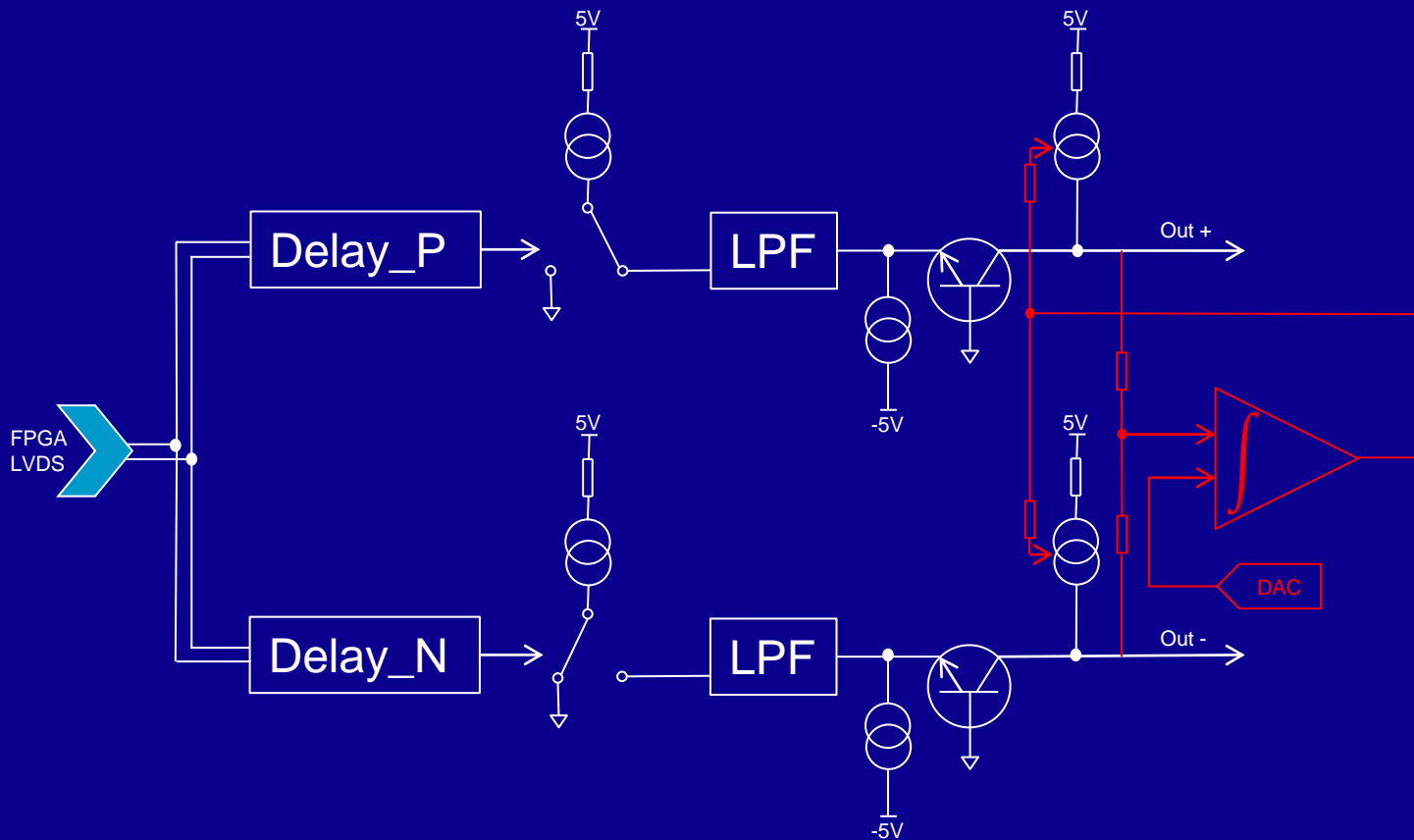


STAR-Dundee Analog Chain: Swing



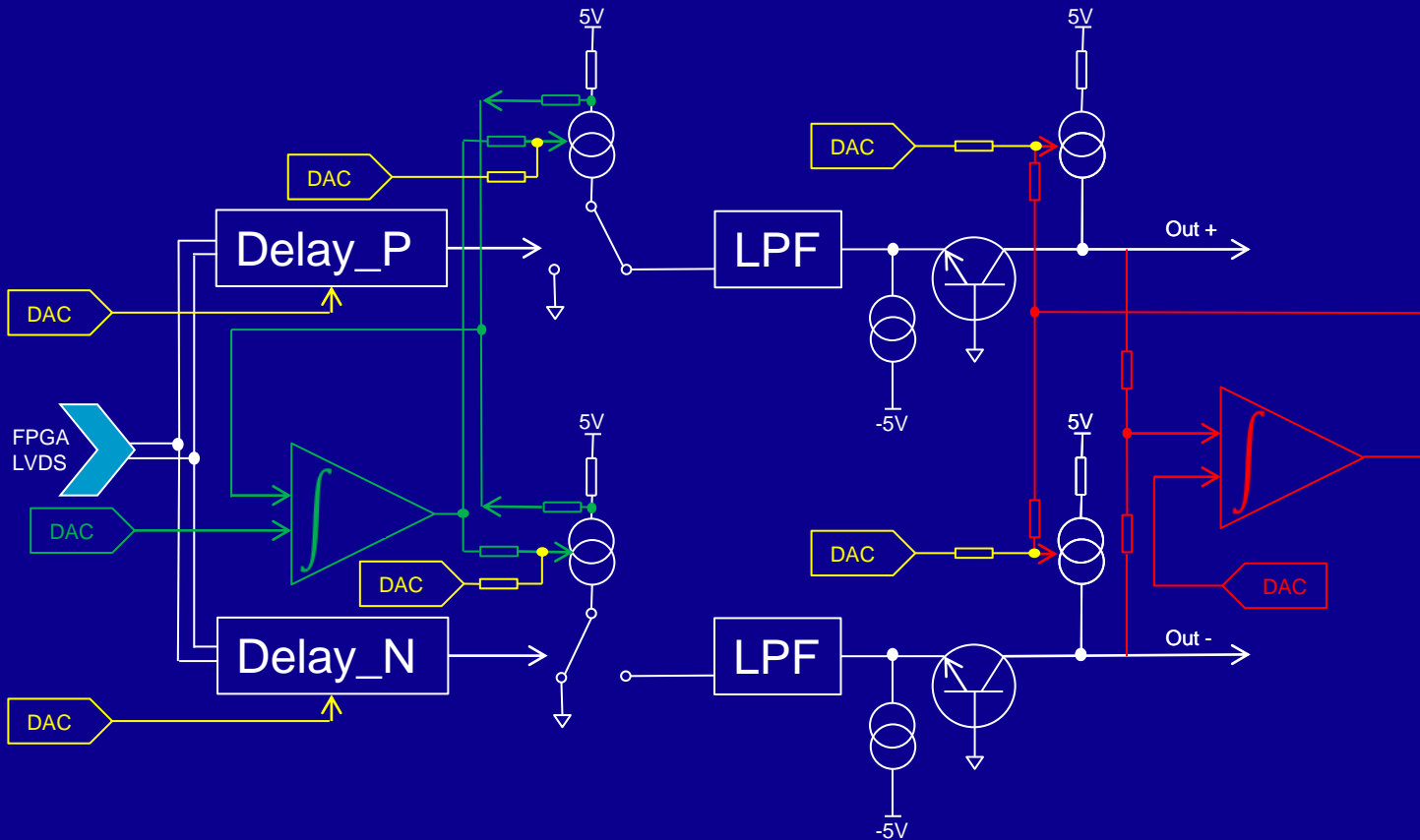


STAR-Dundee Analog Chain: Common Mode





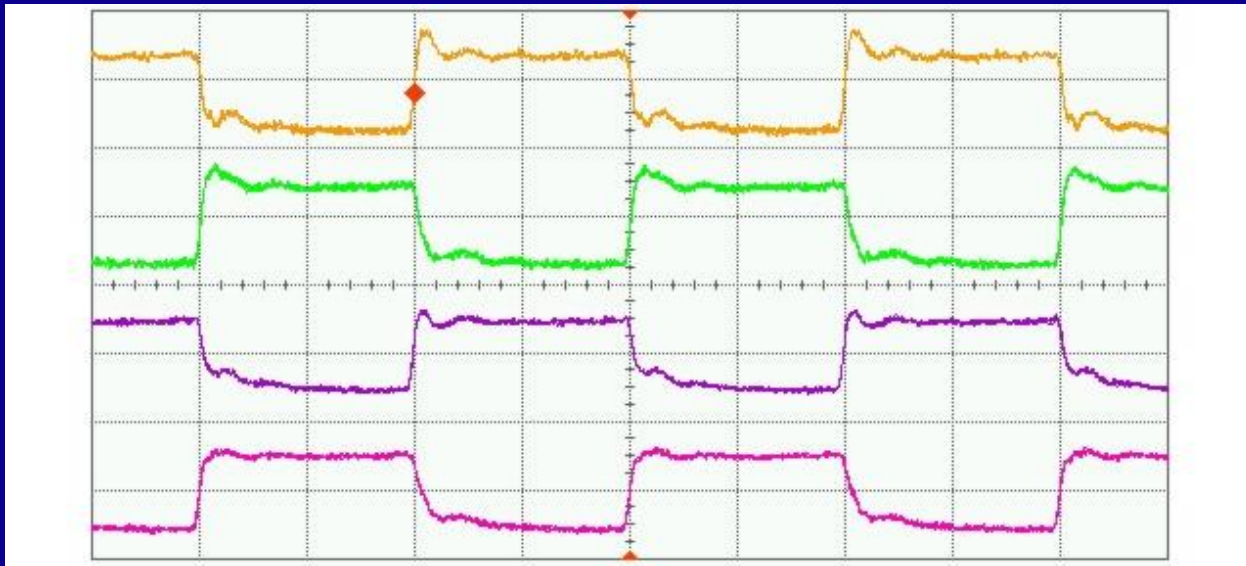
STAR-Dundee Analog Chain: Trim





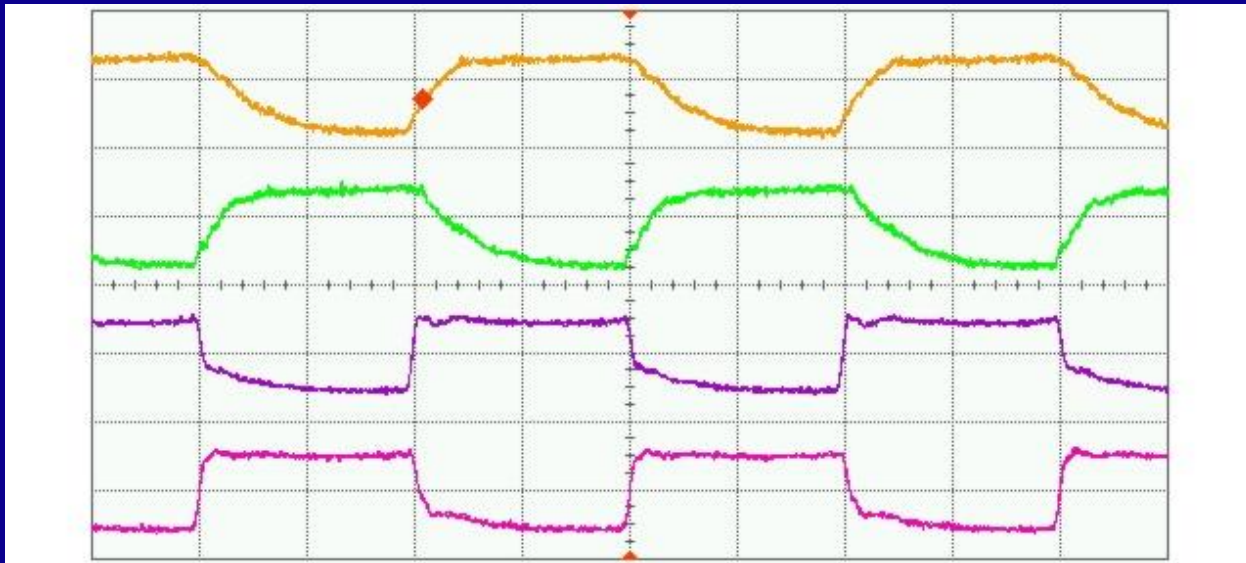
STAR-Dundee Results: Unmodified & Slew

Y: 300mV/div
X: 10ns/div



Unmodified

Y: 300mV/div
X: 10ns/div

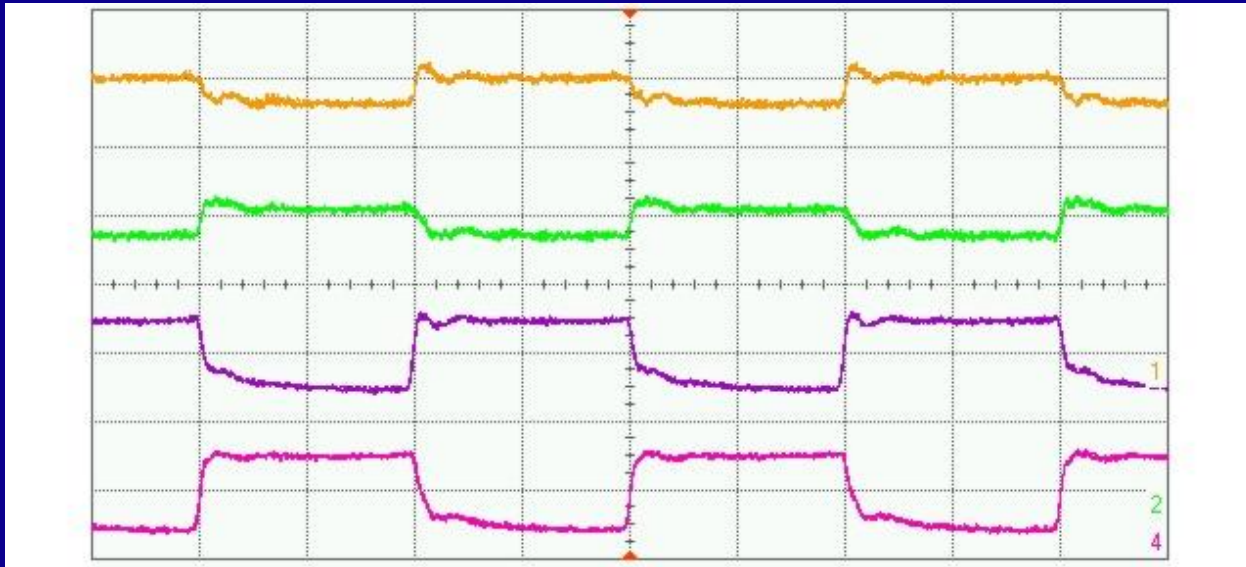


Slew:
116pF LPF



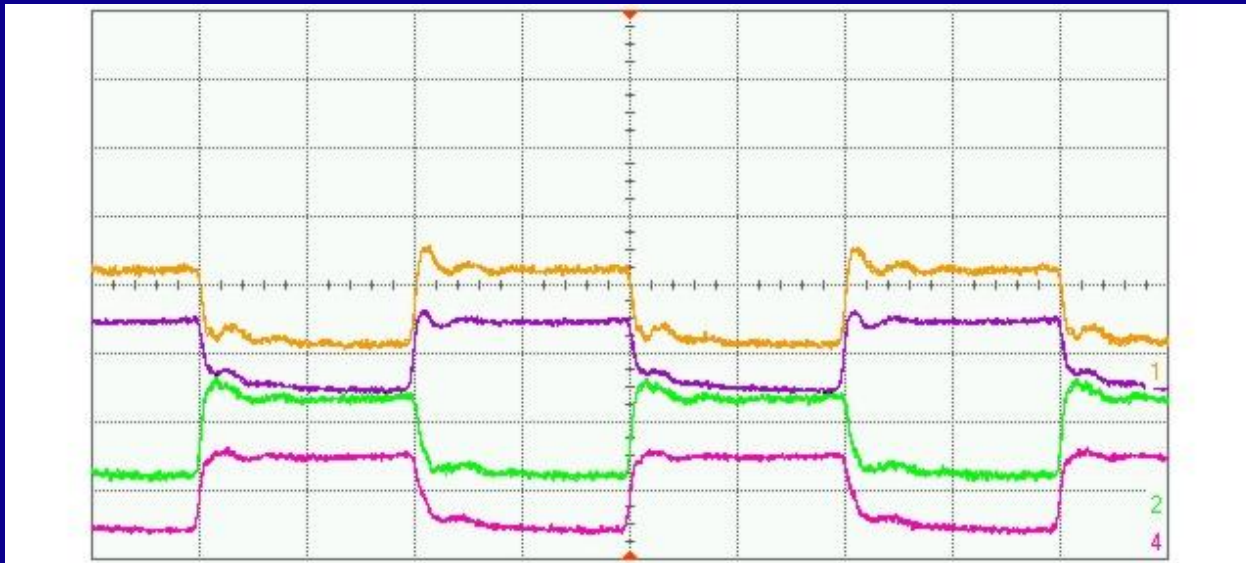
Results: Swing & Common Mode

Y: 300mV/div
X: 10ns/div



Swing
Reduced to
100 mV

Y: 300mV/div
X: 10ns/div

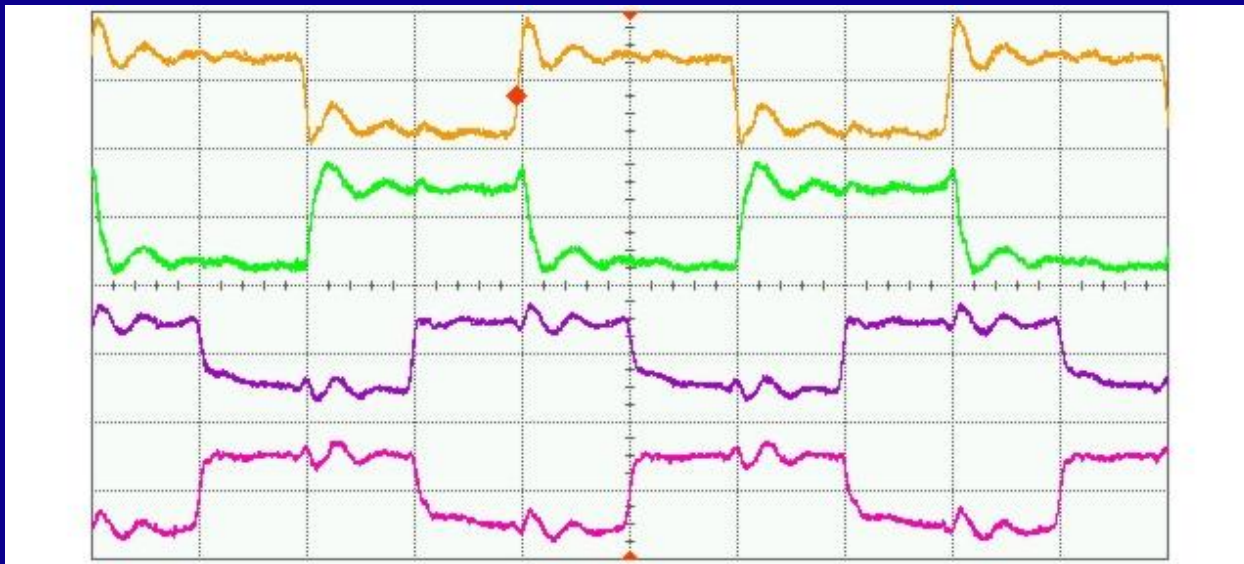


Common
Mode
Reduced by
1 Volt



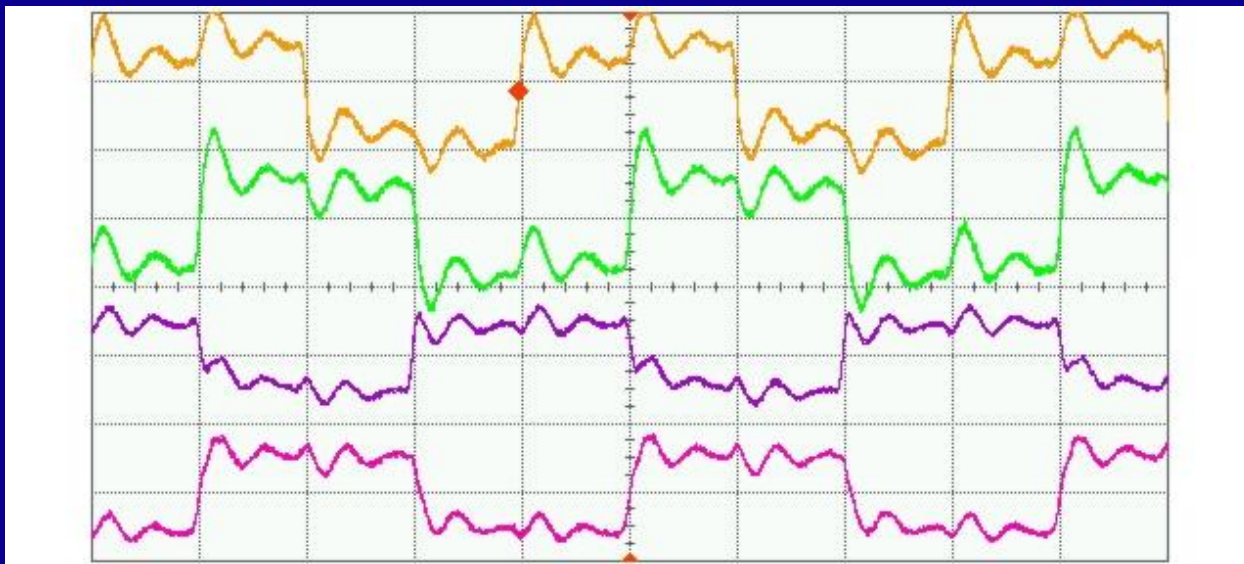
STAR-Dundee Results: Skew

Y: 300mV/div
X: 10ns/div



Data-Strobe
Skew (10ns)

Y: 300mV/div
X: 10ns/div

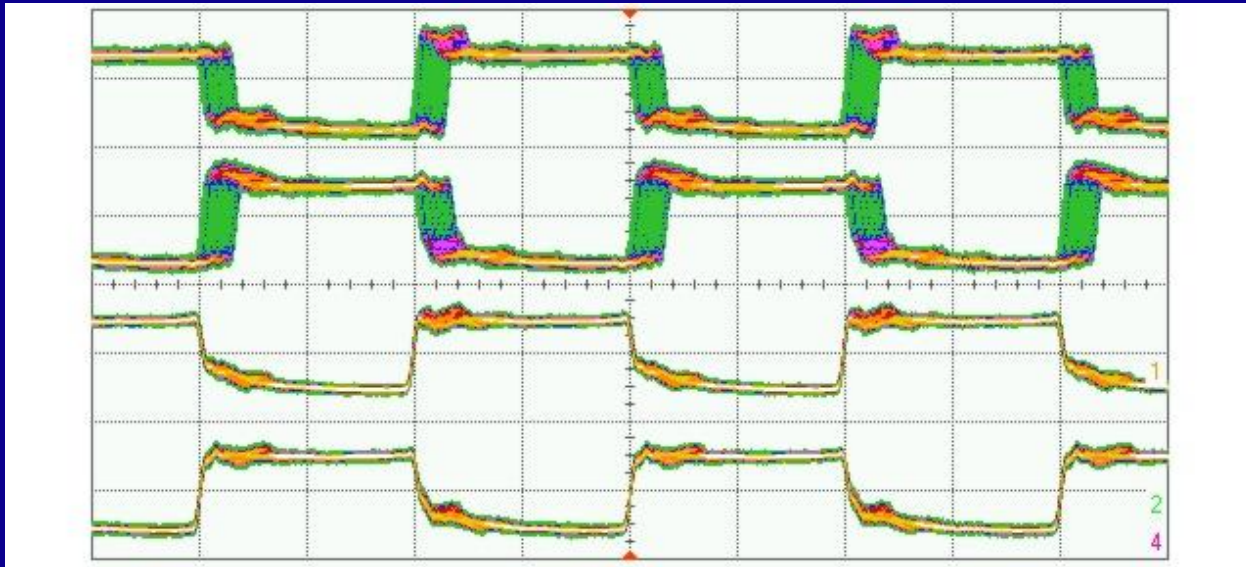


In-pair
Skew (10ns)



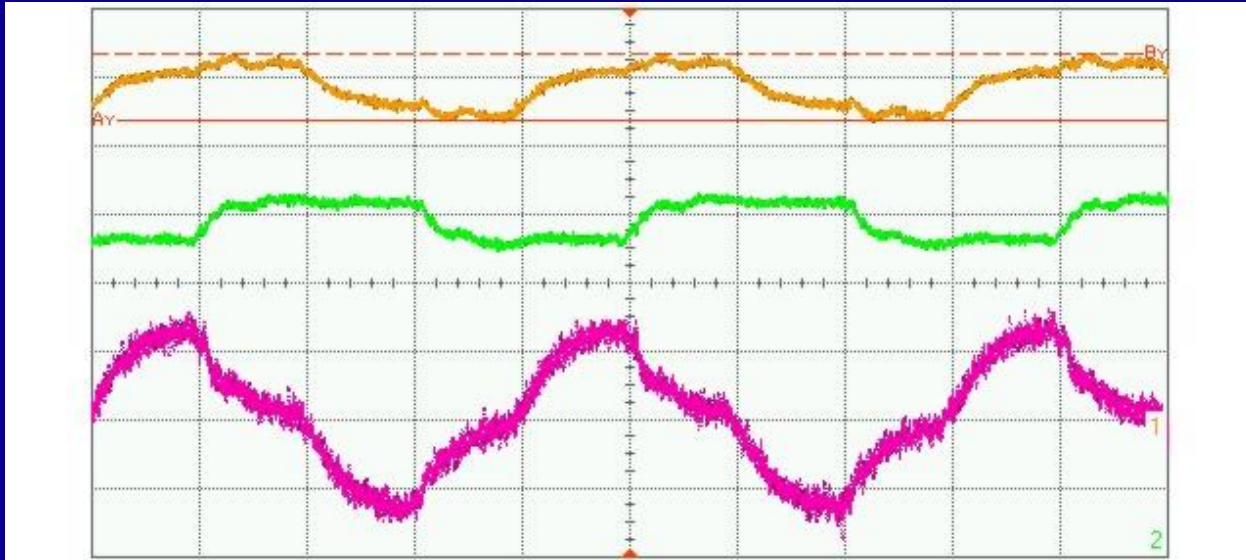
Results: Jitter & Multiple noise

Y: 300mV/div
X: 10ns/div
Infinite
Persistence



300ps of
uniform jitter

Y: 300mV/div
X: 10ns/div



Multiple
Sources of
interference

Subtraction:
Orange-Green
shown in pink



- Test across the standard
- Test throughout development
- Test in different Configurations:
 - In line analysis
 - Conformance testing
 - Loop-back testing
 - Interface testing
- Test as a system
 - Logic Analyser interface
 - Oscilloscope interface
- A system may meet requirements in test; But by what margin does it exceed requirements?