ALLION®
Engineering Services

COMPLIANCE PROGRAM
TEST REPORT

USB 2.0 Test Report
For
Peripheral

Company Name: NXP Semiconductors

VID (Dec or Hex): 0x1FC9 The VID for the company who apply the USB-IF logo.

Model Name: LPC55S69

Product Type: MSC

Report Date: 2/1/2019

Test Result: **PASS**

Tester: **Sofiya Mayevskiy**   Authorized Signature: **Kayla Seliner**

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1. TEST RESULT IS VALID ONLY TO THE ORIGINAL TESTED DEVICE MODEL. ALLION RESERVES THE RIGHT TO PROHIBIT OTHERS TO DISTORT, ISOLATE, FALSIFY, COPIED AND/OR BY ANY PROCESS TO CHANGE THE CONTENT OF THIS TEST REPORT UNLESS IT IS PRIOR APPROVED BY ALLION.

Company Information:

Company
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High Speed & Basic Speed Compliance Tests

A4.4: Device High-speed Signal Quality ☒ Pass ☐ **Fail** ☐ N/A

These tests measure the ability of transmitters to do valid high speed signaling. High speed signal quality is measured on upstream ports. A high speed scope with differential probes is used. Signaling data is captured with the scope and then translated to an eye pattern. The signal quality eye patterns obtained from the measurements must agree with the transmit eye patterns in the USB 2.0 Specification.

Connector Type: <u>Untethered</u> (Tethered means no standard B or special B connector)

EL_2: Transmitter Data Rate	☒ Pass	☐ **Fail**	☐ N/A
EL_4: Eye Pattern (Template 1)	☒ Pass	☐ **Fail**	☐ N/A
EL_5: Eye Pattern (Template 2)	☐ Pass	☐ **Fail**	☒ N/A
EL_6: Rising and Falling Time	☒ Pass	☐ **Fail**	☐ N/A
EL_7: Monotonic Data Transition	☒ Pass	☐ **Fail**	☐ N/A

A4.5: Device Packet Parameters ☒ Pass ☐ **Fail** ☐ N/A

This test measures the amount of time it takes hosts and devices to respond. It also verifies device generated SYNCs and EOPs.

EL_21: **(32bit)**	**32bit**	☒ Pass	☐ **Fail**	☐ N/A
EL_22-Step1: **(>=8bit and <=192bit)**	**134bit**	☒ Pass	☐ **Fail**	☐ N/A
EL_22-Step2: **(>=8bit and <=192bit)**	**108bit**	☒ Pass	☐ **Fail**	☐ N/A
EL_25: **(8bit)**	**8bit**	☒ Pass	☐ **Fail**	☐ N/A

A4.6: Device CHIRP Timing ☒ Pass ☐ **Fail** ☐ N/A

This test examines the basic timings and voltages of both upstream ports during the speed detection protocol. (Device reset from Full Speed)

EL_28: **(>=2.5us and <=6ms)**	**128.427us**	☒ Pass	☐ **Fail**	☐ N/A
EL_29: **(>=1ms and <=7ms)**	**3.072ms**	☒ Pass	☐ **Fail**	☐ N/A
EL_31: **(<=500us)**	**3.351us**	☒ Pass	☐ **Fail**	☐ N/A

A4.7: Device Suspend/Resume/Reset timing ☒ Pass ☐ Fail ☐ N/A

This test verifies that a device can be suspended and resumed while operating in high speed and also that the device can be reset from the suspended state.

EL_38: (>=3ms and <=3.125ms)	3.074ms	☒ Pass	☐ Fail	☐ N/A
EL_39:		☒ Pass	☐ Fail	☐ N/A
EL_40:		☒ Pass	☐ Fail	☐ N/A
EL_27: (>=3.1ms and <=6ms)	3.497ms	☒ Pass	☐ Fail	☐ N/A
EL_28: (>=2.5us and <=6ms)	128.389us	☒ Pass	☐ Fail	☐ N/A

A4.8: Device Test J/K, SE0_NAK ☒ Pass ☐ Fail ☐ N/A

The USB-IF no longer requires EL_8: Test_J and Test_K to be performed as a condition for USB Certification. Measurement of EL_9: Test_J, Test_K and SE0 are still a requirement for certification. EL_9 is defined in the USB 2.0 Test Specification and measures the data line voltage when not driven. For detail information please reference as below link:

EL_9

Test Mode	Voltage (mV)
SE0_NAK D+	0.5
SE0_NAK D-	0.6
Test J D-	1.9
Test K D+	1.8

(-20mV to 20mV)

A4.9: Device Receiver Sensitivity   ☒ Pass   ☐ Fail   ☐ N/A

These tests check the receive characteristics of upstream ports

EL_18		☒ Pass	☐ Fail	☐ N/A
EL_17 Positive: (<= +200mV)	+144.8mV	☒ Pass	☐ Fail	☐ N/A
EL_17 Negative: (>= -200mV)	-163.0mV	☒ Pass	☐ Fail	☐ N/A
EL_16 Positive: (>= +100mV)	+136.6mV	☒ Pass	☐ Fail	☐ N/A
EL_16 Negative: (<= -100mV)	-155.5mV	☒ Pass	☐ Fail	☐ N/A

Basic Speed Signal Quality Test Result   ☒ Pass   ☐ Fail

Connector Type: Untethered (Tethered means no standard B or special B connector)

Basic Speed Upstream Signal Quality: ☒ Pass   ☐ Fail

Inrush Current Test: ☒ Pass   ☐ Fail

Back Voltage Test Result   ☒ Pass   ☐ Fail

Enumerate before / after

Pin	Voltage (mV)	
D+	1.0	1.0
D-	1.2	1.2
V$_{Bus}$	0.0	0.0

(All values <= 400mV)

Miscellaneous: ☒ Pass   ☐ Fail

Bypass Capacitance Check: ☒ Pass   ☐ Fail

BC 1.2 Implemented Check: ☐ Support   ☒ Not Supported

If the upstream port has BC 1.2 capability, all items of BC 1.2 Portable Device category should be tested under this port for USB-IF certification.

Frameworks Test Result (USB20CV) ☒ **Pass** ☐ **Fail**

This test primarily covers USB-IF testing of devices and hubs for compliance with the standard commands in Chapters 9 and 11 of the USB 2.0 specification. This specification does not describe the full set of USB-IF tests and assertions for these devices.

High-Speed:

VID: 0x1FC9   **PID: 0x0092**

Chapter 9 Test:	☒ **Pass**	☐ **Fail**	☐ **N/A**

Interface: 1 MAX Power: 100 mA   **Remote Wakeup: N/A**

MSC Class Test:	☒ **Pass**	☐ **Fail**	☐ **N/A**
UVC Class Test:	☐ **Pass**	☐ **Fail**	☒ **N/A**
HID Class Test:	☐ **Pass**	☐ **Fail**	☒ **N/A**

Basic-Speed:

VID: 0x1FC9   **PID: 0x0092**

Chapter 9 Test:	☒ **Pass**	☐ **Fail**

Interface: 1 MAX Power: 100 mA   **Remote Wakeup: N/A**

MSC Class Test:	☒ **Pass**	☐ **Fail**	☐ **N/A**
UVC Class Test:	☐ **Pass**	☐ **Fail**	☒ **N/A**
HID Class Test:	☐ **Pass**	☐ **Fail**	☒ **N/A**

__Frameworks Test Result (USB3xCV)__ ☒ **Pass**   ☐ **Fail**

All USB peripherals are required to enumerate on a SuperSpeed host controller and pass all applicable tests within USB3xCV. Failure framework test in USB3xCV will prevent certification.

High-Speed:

VID: 0x1FC9   **PID: 0x0092**

Chapter 9 Test:	☒ **Pass**	☐ **Fail**	☐ **N/A**

Interface: 1 MAX Power: 100 mA   **Remote Wakeup: N/A**

MSC Class Test:	☒ **Pass**	☐ **Fail**	☐ **N/A**
UVC Class Test:	☐ **Pass**	☐ **Fail**	☒ **N/A**
HID Class Test:	☐ **Pass**	☐ **Fail**	☒ **N/A**

Basic-Speed:

VID: 0x1FC9   **PID: 0x0092**

Chapter 9 Test:	☒ **Pass**	☐ **Fail**

Interface: 1 MAX Power: 100 mA   **Remote Wakeup: N/A**

MSC Class Test:	☒ **Pass**	☐ **Fail**	☐ **N/A**
UVC Class Test:	☐ **Pass**	☐ **Fail**	☒ **N/A**
HID Class Test:	☐ **Pass**	☐ **Fail**	☒ **N/A**

Power Current Test Result ☒ **Pass** ☐ **Fail**

High-Speed: Low Powered Device ☒ **Pass** ☐ **Fail** ☐ **N/A**

Unconfiguration Power: 0.19 mA
(<= 100mA)

Configuration Power: 0.19 mA
(<= Max Power <= 100mA for Low Power)
(<= Max Power <= 500mA for High Power)

Suspend Mode Power without Remote Wakeup: 172.7 uA
Suspend Mode Power with Remote Wakeup Enabled: N/A uA
Suspend Mode Power with Remote Wakeup Diabled: N/A uA
(<= 2500uA for Self Power Hub or Non Compound Device)
(<= 12500uA for Bus Power Hub or Compound Device)

Powered' State Suspend Mode Power: 172.7 uA
(<= 2500uA for not Supporting USB Battery Charging)
(<= 100mA for Supporting USB Battery Charging)

Operating Power: 0.19 mA
(<= Max Power <= 100mA for Low Power)
(<= Max Power <= 100mA for Self Power)
(<= Max Power <= 500mA for High Power)

Basic-Speed: Low Powered Device ☒ **Pass** ☐ **Fail**

Unconfiguration Power: 0.19 mA
(<= 100mA)

Configuration Power: 0.19 mA
(<= Max Power <= 100mA for Low Power)
(<= Max Power <= 500mA for High Power)

Suspend Mode Power without Remote Wakeup: 176.6 uA
Suspend Mode Power with Remote Wakeup Enabled: N/A uA
Suspend Mode Power with Remote Wakeup Diabled: N/A uA
(<= 2500uA for Self Power Hub or Non Compound Device)
(<= 12500uA for Bus Power Hub or Compound Device)

Powered' State Suspend Mode Power: 176.3 uA
(<= 2500uA for not Supporting USB Battery Charging)
(<= 100mA for Supporting USB Battery Charging)

Operating Power: 0.19 mA
(<= Max Power <= 100mA for Low Power)
(<= Max Power <= 100mA for Self Power)
(<= Max Power <= 500mA for High Power)

Interoperability Test Overall Result   ☒ **Pass**   ☐ **Fail**

<mark>**Operating System: Win10**</mark>

XHCI Host Controller:
Root Port

Enumeration and Driver installation	☒ **Pass** ☐ **Fail**	
Check operation of device	☒ **Pass** ☐ **Fail**	
Interoperability – Operate all devices	☒ **Pass** ☐ **Fail**	
Hot plug test – A Plug	☒ **Pass** ☐ **Fail**	
Hot plug test – B Plug	☒ **Pass** ☐ **Fail** ☐ **N/A**	
S3 Active Standby Test	☒ **Pass** ☐ **Fail**	
Remote Wake-up Test	☐ **Pass** ☐ **Fail** ☒ **N/A**	
S3 Active Standby Resume Test	☒ **Pass** ☐ **Fail**	
S4 Active Hibernate Test	☒ **Pass** ☐ **Fail**	
S4 Active Hibernate Resume Test	☒ **Pass** ☐ **Fail**	
Warm Boot Test	☒ **Pass** ☐ **Fail**	
Hybrid Boot Test	☒ **Pass** ☐ **Fail**	
Cold Boot Test	☒ **Pass** ☐ **Fail**	

Topology Change 1 (SS Tree)

Enumeration	☒ **Pass** ☐ **Fail**	
Check operation of device	☒ **Pass** ☐ **Fail**	
Interoperability – Operate all devices	☒ **Pass** ☐ **Fail**	
Hot plug test – A Plug	☒ **Pass** ☐ **Fail**	
Hot plug test – B Plug	☒ **Pass** ☐ **Fail** ☐ **N/A**	
S3 Active Standby Test	☒ **Pass** ☐ **Fail**	
Remote Wake-up Test	☐ **Pass** ☐ **Fail** ☒ **N/A**	
S3 Active Standby Resume Test	☒ **Pass** ☐ **Fail**	
S4 Active Hibernate Test	☒ **Pass** ☐ **Fail**	
S4 Active Hibernate Resume Test	☒ **Pass** ☐ **Fail**	
Warm Boot Test	☒ **Pass** ☐ **Fail**	
Hybrid Boot Test	☒ **Pass** ☐ **Fail**	
Cold Boot Test	☒ **Pass** ☐ **Fail**	

Topology Change 2 (HS Tree)

Enumeration	☒ Pass	☐ Fail
Check operation of device	☒ Pass	☐ Fail
Interoperability – Operate all devices	☒ Pass	☐ Fail
Hot plug test – A Plug	☒ Pass	☐ Fail
Hot plug test – B Plug	☒ Pass	☐ Fail ☐ N/A
S3 Active Standby Test	☒ Pass	☐ Fail
Remote Wake-up Test	☐ Pass	☐ Fail ☒ N/A
S3 Active Standby Resume Test	☒ Pass	☐ Fail
S4 Active Hibernate Test	☒ Pass	☐ Fail
S4 Active Hibernate Resume Test	☒ Pass	☐ Fail
Warm Boot Test	☒ Pass	☐ Fail
Hybrid Boot Test	☒ Pass	☐ Fail
Cold Boot Test	☒ Pass	☐ Fail

Topology Change 3 (FS Tree)

Enumeration	☒ Pass	☐ Fail
Check operation of device	☒ Pass	☐ Fail
Interoperability – Operate all devices	☒ Pass	☐ Fail
Hot plug test – A Plug	☒ Pass	☐ Fail
Hot plug test – B Plug	☒ Pass	☐ Fail ☐ N/A
S3 Active Standby Test	☒ Pass	☐ Fail
Remote Wake-up Test	☐ Pass	☐ Fail ☒ N/A
S3 Active Standby Resume Test	☒ Pass	☐ Fail
S4 Active Hibernate Test	☒ Pass	☐ Fail
S4 Active Hibernate Resume Test	☒ Pass	☐ Fail
Warm Boot Test	☒ Pass	☐ Fail
Hybrid Boot Test	☒ Pass	☐ Fail
Cold Boot Test	☒ Pass	☐ Fail

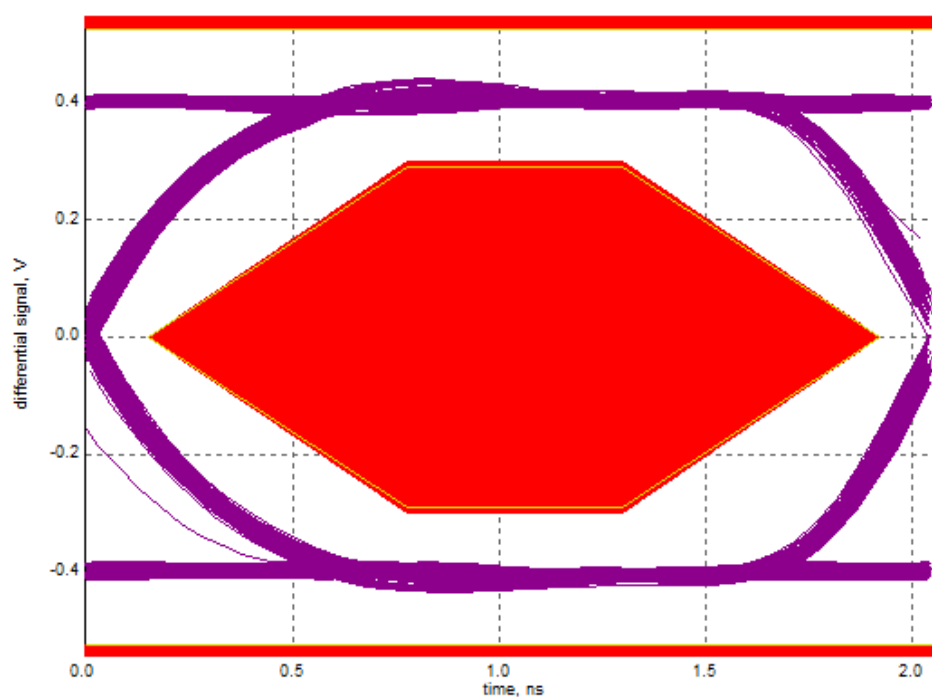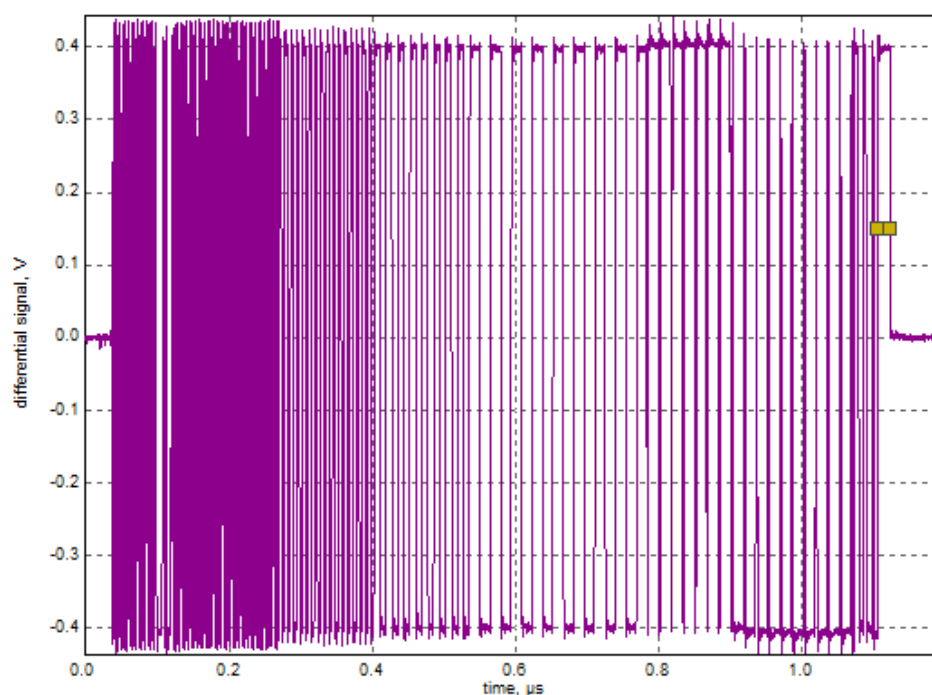**More Detail Test Result:**

1. High Speed Upstream Signal Quality: Pass

- Overall result: pass!
- Signal eye:
  eye passes
- EOP width: 7.92 bits
  EOP width passes
- Measured signaling rate: 479.9839 MHz
  signal rate passes
- Edge Monotonicity: 0 mV
  Monotonic Edge passes
- Rising Edge Rate: 1247.57 V/us (513.00 ps equivalent risetime)
  passes
- Falling Edge Rate: 1167.17 V/us (548.33 ps equivalent falltime)
  passes

Additional Information

- Consecutive jitter range: -39.138 ps to 38.369 ps, RMS jitter 17.496 ps
- Paired JK jitter range: -36.076 ps to 40.724 ps, RMS jitter 12.621 ps
- Paired KJ jitter range: -30.110 ps to 37.794 ps, RMS jitter 13.056 ps

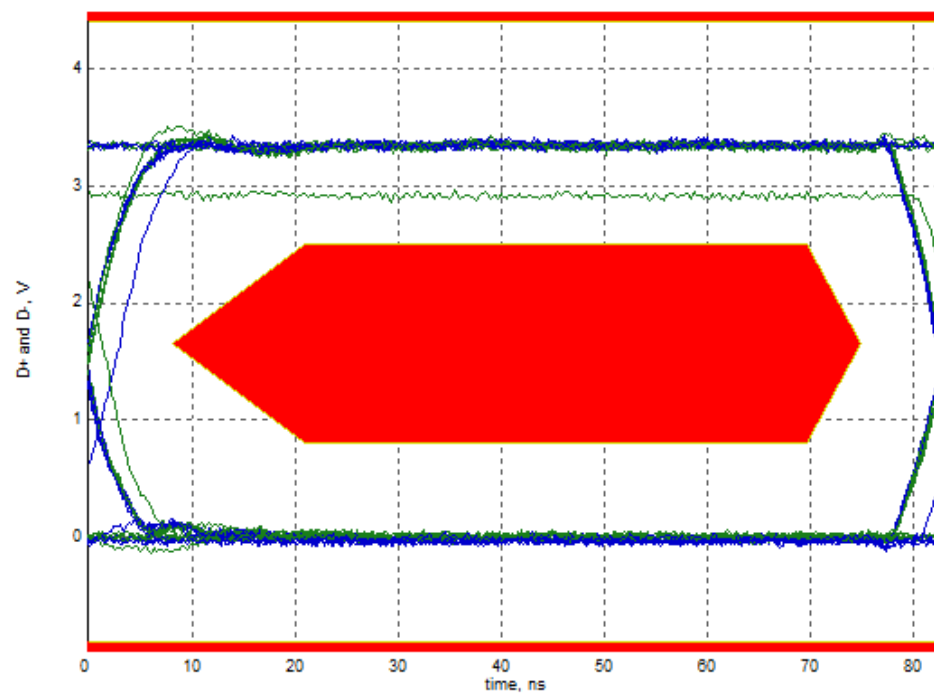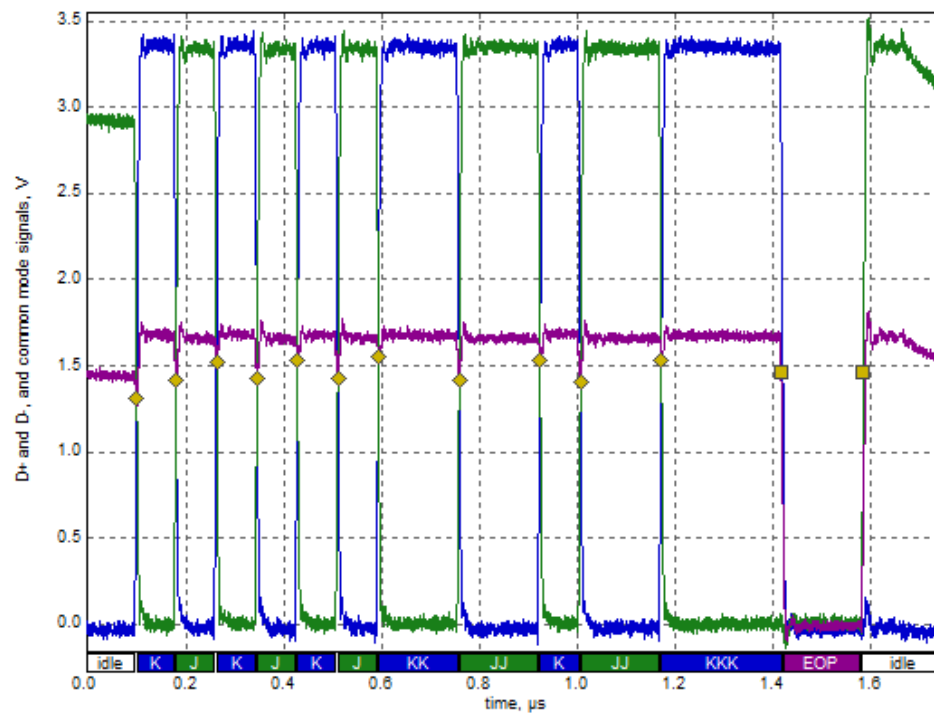### Signal Data and Eye

2. Basic Speed Upstream Signal Quality: Pass

- Overall result: pass!
- Signal eye:
  eye passes
- EOP width: 166.47 ns
  EOP width passes
- Measured signaling rate: 11.9992 MHz
  signal rate passes
- Edge Monotonicity: 0 mV
  Monotonic Edge passes
- Crossover voltage range: 1.31 V to 1.56 V, mean crossover 1.46 V
  (first crossover at 1.31 V, 10 other differential crossovers checked)
  crossover voltages pass
- Consecutive jitter range: -258.825 ps to -135.864 ps, RMS jitter 222.105 ps
- Paired JK jitter range: -21.609 ps to 41.268 ps, RMS jitter 32.939 ps
- Paired KJ jitter range: -94.910 ps to 97.502 ps, RMS jitter 68.042 ps
  jitter passes

Additional Information

- Rising Edge Rate: 374.72 V/us (Equivalent risetime = 7.05 ns)
- Falling Edge Rate: 419.69 V/us (Equivalent falltime = 6.29 ns)
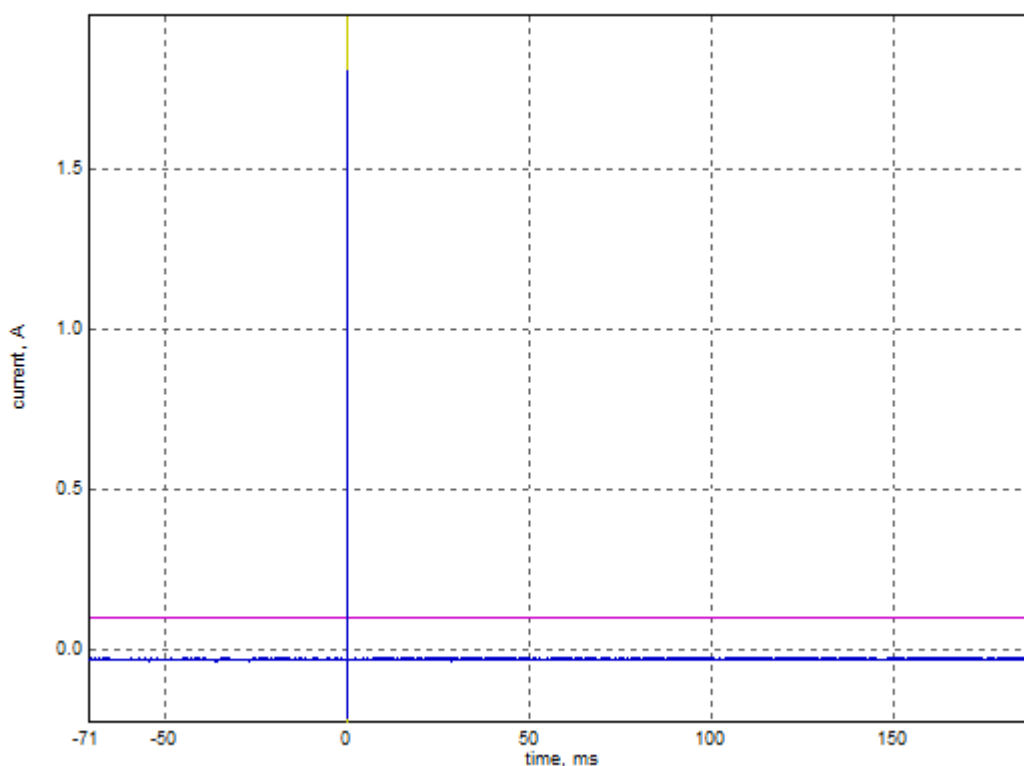- Edge Rate Match: 11.32% (limit +/-10%)

Signal Data and Eye

3. Inrush Current: Pass

- Overall result: pass!
- Inrush at 5.241 V: 4.8830 μC
  Inrush passes
- **Region 1 Start: -0.00037 ms - End: 0.105 ms = 4.883 μC**

Hot Plug (Attach) Current Draw

Test Procedure Reference:

1. Universal Serial Bus Implementers Forum Device Hi-Speed Electrical Test Procedure For Agilent Infiniium Test Equipment, version: 1.2
2. Universal Serial Bus Implementers Forum Full and Low Speed Electrical and Interoperability Compliance Test Procedure, Version: 1.3
3. USB Implementers Forum Compliance Document USB 2.0 Interoperability and EHCI Test Procedures, Version 1.2
4. USB Implementers Forum xHCI Interoperability Test Procedures For Peripheral, Hubs, and Hosts (Legacy, USB Type-C and Power Delivery), Version 0.9
5. USB Battery Charging 1.2 Compliance Plan, Revision: 1.1

Notice: Test result is valid only to the original tested device model. The content of test report may not be copied or re-transmitted (except for the entire report) unless it is prior approved by Allion.