

Test Report

Telecommunications Technology Association

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Report Number: TTA-21-0918

**1. Client**

o **Name:** Suprema ID Inc.

o **Address:** 305, Tera Tower#2, 201, Songpa-daero, Songpa-gu, Seoul, Korea

2. Test Sample: RealScan S60(RS-S60)

3. Date of Test: 2021-08-30 ~ 2021-10-14

4. Reference: D.2 Reference Documents

5. Test Results: Attached 'USB 2.0 High-Speed Peripheral Compliance Test Report'

The results of this test are for the test item only provided by client and prohibited to use for any other purpose.

Affirmation	Written by	Approved by
	Name : Taekyeong Ko  (Signature)	Name : Joonsi Jung  (Signature)

October 25, 2021

President

Telecommunications Technology Association  (Signature)





USB 2.0 High-Speed Peripheral Compliance Test Report



USB-IF Compliance Program	
Company Name	Suprema ID Inc.
Model Name	RealScan S60
Model Number	RS-S60
Product Revision	V01
Test Date	2021-08-30 ~ 2021-10-14
Test Result	PASS

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A. Vendor and Product Information

Vendor Information	
■ Vendor Name: <u>Suprema ID Inc.</u> ■ Vendor Complete Address: <u>305, Tera Tower#2, 201, Songpa-daero, Songpa-gu, Seoul, Korea</u> ■ Vendor Phone Number: <u>+82-10-3161-3686</u> ■ Vendor Contact(s) – Name: <u>Byoung-Joon Jang</u> Tel: <u>+82-10-3161-3686</u> E-mail: <u>bjjang@suprema.co.kr</u>	
Product Information	
■ Silicon Model Name: <u>Cypress Semiconductor(EZ-USB FX2LP/CY7C68013A)</u> ■ TID(if you know): <u>6512</u> VID: <u>5841</u> PID: <u>1061</u> ■ Product Category: <u>Retail/High-Speed/Peripheral</u> ■ Product Description: <u>Ultra Slim Enrollment Scanner</u> <div style="display: flex; justify-content: space-between;"> <div> <input checked="" type="checkbox"/> High Power <input type="checkbox"/> Low Power <input checked="" type="checkbox"/> Bus Powered <input type="checkbox"/> Self Powered <input type="checkbox"/> Battery Powered <input checked="" type="checkbox"/> Untethered <input type="checkbox"/> Tethered </div> </div> ■ Connector Type: <input type="checkbox"/> Type-A <input type="checkbox"/> Type-B <input checked="" type="checkbox"/> Type-C ■ Tested OS: <u>Windows 10</u>	
Picture of Product	
Top view	Port Under Test
	
Tested by Yeohoon Yoon and reviewed by Taekyeong Ko	

Overall Test Result: PASS

Scope	Test Items	Test Result*
High-Speed USB Compliance Test	B.1 Legacy USB Electrical Tests	PASS
	B.2 High-Speed USB Electrical Tests	PASS
	B.3 High-Speed USB Functional Tests	PASS
USB Type-C Compliance Test	C.1 Type-C Functional Test**	PASS
	C.2 Type-C Interoperability Test	PASS

* Test result is only valid to the original tested product model.

** Required to test against 2 test systems



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B. High-Speed USB Compliance Test Result: PASS**B.1 Legacy USB Electrical Test Results:**☒ **Pass** ☐ Fail**B.1.1 Full-speed Upstream Signal Quality Test Results:**☒ **Pass** ☐ Fail

Signal Quality Test:

☒ Pass ☐ Fail

Rise Time Test:

☒ Pass ☐ Fail

Fall Time Test:

☒ Pass ☐ Fail**B.1.2 Inrush Current Test:**☒ **Pass** ☐ Fail**B.1.3. Back Voltage Test Results: (Enumerate before/after)**☒ **Pass** ☐ Fail

D+ : 0 mV / 0 mV

D- : 0 mV / 0 mV

V_{Bus}: 0 mV / 0 mV**B.2 High-Speed USB Electrical Test Results:**☒ **Pass** ☐ Fail**B.2.1 Device High-Speed Signal Quality (EL_2, EL_4, EL_5, EL_6, EL_7)**EL_2 A USB 2.0 High-Speed transmitter data rate must be 480 Mb/s \pm 0.05%.**Reference documents:** *USB 2.0 Specification*, Section 7.1.11☒ **Pass** ☐ Fail ☐ N/A

EL_4 A USB 2.0 upstream facing port on a device without a captive cable must meet Template 1 transform waveform requirements measured at TP3.

Reference documents: *USB 2.0 Specification*, Section 7.1.2.2☒ **Pass** ☐ Fail ☐ N/A

EL_5 A USB 2.0 upstream facing port on a device with a captive cable must meet Template 2 transform waveform requirements measured at TP2.

Reference documents: *USB 2.0 Specification*, Section 7.1.2.2☐ Pass ☐ Fail ☒ N/A

EL_6 A USB 2.0 HS driver must have 10% to 90% differential rise and fall times of greater than 300ps.

Reference documents: *USB 2.0 Specification*, Section 7.1.2.2☒ **Pass** ☐ Fail ☐ N/A

EL_7 A USB 2.0 HS driver must have monotonic data transitions over the vertical openings specified in the appropriate eye pattern template.

Reference documents: *USB 2.0 Specification*, Section 7.1.2.2☒ **Pass** ☐ Fail ☐ N/A

B.2.2 Device Packet Parameters (EL_21, EL_22, EL_25)

EL_21 The SYNC field for all transmitted packets (not repeated packets) must begin with a 32-bit SYNC field.

Reference documents: *USB 2.0 Specification*, Section 8.2

Result: 64.643 ns

☒ **Pass** ☐ Fail ☐ N/A

EL_22 When transmitting after receiving a packet, hosts and devices must provide an inter-packet gap of at least 8-bit times and not more than 192-bit times.

Reference documents: *USB 2.0 Specification*, Section 7.1.18.2

Result: 162.594, 152.726 ns

☒ **Pass** ☐ Fail ☐ N/A

EL_25 The EOP for all transmitted packets (except SOFs) must be an 8-bit NRZ byte of 01111111 without bit stuffing. (*Note, that a longer EOP is waiverable*)

Reference documents: *USB 2.0 Specification*, Section 7.1.13.2

Result: 16.911 ns

☒ **Pass** ☐ Fail ☐ N/A

B.2.3 Device CHIRP Timing (EL_28, EL_29, EL_31)

EL_28 Devices must transmit a chirp handshake no sooner than 2.5us and no later than 3ms when being reset from suspend or a full-speed state.

Reference documents: *USB 2.0 Specification*, Section 7.1.7.5

Result: 1.571117 ms

☒ **Pass** ☐ Fail ☐ N/A

EL_29 The chirp handshake generated by a device must be at least 1ms and not more than 7ms in duration.

Reference documents: *USB 2.0 Specification*, Section 7.1.7.5

Result: 1.501 ms

☒ **Pass** ☐ Fail ☐ N/A

EL_31 During device speed detection, when a device detects a valid Chirp K-J-K-J-K-J sequence, the device must disconnect its 1.5K pull-up resistor and enable its High-Speed terminations within 500us.

Reference documents: *USB 2.0 Specification*, Section 7.1.7.5

Result: 10.220 us

☒ **Pass** ☐ Fail ☐ N/A

B.2.4 Device Suspend/Resume/Reset Timing (EL_27, EL_28, EL_38, EL_39, EL_40)

EL_38 A device must revert to full-speed termination no later than 125us after there is a 3ms idle period.



Reference documents: *USB 2.0 Specification*, Section 7.1.7.6

Result: 3.003 ms

☒ **Pass** ☐ Fail ☐ N/A

EL_39 A device must support the Suspend state.

Reference documents: *USB 2.0 Specification*, Section 7.1.7.6

☒ **Pass** ☐ Fail ☐ N/A

EL_40 If a device is in the suspend state, and was operating in High-Speed before being suspended, then device must transition back to High-Speed operation within two bit times from the end of resume signaling.

(Note. It is not feasible to measure the device transition back to High-Speed operation within 2- bit times from the end of the resume signaling. The presence of SOFs at nominal 400mV amplitude following the resume signaling is sufficient for this test)

Reference documents: *USB 2.0 Specification*, Section 7.1.7.7

☒ **Pass** ☐ Fail ☐ N/A

EL_27 Devices must transmit a chirp handshake no sooner than 3.1ms and no later than 6ms when being reset from a non-suspended High-Speed mode. The timing is measured from the beginning of the last SOF transmitted before the reset begins.

Reference documents: *USB 2.0 Specification*, Section 7.1.7.5

Result: 3.402 ms

☒ **Pass** ☐ Fail ☐ N/A

EL_28 A device must transmit a chirp handshake no sooner than 2.5us and no later than 3ms when being reset from suspend or a full-speed state.

Reference documents: *USB 2.0 Specification*, Section 7.1.7.5

Result: 1.588650 ms

☒ **Pass** ☐ Fail ☐ N/A

B.2.5 Device Test J/K, SE0_NAK (EL_8, EL_9)

EL_8 When either D+ or D- are driven high, the output voltage must be $400\text{mV} \pm 10\%$ when terminated with precision 45 Ohm resistors to ground.

Reference documents: *USB 2.0 Specification*, Section 7.1.1.3

Result:

☐ Pass ☐ Fail ☒ N/A

Comments: No longer required. Violations of driven data-lines should be detectable in signal quality tests

EL_9 When either D+ or D- are not being driven, the output voltage must be $0\text{V} \pm 20\text{mV}$ when terminated with



precision 45 Ohm resistors to ground.

Reference documents: *USB 2.0 Specification*, Section 7.1.1.3

Result:

Test Mode	D+ (mV)	D- (mV)
Test_J	-	3
Test_K	4	-
SE0_NAK	2	2

☒ **Pass** ☐ Fail ☐ N/A

B.2.6 Device Receiver Sensitivity (EL_16, EL_17, EL_18)

EL_18 A High-Speed capable device's Transmission Envelope Detector must be fast enough to allow the HS receiver to detect data transmission, achieve DLL lock, and detect the end of the SYNC field within 12-bit times.

Reference documents: *USB 2.0 Specification*, Section 7.1

☒ **Pass** ☐ Fail ☐ N/A

EL_17 A High-Speed capable device must implement a transmission envelope detector that does not indicate squelch (i.e. reliably receive packets) when a receiver exceeds 150mV differential amplitude.

(Note. A waiver granted if the receiver does not indicate Squelch at +/-50mV of 150mV differential amplitude. This is to compensate for the oscilloscope probe point away from the receiver pin)

Reference documents: *USB 2.0 Specification*, Section 7.1

Results: 149.500 mV

☒ **Pass** ☐ Fail ☐ N/A

EL_16 A High-Speed capable device must implement a transmission envelope detector that indicate squelch (i.e. never receive packets) when a receiver's input falls below 100mV differential amplitude.

(Note. A waiver granted if the receiver indicates Squelch at +/-50mV of 100mV differential amplitude. This is to compensate for the oscilloscope probe point away from the receiver pin)

Reference documents: *USB 2.0 Specification*, Section 7.1

Results: 133.500 mV

☒ **Pass** ☐ Fail ☐ N/A

B.2.7 Bypass Capacitance Test

CRPB A USB device is required to expose a capacitance on the VBUS pin of its connector of CRPB. This capacitance shall be greater than CRPB min for voltages on the VBUS pin from 0V to 5.25V, regardless of whether the USB device is powered or unpowered

Reference documents: *USB 2.0 Specification*, Section 7.2.4

☐ **Pass** ☐ Fail ☒ N/A

Comments: Peripherals certifications no longer require a minimum of 1uF bypass capacitance across VBus.



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B.3 High-Speed USB Functional Test Results:☒ **Pass** ☐ Fail**B.3.1 Frameworks Test Results:**☒ **Pass** ☐ Fail**Device Summary(EHCI Controller)**Interface: 1 MAX Power: 500 mA Self-powered: No Remote Wakeup: No**Chapter 9(EHCI Controller)**High-Speed Mode: ☒ Pass ☐ FailFull-Speed Mode: ☒ Pass ☐ Fail**Chapter 9(xHCI Controller)**High-Speed ☒ Pass ☐ FailFull-Speed ☒ Pass ☐ Fail**Connector Type Tests(xHCI Controller)**High-Speed ☒ Pass ☐ FailFull-Speed ☒ Pass ☐ Fail**B.3.2 Interoperability Test Overall Results:**☒ **Pass** ☐ Fail**xHCI Controller Driver Installation**☒ Pass ☐ Fail**Peripheral Enumeration and Driver Installation**☒ Pass ☐ Fail**Interoperability**☒ Pass ☐ Fail**Root Port Testing (xHCI Controller: DELL XPS8930 Host PC)**☒ Pass ☐ Fail**All Device Tests (Behind SS Hub)**☒ Pass ☐ Fail

- | | | |
|---|--|-------------------------------|
| 1. Inactive Detach & Reattach | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail |
| 2. Inactive Detach & Flip/Reverse attach (USB Type-C) | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail |
| 3. Active Sleep/Remote Wake | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail |
| 4. Active S4 Hibernation/Resume | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail |
| 5. Warm boot | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail |
| 6. Cold Boot | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail |
| 7. Hybrid Boot | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail |

Topology Change 1 (Behind HS Hub)☒ Pass ☐ Fail

- | | | |
|---|--|-------------------------------|
| 1. Inactive Detach & Reattach | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail |
| 2. Inactive Detach & Flip/Reverse attach (USB Type-C) | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail |
| 3. Active Sleep/Remote Wake | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail |
| 4. Active S4 Hibernation/Resume | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail |
| 5. Warm boot | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail |
| 6. Cold Boot | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail |
| 7. Hybrid Boot | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail |

Topology Change 2 (Behind FS Hub)☒ Pass ☐ Fail**B.3.3 Current Measurement Results:**☒ **Pass** ☐ Fail**High Speed Mode:**☒ Pass ☐ Fail

Configured current: 27 mA
 Operating current: 350 mA
 Powered Stated Suspend Current: 1 mA

Unconfigured current: 27 mA
 Suspend current: 0 mA

Full Speed Mode:☒ Pass ☐ Fail

Configured current: 24 mA
 Operating current: 310 mA
 Powered Stated Suspend Current: 0 mA

Unconfigured current: 24 mA
 Suspend current: 0 mA

C. USB Type-C Compliance Test Result: PASS**C.1 Type-C Functional Test Results:**☒ Pass ☐ Fail**C.1.1 Connection Tests**☒ Pass ☐ Fail

Test item	LeCroy	Ellisys	Test Status (Ellisys)
TD.4.1.1 Initial Voltage	Pass	Pass	Stable
TD.4.3.1 Sink Connect Source Test	Pass	Pass	RC
TD.4.3.2 Sink Connect DRP Test	Pass	Pass	RC
TD.4.3.3 Sink Connect Try.SRC DRP Test	Pass	Pass	RC
TD.4.3.4 Sink Connect Try.SNK DRP Test	Pass	Pass	RC
TD.4.3.5 Sink Connect SNKAS Test	N/A	N/A	RC
TD.4.3.6 Sink Connect Accessories Test	Pass	Pass	RC

C.1.2 Sink-Capable Tests☒ Pass ☐ Fail

Test item	LeCroy	Ellisys	Test Status (Ellisys)
TD.4.10.1 Sink Power Sub-States Test	Pass	Pass	RC
TD.4.10.2 Sink Power Precedence Test	Pass	Pass	RC
TD.4.10.3 Sink Suspend Test	Pass	Pass	RC
TD.4.10.4 Sink PR_Swap Test	Pass	Pass	RC
TD.4.10.5 Sink Vconn_Swap Test	N/A	Pass	Stable
TD.4.10.6 Sink Alternate Mode Test	N/A	N/A	RC

C.2 Type-C Interoperability Test Results:☒ Pass ☐ Fail**C.2.1 Pixel 4 Phone(Google)**☒ Pass ☐ Fail ☐ N/A

Inactive Detach/Reverse Attach at Device
 Turn off/On Display
 Restart
 Power Off/Start

☒ Pass ☐ Fail ☐ N/A
☒ Pass ☐ Fail ☐ N/A
☒ Pass ☐ Fail ☐ N/A
☒ Pass ☐ Fail ☐ N/A



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C.2.2 MacBook Air 2019(Apple)

Inactive Detach/Reverse Attach at Device
 Sleep/Remote Wake
 Restart
 Shutdown

☒ **Pass** ☐ Fail ☐ N/A
☒ Pass ☐ Fail ☐ N/A
☒ Pass ☐ Fail ☐ N/A
☒ Pass ☐ Fail ☐ N/A

C.2.3 Pixel Book Go(Google)

Inactive Detach/Reverse Attach at Device
 Sleep / Wake
 Power Off/Start

☒ **Pass** ☐ Fail ☐ N/A
☒ Pass ☐ Fail ☐ N/A
☒ Pass ☐ Fail ☐ N/A

C.2.4 Generic 4K Monitor(ASUS)

Inactive Detach/Reverse Attach at Device
 Turn Off Display
 Power Off/Start

☐ Pass ☐ Fail ☒ **N/A**
☐ Pass ☐ Fail ☒ N/A
☐ Pass ☐ Fail ☒ N/A

Comments: Only for devices that supports DisplayPort Alt mode.

C.2.5 Galaxy S21(Samsung)

Inactive Detach/Reverse Attach at Device
 Turn off/On Display
 Restart
 Power Off/Start

☒ **Pass** ☐ Fail ☐ N/A
☒ Pass ☐ Fail ☐ N/A
☒ Pass ☐ Fail ☐ N/A
☒ Pass ☐ Fail ☐ N/A

D. Test Configuration Information**D.1 USB 2.0 Test Systems**

No	Test Equipment	Test Item
1	Vendor: DELL Product Name: XPS8930 BIOS Version: 1.1.13	USB 3.2 Certification Platform
2	Vendor: Keysight Technologies Product Name: DSAV254A Test Software: N5449A Version: 4.2.0.0	USB 2.0 Electrical Tests
3	Vendor: USB-IF Tool Name: xHCI Command Verifier Version: 2.2.2.0	USB 2.0 Framework Tests
4	Vendor: USB-IF Tool Name: EHCI Command Verifier Version: 1.5.14.0	USB 2.0 Framework Tests



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5	Vendor: USB-IF Model: Vendor Info File Generator Version: v3.2.1.0	USB 2.0 Framework Tests USB Type-C Functional Tests
6	Vendor: Ellisys Corporation Model: USB EX350 Version: 3.1.7906	USB Type-C Functional Test
7	Vendor: LeCroy Model: M310P Version: Compliance Suite - 5.27 Build 963 Protocol Suite – 8.59 Build 3800	USB Type-C Functional Tests
8	Vendor: USB-IF Tool Name: Interoperability Version: 10-26-17(Win 10)	USB 2.0 Interoperability Tests

D.2 Reference Documents

1. Universal Serial Bus Revision 2.0 Specification(April 27, 2000) Including ENCs and errata
2. USB-IF USB 2.0 Electrical Compliance Test Specification, Ver 1.07(February, 2019)
3. USB Implementers Forum xHCI Interoperability Test Procedures for Peripherals, Hubs, Hosts, Rev 0.98(January, 2021)
4. Universal Serial Bus Type-C(USB Type-C) Functional Test Specification Chapters 4&5, Ver 0.86(July 16, 2020)

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