



**IT CERTIFICATION SERVICES**  
**Test Method for Biometric Devices**  
**(Authentication - IRIS)**

Document : BDCS(A-I)-03-08

Issue : 01 dated. 01.07.2013

Revision 00 dated.

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**Chief Executive Officer**

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**Amendment Record**

<b>Amendment No.</b>	<b>Date of Amendment</b>	<b>Nature of Amendment</b>	<b>Page Ref.</b>

**Purpose** : Purpose of the document is to define test methods and procedure for Biometric Device (Authentication)

**Reference Documents:**

- ISO 19794-6 : 2011
- NIST SP 500-280
- UIDAI Iris Authentication Device Specifications
- ISO/IEC 29794-6

**1 Terms and definitions**

For the purpose of this document, the following terms and definitions specific to iris images are as under:

**1.1 Grey Scale**

Continuous-tone image that has one component, which is luminance

**1.2 Iris**

Coloured annular structure in the front portion of the eye comprised of muscular and connective tissue and pigmented layers, that defines the pupil and controls its size

**1.3 Iris centre**

Centre of a circle modeling the boundary between iris and sclera

**1.4 Iris radius**

Radius of a circle modeling the boundary between iris and sclera

**1.5 Limbus**

Outer boundary of the iris where it is joined to the sclera

**1.6 Margin**

Distance in an image from the iris-sclera border, when modelled as a circle, to the closest image border, expressed in pixels

**1.7 Modulation Transfer Function**

Ratio of the image modulation to the object modulation as a function of spatial frequency

**1.8 Pupil**

Optical opening in the centre of the eye that serves as a variable light aperture and defines the inner boundary of the iris

**1.9 Pupil centre**

Average of coordinates of all the pixels lying on the boundary of the pupil and the iris

**1.10 Sclera**

Generally white wall of the eye peripheral to the iris

**1.11 Spatial Frequency**

Measure of the repetition rate of a sinusoidal intensity pattern in space, in units of cycles/deg or of cycles/mm at a given target range

**1.12 BDIR**

Biometric Data Interchange Record

**1.13 JPEG2000**

Joint Photographic Experts Group enhanced compression standard for images as defined in ISO/IEC 15444

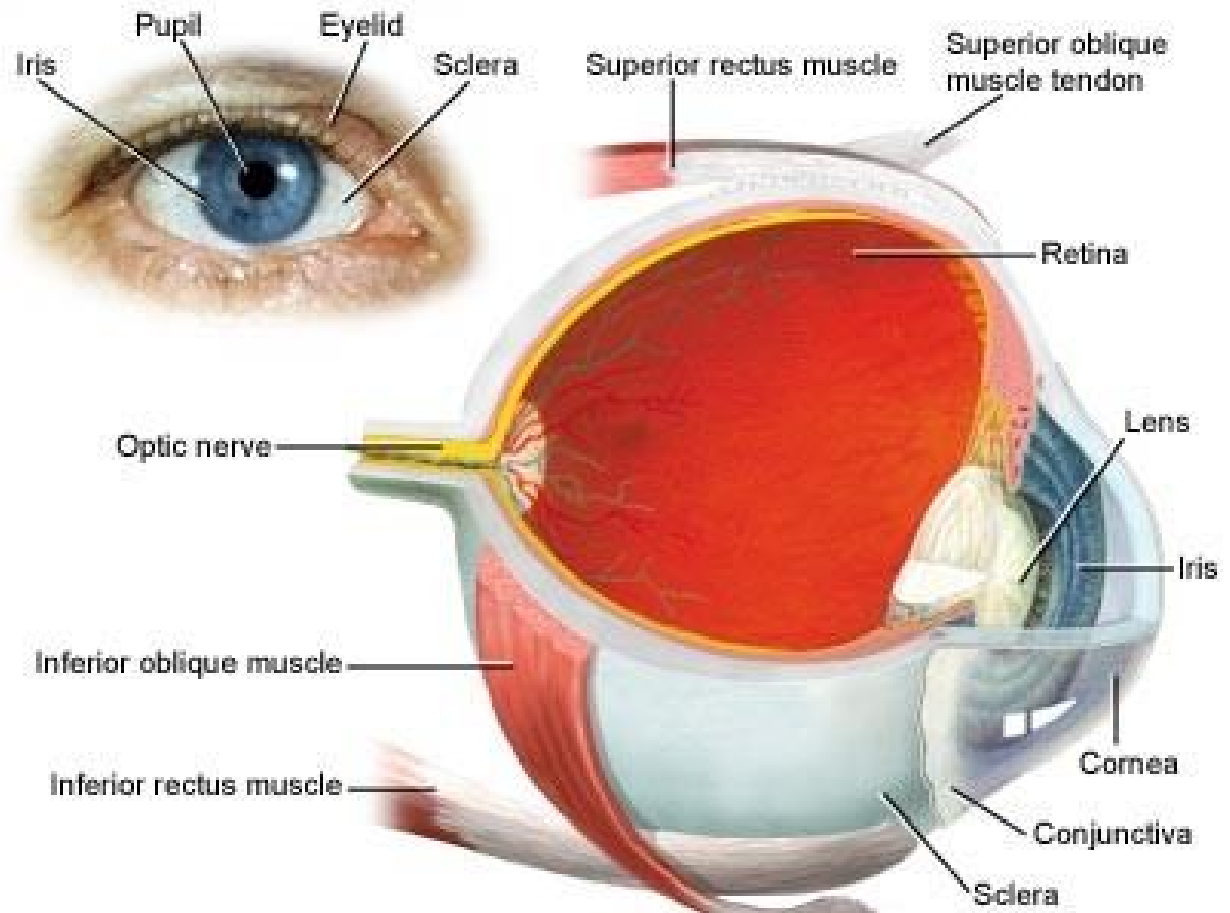
**1.14 PNG**

Portable Network Graphics lossless compression standard for images as defined in ISO/IEC 15948:2004

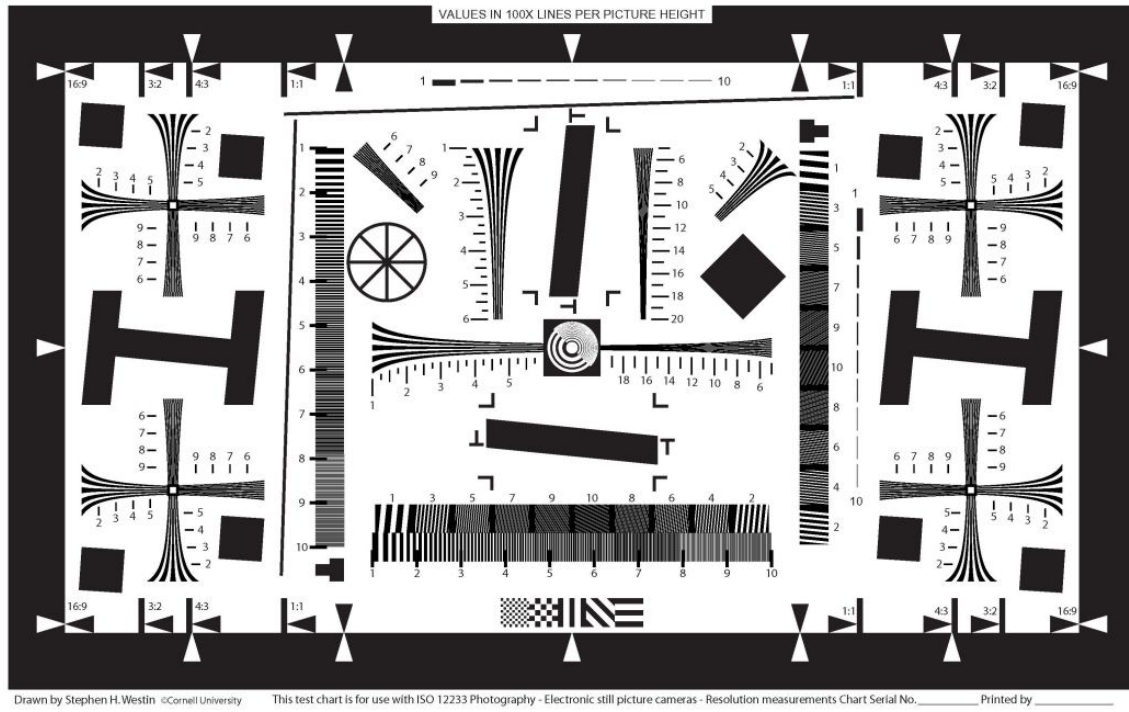
**1.15 VGA**

Video Graphics Array image format having width 640 pixels and height 480 pixels

## 2. About an eye:



### 3. Standard Image Quality Test Target : ISO 12233



### 4. Sampling Plan for Testing:

As per certification scheme **3** samples are required as detailed below:

- |                                                |     |
|------------------------------------------------|-----|
| a) Climatic & Durability testing:              | One |
| b) ESD, EMI, Safety RoHS testing:              | One |
| c) Software API Testing and Reference Sample*: | One |

\*Reference sample shall be retained at BDTL Mohali after testing



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## 5. UIDAI Iris Authentication Device Specification

Sr. No.	Device Characteristics	Specification	Ref. Test Method at Sr. no.
	<b>Functional</b>		
1	Spatial Resolution	> 60% @ 2.0 LP/mm <sup>1</sup>	6.1
2	Pixel Resolution	> 10 pixels/mm	6.2
3	Image Margins	Left & right $\geq 0.6 \times$ iris radius Top & bottom $\geq 0.2 \times$ iris radius	6.3
4	Imaging Wavelength	700-900 nm	6.4
5	Spectral Spread	Power in any 100nm band > 35% of total power	6.5
6	Pixel Depth	8 bits/pixel	6.6
7	Sensor Signal to Noise Ratio	>36 dB	6.7
8	Scan Type	Progressive	6.8
9	Output Image	At least IMAGE_TYPE_CROPPED_AND_MASKED with JPEG2000 compression.	6.9
10	Contrast	The iris image should have good grey level separation between the iris and sclera and between the iris and pupil and should have sufficient contrast to reveal the iris texture.	6.10
11	Optical Distortion	The iris image should not exhibit effects of optical distortion including spherical aberration, chromatic aberration, astigmatism and coma consistent with standard optical design practices	6.11
12	Noise	No compression artifacts, particularly blocks, except from a single pass of JPEG2000 compression	6.12
13	Capture Mode	Auto capture with built-in quality check	6.13
14	Usability and Ergonomics	For detailed requirements refer to document BDCS(A-I)-03-07	6.15
15	Operational Performance	FRR < 1% at FAR of 1 in 100000 with images conforming to Kind7 (Cropped and masked) of size less than 2.5KB(Refer notes below)	6.16
16	Average Capture time	<5 sec	6.17
17	Operating temperature	0...50 C (IEC 68-2-2)	7.2
18	Storage temperature	0...50 C (IEC 68-2-2)	7.3



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19	Dry Heat Test as per 60068-2-2	Temp: 50deg ± 2 C Recovery Period: 1 to 2 Hours	7.3
20	Damp Heat Cyclic Test 20(First Cycle) as per 60068-2-30	Temp: 40 C ± 2 C Humidity(RH): 90% ± 2% Duration of Test: 1 cycle of 24Hrs.(12h +12h) Recovery Period: 1 to 2 Hours	7.4
21	Cold test as per 60068-2-1	Temp: -10 C ± 2 C Duration : 16 Hrs. Recovery Period : 1 to 2 Hrs.	7.5
22	Damp heat Cyclic Test(Five Cycles) as per 60068-2-30	Temp: 40 C ± 2 C Humidity(RH): 90% ± 2% Duration of test: 5 cycles of 24 Hrs each (12 h + 12h) Recovery Period: 1 to 2 Hours	7.6
23	Durability Test(IP 54) as per IEC 60529	Dust Test Duration: 8 Hrs. Recovery Period: 1 to 2 Hrs	7.7
		Water Splash test: Test Duration: 10 Minutes Recovery Period: 1 to 2 Hrs.	
24	Drop test as per 60068-2-31	No. of drops: Six drops (one drop on each face) Height of fall: 1000 mm unpacked condition.	7.8
25	Vibration Test as per IEC60068 2-6	Frequency: 10...150 Hz, 0.15mm or 2.0g No. of Sweeps: 10 in each axis Condition: in Packed Condition	7.9
<b>26</b>	<b>Safety</b>	Exempt Group per IEC 62471:2006-07	8.5
<b>27</b>	<b>Occupational Health-Safety</b>	RoHS compliant	8.6
<b>28</b>	<b>Electro-Magnetic compatibility</b>		
	ESD Test as per IEC61000-4-2	Type of discharge: contact Type, Test Voltage: Air discharge+-8 KV ,contact type+-4Kv	8.2
	Radiated Emission	As per FCC Part 15 /IEC Standard	8.3
	Radiated Immunity	As per 61000-4-3:2002+A1 2002	8.4
<b>29</b>	<b>Software API</b>	Compliant with UIDAI API specification	9.2
<b>39</b>	<b>Connectivity</b>	USB 2 And / Or USB-IF compliant	6.14
<b>31</b>	<b>Operating System Support</b>	Minimum support of device drivers for Windows XP onwards/Android / Linux. For purpose of certifications tests, drivers need to be windows XP and above compliant including Software API compliant to UIDAI API specifications as cited above.	9.3



## **6.0 Test Methods:**

### **6.1 Spatial Resolution:**

MTF Test target (as applicable w.r.t. the device) image shall be captured and the captured image using the image processing software is used for measuring the spatial resolution test. The Modulation Transfer Function (MTF) of the imaging system should be greater than 60% at 2 lp/mm.

(Ref: ISO/IEC19794-6:2011,B.1)

### **6.2 Pixel resolution:**

Pixel resolution Test target (as applicable w.r.t. the device) is used for capturing the image. The captured image is used to measure the pixel resolution. The value obtained should not be less than 10 px/mm.

(Ref: ISO/IEC19794-6:2011,B.1)

### **6.3 Image Margins :**

The IRIS image is captured using the image capturing software. The image captured is analyzed using the image processing software. The left and right, top and the bottom image margins are measured. The values shall comply the limits as specified in Table 1 of clause 6.1 of the above standard.

(Ref: ISO/IEC19794-6:2011-6.1)

### **6.4 Imaging Wavelength :**

The imaging wavelength of iris device should be between the 700 to 900 nanometers. For compliance vendor/supplier is required to submit a test report from any approved test laboratory.

(Ref: ISO/IEC19794-6 :2011,B.7)

### **6.5 Spectral Spread :**

The overall spectral imaging sensitivity, including the sensor characteristics, transfers

at least 35% of the total power per 100 nm-wide sub-band of the 700 to 800 nm

range. For compliance vendor/supplier is required to submit a test report from any approved test laboratory.

(Ref: UID specification BDCS-03-08)

### **6.6 Pixel Depth :**

IRIS image captured at above step is used for analysis using image processing software. The pixel depth should be 8 bits per pixel.

(Ref: ISO/IEC19794-6 :2011,B.6)

### **6.7 Sensor Signal-to-Noise Ratio :**

SNR Test target (as applicable w.r.t. the device) is used for capturing the image. White and black area is selected for image processing to calculate the SNR. As per UID specification document the value obtained shall be greater than 36 dB.

(Ref: UID Iris Authentication Device Specifications)

### **6.8 Scan Type:**

This describes the type of optical sensor used in the device. This is verified from the sensor data sheet. Sensor used in the device should be of progressive type. It is desired that the vendor/supplier supplies a copy of data sheet.

(Ref: UID Iris Authentication Device Specifications)

### **6.9 Output image:**

Capture the IRIS image using the image capturing software. Also capture the IRIS image using Kind 7 selection in the capturing software. (Process for capturing of Kind 7 image may vary as per the device model). the size should be typically between 2 -6 kb.

(Ref: ISO/IEC19794-6 :2011 6.1 Table 1)

### **6.10 Contrast:**

The IRIS image is captured and processed in image processing software. the iris image should have good grey level separation between the iris and sclera and between the iris and pupil.

(Ref: ISO/IEC19794-6 :2011 Clause B.4)

### **6.11 Optical distortion:**

Optical distortion test target (as applicable w.r.t. the device) is used for capturing the image. The captured test target image is used for optical distortion test. Also analyzed visually for the parameters as indicated in the standard.

(Ref: Clause B.9 of ISO/IEC19794-6 :2011)

### **6.12 Noise :**

The captured IRIS image shall be visually analyzed for no compression artifacts, particularly blocks except from a single pass of JPEG2000 compression.

(Ref: UID Iris Authentication Device Specifications)

### **6.13 Capture Mode:**

Auto capture mode is checked with built in quality check feature of the capturing software.

(Ref: UID Iris Authentication Device Specifications)

### **6.14 Connectivity:**

(a) Check the connectivity of IRIS device with USB 2.0 ports. Device shall function satisfactorily.

(b) USB-IF- For compliance vendor/supplier is required to submit a test report from any approved test laboratory.

(Ref: UID Iris Authentication Device Specifications)

### **6.15 Usability & Ergonomics : (Not a criteria for decision on certification)**

Verify Usability & Ergonomics test parameters. Observations are recorded under "Remarks" column of the test report for the feedback to the user.

(Ref: UID Iris Authentication Device Specifications & BDCS(A-I)-03-13 document)

### **6.16 Operational Performance:**

Operational performance is based upon the Field measurement report of IRIS authentication devices. Value of FRR shall be < 1% at FAR of 1 in 100000 conforming to Kind7 (Cropped and masked) of size less than 2.5KB.

(Ref: UID Iris Authentication Device Specifications)

### **6.17 Average capture time:**

Capture time refers to the time gap between starting the capture event from application and capture complete event sent from the device. UIDAI API and POC



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application will be used to measure the capture time. As per UID specifications avg. capture time should be less than 5 secs.

(Ref: UID Iris Authentication Device Specifications)

## **7.0 Climatic & Durability Tests:**

**7.1** All tests indicated at Sr.no. 6.1 to 6.17 shall be performed on Sample no. 1

### **7.2 Operating temperature range test :**

Keep the sample at ambient temperature in ON condition in the climatic test chamber. Then decrease the temperature to 0 deg +/-2 deg C and maintain for 4Hrs. Functional checks are performed at 0 deg C. Device shall function satisfactorily. Now raise the temperature to 50 deg +/-2 deg C and maintain for 4Hrs. Functional checks are performed at 50 deg C. Device shall function satisfactorily. No visual abnormality shall be observed after the test.

### **7.3 Storage temperature test (Dry heat test) :**

Keep the sample at ambient temperature in the climatic test chamber in OFF condition. Raise the temperature to  $50 \pm 2$  degC as per test method prescribed in IEC 60068-2-2 and maintain the temperature for 16 Hrs . Perform the functional check immediately after the recovery period at ambient temperature. Device shall function satisfactorily and no visual abnormality shall be observed after the test.

### **7.4 Damp heat cyclic test(First cycle) :**

Keep the sample at ambient temperature in the climatic test chamber in OFF condition. Then raise the temperature to  $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$  and Relative Humidity at  $90\% \pm 2\%$  as per test method prescribed in IEC 60068-2-30 for 24Hrs (12h+12h) cyclic test. Perform the functional checks immediately after the recovery period at ambient temperature. Device shall function satisfactorily and no visual abnormality shall be observed after the test.

### **7.5 Cold test :**

Keep the sample at ambient temperature in the climatic test chamber in OFF condition. Decrease the temperature to  $0 \pm 2$ degC as per test method prescribed in IEC 60068-2-1 and maintain the temperature for 16 Hrs . Perform the functional



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checks immediately after the recovery period at ambient temperature. Device shall function satisfactorily and no visual abnormality shall be observed after the test.

### **7.6 Damp heat cyclic test (5 cycles) :**

Keep the sample at ambient temperature in the climatic test chamber in OFF condition. Then raise the temperature to  $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$  and Relative Humidity at  $90\% \pm 2\%$  as per test method prescribed in IEC 60068-2-30 for 120Hrs (12h+12h – 5 cycles) cyclic test. Perform the functional checks immediately after the recovery period at ambient temperature. Device shall function satisfactorily and no visual abnormality shall be observed after the test.

### **7.7 (a) Durability test (IP54) :**

Keep the sample at ambient temperature in the climatic test chamber in OFF condition. Then raise the temperature to  $35^{\circ}\text{C} \pm 2^{\circ}\text{C}$  as per test method prescribed in IEC 60529 and maintain for 8 Hrs. Perform the functional checks immediately after the recovery period at ambient temperature. Device shall function satisfactorily and no dust shall not enter in sufficient quantity. No visual abnormality shall be observed after the test.

#### **(b) Water Splash test:**

Water Splash test shall be performed as per prescribed in IEC 60529 for 10 mins. Perform the functional checks immediately after the recovery period at ambient temperature. Device shall function satisfactorily and no water shall not enter the device. No visual abnormality shall be observed after the test.

### **7.8 Drop/Free Fall Test:**

Drop the device from a height of 1000mm in Unpacked Condition as per the test method IEC 60068-2-31. Repeat the drop test for 5 more times i.e total 6 drops (One drop on each face). No loosening, breaking and other mechanical damage of parts shall be observed during visual examination. Perform the functional checks immediately after the test. Device shall function satisfactorily and no visual abnormality shall be observed after the test.

### **7.9 Vibration Test:**

Mount the devices on the vibration machine and perform the vibration test at 10-150 Hz frequency, 0.15mm displacement or 1.0g acceleration for 10 sweeps in each axis. No loosening, breaking and other mechanical damage of parts shall be observed during visual examination. Perform the functional checks immediately after the test. Device shall function satisfactorily and no visual abnormality shall be observed after the test.

**7.10** Perform all the tests indicated at Sr.nos. 6.1, 6.2, 6.3, 6.6, 6.7, 6.9, 6.10, 6.11, 6.13, 6.14(a) and 6.17 on **Sample No. 1**. Device shall function satisfactorily as per the test requirements.

## **8.0 ESD, EMI/EMC, RoHS, Safety Testing**

**8.1** Perform all the tests indicated at Sr.nos. 6.1, 6.2, 6.3, 6.6, 6.7, 6.9, 6.10, 6.11, 6.13, 6.14(a) and 6.17 on **Sample No. 2**. Device shall function satisfactorily as per the test requirements.

### **8.2 ESD Test :**

Perform Electro Static Discharge test as per test method described in IEC 61000-4-2 in ON condition for Contact and Air type discharge at  $\pm 4\text{KV}$  and  $\pm 8\text{KV}$  respectively. No. of discharges shall be 10 at each level. Device shall function satisfactorily and no visual defect shall be observed after the test.

### **8.3 Radiated Emission Test :**

Keep the device in energized condition in Radiated Emission test chamber under normal operating conditions. The test shall be performed from 30-1000 MHz at a distance of 10 meters. The values measured under radiated emission shall be within the specified limits of FCC Part 15 class A standard. Device shall function satisfactorily and no visual defect shall be observed after the test.

### **8.4 Radiated Immunity Test:**

Keep the device in energized condition in Radiated Immunity test chamber under normal operating conditions. The test shall be performed from 80-1000 MHz frequency at 1 KHz amplitude modulating frequency as per test method IEC 61000-4-3. During and after the test the device shall continue to operate as intended without any malfunctioning and degradation in performance. Device shall function satisfactorily and no visual defect shall be observed after the test.

### **8.5 Safety Test**

The device shall comply the tests as per IEC 62471 safety standard. Vendor/Supplier is required to submit a test report from any approved test laboratory.

### 8.6 Occupational Health-Safety (RoHS):

Reduction in the use of Hazardous substance (RoHS) in the manufacture of electrical and electronic equipment shall ensure that equipment does not contain Lead, Mercury, Cadmium, Hexavalent chromium, Poly Brominated Biphenyls(PBB) or PolyBrominated Diphenyl ether's (PBDE).

The maximum permissible levels for six restricted materials are as under:

- Cadmium CD : 100 ppm
- Mercury Hg : 100 ppm
- Lead Pb : 1000 ppm
- Poly brominated biphenyls(PBB): 1000 ppm
- Poly brominated Diphenyl Ethers (PBDE) : 1000 ppm
- Hexa valent chronicum (Cr VI) : 1000 ppm 43

For compliance vendor/supplier is required to submit a test report from any approved test laboratory.

**8.7** Perform all the tests indicated at Sr.nos. 6.1, 6.2, 6.3, 6.6, 6.7, 6.9, 6.10, 6.11, 6.13, 6.14(a) and 6.17 on **Sample No. 2**. Device shall function satisfactorily as per the test requirements.

### 9.0 Software API Testing

**9.1** Perform all the tests indicated at Sr.nos. 6.1, 6.2, 6.3, 6.6, 6.7, 6.9, 6.10, 6.11, 6.13, 6.14(a) and 6.17 on **Sample No.3**. Device shall function satisfactorily as per the test requirements.

#### 9.2 Software API:

API testing performed as per UIDAI specifications by the Software Test Lab. Device shall function satisfactorily and comply with the UIDAI API specifications V 1.0 RC 3

#### 9.3 Operating System Support :

Check the functionality and software API specifications as per UIDAI V 1.0 RC 3 on Windows XP and above (Windows 7 as default) OS.

NOTE: Additionally, testing on Android and Linux OS can be undertaken separately if desired by the vendor/supplier (Test charges as per STQC guidelines).



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**9.4.** Perform all the tests indicated at Sr.nos. 6.1, 6.2, 6.3, 6.6, 6.7, 6.9, 6.10, 6.11, 6.13, 6.14(a) and 6.17 on **Sample No.3**. Device shall function satisfactorily as per the test requirements.