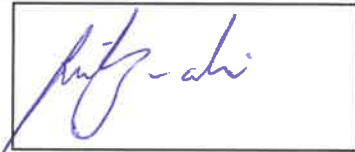


Prüfbericht-Nr.: <i>Test report no.:</i>	60358674-002	Auftrags-Nr.: <i>Order no.:</i>	23870325	Seite 1 von 16 Page 1 of 16
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	-	Auftragsdatum: <i>Order date:</i>	2019-08-28	
Auftraggeber: <i>Client:</i>	Amazon Data Services, Inc.			
Prüfgegenstand: <i>Test item:</i>	IoT Device			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	TE1A001			
Auftrags-Inhalt: <i>Order content:</i>	FCC Part 15 subpart B compliance testing			
Prüfgrundlage: <i>Test specification:</i>	FCC 47 CFR Part 15.109 ANSI C63.4:2014			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2020-02-17			
Prüfmuster-Nr.: <i>Test sample no.:</i>	See chapter 2.3			
Prüfzeitraum: <i>Testing period:</i>	2020.02.19 – 2020.02.24			
Ort der Prüfung: <i>Place of testing:</i>	Lund, Sweden			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rhinland Sweden			
Prüfergebnis*: <i>Test result*:</i>	Pass			
überprüft von: <i>reviewed by:</i>		genehmigt von: <i>authorized by:</i>		
Datum: 2020.07.14 <i>Date:</i>		Datum: 2020.07.14 <i>Date:</i>		
Stellung / Position:	Test Engineer	Stellung / Position:	Lab manager	
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>				
Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>				
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht getestet
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient N/T = not tested
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts.</i>				

Revision History

REVISION	DATE	REMARKS	AUTHOR
001	2020-04-13		Fariborz Abasi
002	2020.07.14	Corrected customer's contact info in page 4	Fariborz Abasi
Note: Latest revision report will replace all previous reports			
This report based on FCC Part 15B no JBP Template version 1.1			

Summary of Test Results

FCC 47 CFR Rule Part	Test Description	Applicability	Report Section	RESULT	REMARKS
15.107	AC Power Line Conducted Emissions (Unintentional Radiators)	NO	-	N/A	
15.109	Radiated Emissions (Unintentional Radiators)	YES	4.1	PASS	

Possible test case verdicts:

- | | |
|--|-----------------------|
| - Test case does not apply to the test object: | N/A |
| - Test object complies with the requirement: | PASS or COMPLIANT |
| - Test object does not meet the requirement: | FAIL or NOT COMPLIANT |
| - Test case not performed on the test object: | N.P. |

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1. GENERAL INFORMATION

1.1 Test Site

Test Facility:	TÜV Rheinland Sweden AB
Address:	Mobilvägen 10
	223 62 Lund
	Sweden
Swedac Registration Number:	10325
FCC Test Firm Registration Number:	517458
ISED Test Site Registration Number:	24753

1.2 Client Information

Company Name:	Amazon Data Services, Inc.
Address:	410 Terry Ave N, Seattle,
	WA 98109, USA
Contact Person:	
Contact e-Mail / Telephone	gtpcrequests@amazon.com

2. PRODUCT INFORMATION

2.1 General Description

Model name:	IoT Device
Manufacturer:	Amazon Data Services, Inc.
Model number / Marketing name:	TE1A001
FCC ID:	2AVPL-TE1A001
Description:	IoT Device
Ancillary Equipment:	See section 2.7

2.2 Device Characteristics

Device Class for 47 CFR Part 15 B	B
Type of Power Supply	2 x CR2450 coin cells
Nominal Supply Voltage	3 VDC
Supply Voltage Range	2,5 -3,2 VDC
Highest Internal Frequency Source	2480MHz (BLE Radio high channel)

2.3 Test Samples

EUT #	EUT ID	Description	Used For:
1	A000256602-002 (S/N: F6119711)	Standard Sample HW: TE1A001, SW: JAX_OTA_1.0	Radiated Tests (SAC 5)

2.4 Wireless Technologies and Bands Supported by the EUT

Technology	Band	Frequency Range (Tx)	Evaluation Performed*
Bluetooth Low Energy	2,4 GHz	2402 MHz – 2480 MHz	YES
RFID / NFC	13.56 MHz	13.56 MHz	NO

*This statement refers only to this report. Other wireless technologies may be covered by other reports.

2.5 Antenna Information

Technology	Band	Number of Antennas	Antenna Type(s)	Gain
Bluetooth Low Energy	2,4 GHz	1	Integral Antenna	2.22 dBi

2.6 Wireless Technology Details

Technology	Band	Modulation Type(s)	No. of Channels	Channel Spacing	Adaptivity
Bluetooth Low Energy	2,4 GHz	GFSK	40	2 MHz	Non adaptive

2.7 Ancillary Equipment

None

3. TEST METHODS

3.1 Test Standards

Testing was performed according to the following standards / references

Standard	Version	Description
FCC 47 CFR 15.109	-	Radiated emission limits

3.2 Additional references

The following standards / references were also considered for the testing

Standard	Version	Description
ANSI C63.4	2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

3.3 Limits

FCC 47 CFR Rule Part	Test Description	Limit Reference (FCC 47 CFR Reference)
15.109	Radiated Emissions (Unintentional Radiators)	15.109 (a) for Class B Devices *See Note 1

Note 1

Radiated Emissions limits in the tables from 47 CFR sections 15.109 are presented in $\mu\text{V/m}$. Measurements on the test system are made in $\text{dB}\mu\text{V/m}$. To convert between these, the following adjustment is used:

$$\text{New Limit} = 20 \log \left(\frac{\text{Original Limit}}{10^6} \right) + 120$$

Example: from 15.209(a) the limit for 30MHz – 88MHz is $100\mu\text{V/m}$ at 3m. This gives:

$$\text{New Limit} = 20 \log \left(\frac{100}{10^6} \right) + 120 = 40\text{dB}\mu\text{V/m at 3m}$$

Additionally, in some cases testing has been performed at distances other than those specified in the tables. When this has occurred, the limits have been adjusted in accordance with the requirements in 47 CFR 15.31, using an extrapolation factor of 40dB/decade at frequencies below 30MHz and 20dB/decade at or above 30MHz

Example: from 15.209(a) the limit for 1.705MHz – 30MHz is $30\mu\text{V/m}$ (=29.54 $\text{dB}\mu\text{V/m}$) at 30m

$$\text{Limit@3m} = \text{Limit@30m} + 40 \log \left(\frac{30}{3} \right) = 29.54 + 40.00 = 69.54 \text{ dB}\mu\text{V/m at 3m}$$

Example: from 15.209(a) the limit for 1GHz – 18GHz is $500\mu\text{V/m}$ (=53.98 $\text{dB}\mu\text{V/m}$) at 3m

$$\text{Limit@1m} = \text{Limit@3m} + 20 \log \left(\frac{3}{1} \right) = 53.98 + 9.54 = 63.52 \text{ dB}\mu\text{V/m at 1m}$$

3.4 Description of Test Methods and Equipment Setup

3.4.1 General Description

Testing was performed in accordance with the various requirements of ANSI C63.4 and ANSI C63.10. Any deviations from the test methods are described in section 3.6

Where different arrangements of equipment were used for different types of measurements, these are tabulated in section 3.4.2 and details of each arrangement are included in subsequent sections

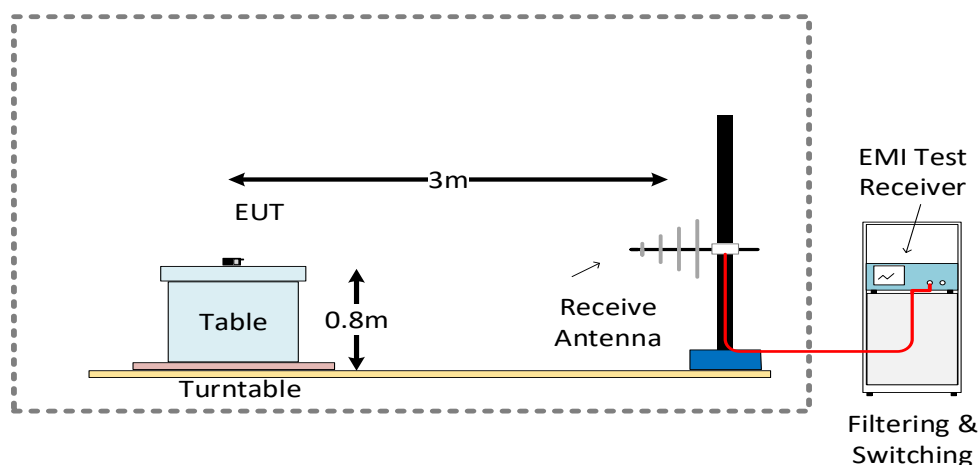
3.4.2 Test Equipment Setup Used by Test Type

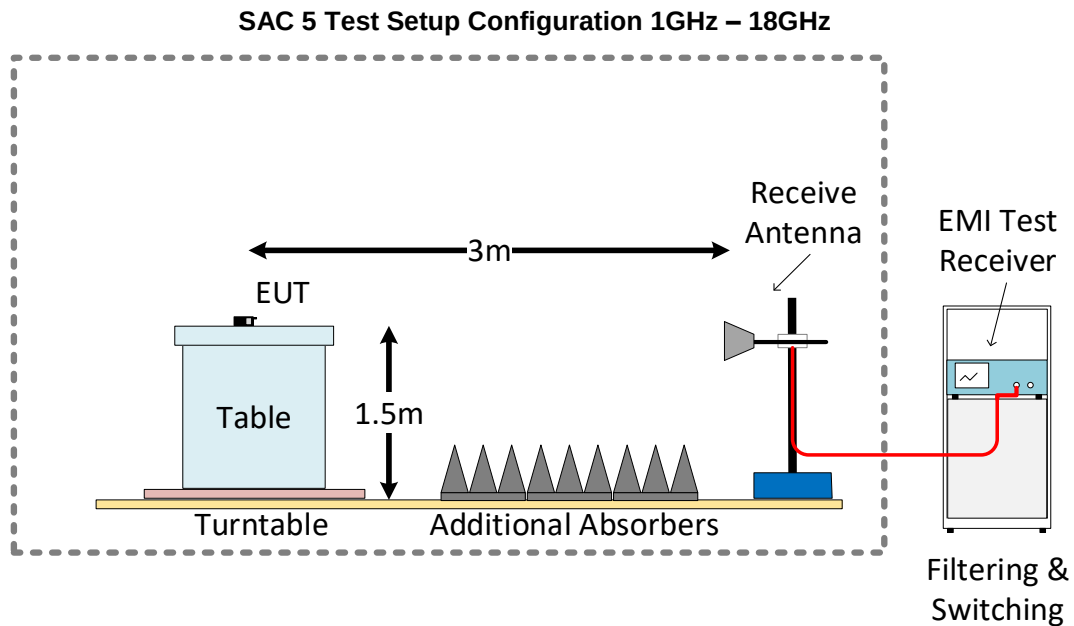
FCC 47 CFR Rule Part	Test Description	Test Equipment Used
15.109	Radiated Emissions (Unintentional Radiators)	SAC5

3.4.3 Test Equipment Setup – SAC 5 (Radiated Emissions)

- For frequency range 30MHz-1GHz Log-Periodic Antenna was used. Antenna elevated from 100 cm from floor to 400 cm from floor, and was placed at 3 m from center of turntable in tilted position. The equipment under test (EUT) was placed at the middle of the turntable at 80 cm height from floor. The antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.
- For frequency range 1GHz-18GHz horn Antenna was used. Antenna elevated from 100 cm from floor to 400 cm from floor, and was placed at 3 m from center of turntable. The equipment under test (EUT) was placed at the middle of the turntable at 150 cm height from floor. The antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.
- For all frequency ranges the turntable was rotated 360° for obtaining the maximum emission.

SAC 5 Test Setup Configuration 30MHz – 1GHz





3.5 EUT Operation Modes

Operation mode	Description
BLE Idle	EUT in RX mode. TX was de-activated

3.6 Deviations from the Test Standard

None

3.7 Environmental Conditions

3.7.1 Environmental Conditions – SAC5 (Radiated Emissions)

See details for each individual test below

4. TEST RESULTS

4.1 Test Results – Radiated Emissions (Unintentional Transmitter)

4.1.1 Radiated Emissions (Unintentional) – Test Summary

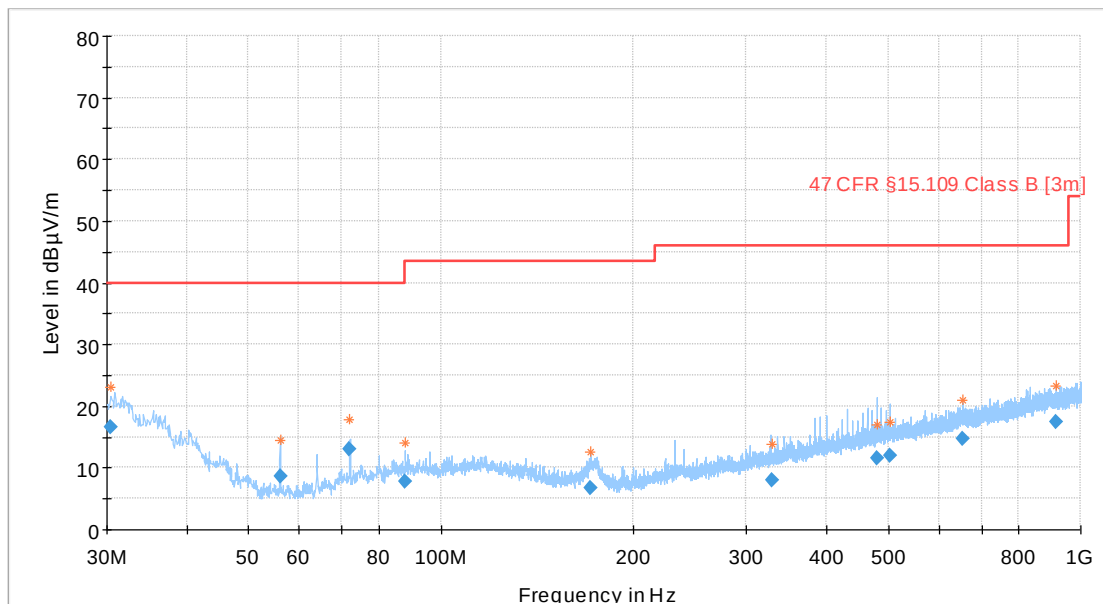
Test Specification	FCC 47 CFR 15.109 (Part 15 Subpart B)	
Test Engineer & Date	Simon Palmhager Sam Ebadeh	2020.02.19 – 2020.02.24
EUT and Ancillary Equipment IDs	A000256602-002	None
EUT Operation Mode(s)	BLE Idle	
EUT Wireless Configuration(s)	See below	
EUT Hardware Configuration(s)	-	
Overall Result	Pass	
Test Parameter	Frequency Range	Result*
Radiated Emissions - Idle Mode	30 MHz – 1 GHz	Pass
Radiated Emissions - Idle Mode	1 GHz – 18 GHz	Pass

* For detailed measurements, see tables and graphs in sections below

4.1.2 Radiated Emissions (Unintentional) – Test Details

30MHz – 1GHz

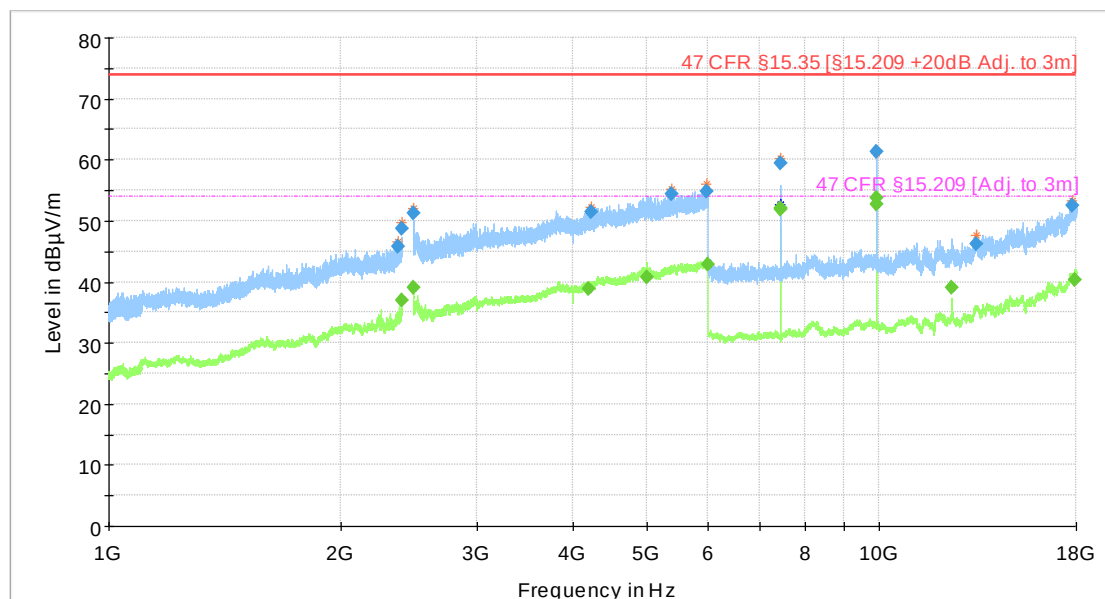
Test mode condition	Idle	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	30 MHz-1 GHz	
Standard	47 CFR Part 15 subpart B	
EUT	A000256602-002	
Ancillary Equipment	None	
Test Engineer	Sam Ebadeh	Date: 2020-02-24
Environmental conditions	Temperature: 18,4 °C	Humidity: 36,6 %
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
30.3804	16.56	---	40	23.44	1000	120	367	H	111
56.01748	8.56	---	40	31.44	1000	120	164	V	115
71.99296	12.94	---	40	27.06	1000	120	175	V	336
87.9792	7.77	---	40	32.23	1000	120	125	V	38
654.9534	14.61	---	46.02	31.41	1000	120	378	V	22
914.92192	17.37	---	46.02	28.66	1000	120	148	H	202

1GHz – 18GHz

Test mode condition	Traffic- BLE high channel	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz-18 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A000256602-002	
Ancillary Equipment	None	
Test Engineer	Simon Palmhager	Date: 2020-02-19
Environmental conditions	Temperature: 20,7 °C	Humidity: 32,8 %
Chamber details	Chamber: SAC 5	



	Preview Result 2-AVG		Preview Result 1-PK+
	Critical_Freqs AVG		Critical_Freqs PK+
	47 CFR §15.35 [§15.209 +20dB Adj. to 3m]		47 CFR §15.209 [Adj. to 3m]
	Final_ResultPK+		Final_ResultAVG

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
5981.729	---	42.91	53.98	11.07	1000	1000	100	V	338
7439.442	---	51.93	53.98	2.05	1000	1000	210	V	318
7440.691	---	52.07	53.98	1.91	1000	1000	210	V	319
9920.961	---	52.68	53.98	1.3	1000	1000	185	V	247
9920.974	---	53.81	53.98	0.17	1000	1000	206	V	229
9921.105	61.29	---	73.98	12.69	1000	1000	185	V	228

5. TEST EQUIPMENT STATUS

5.1 List of Hardware with Calibration Dates

5.1.1 Hardware List – SAC5 System

Type	Manufacturer	Model	Serial Number / ID	Calibration Date	Calibration Due
EMI Test Receiver	Rohde & Schwarz	ESW44	101760 2881044	28.10.2019	28.10.2020
Ultra Broadband Antenna	Rohde & Schwarz	HL562E	100988 2823181	23.07.2019	23.07.2021
Double Ridged Waveguide Horn Antenna	Rohde & Schwarz	HF907	102678 2823164	15.07.2019	15.07.2021
Control Device	Maturo	NCD	NCD/393/2372.01	N/A	N/A
Open Switch & Control Unit	Rohde & Schwarz	OSP150	100081 2884198	01.04.2019	01.04.2020
Open Switch & Control Unit	Rohde & Schwarz	OSP120	100084 2761253	01.04.2019	01.04.2020
Shielded Filter Unit	Rohde & Schwarz	OSP-F Extension	101333 2761265	01.04.2019	01.04.2020
Shielded Filter Unit	Rohde & Schwarz	OSP-F Extension	101335 2761266	01.04.2019	01.04.2020
Shielded Filter Unit	Rohde & Schwarz	OSP-F Base Unit	101330 2761262	01.04.2019	01.04.2020
Humidity Temperature Probe	Rotronic	HF532- DG1XX21X	0061829280 2926379	14.08.2018	14.08.2020

5.2 Software / Firmware Versions

Equipment	Software / Firmware Name	Version
SAC 5	EMC 32	V10.50.40

6. MEASUREMENT UNCERTAINTY

6.1 Measurement Uncertainty for SAC 5 (Radiated Emissions & Band Edge)

Parameter	Uncertainty (Coverage Factor $k=2$)
Field Strength 10 Hz -9 kHz	3.38 dB
Field Strength 9 kHz -30 MHz	3.38 dB
Field Strength 30 MHz -1000 MHz	3.38 dB
Field Strength 1 GHz -18 GHz	4.88 dB
Field Strength 18 GHz - 40 GHz	5.14 dB

7. PHOTOGRAPHS

7.1 Photographs of the Test Setup

See report 60358674-DRAFT Appendix 1