

Prüfbericht-Nr.: <i>Test report no.:</i>	60379462 009	Auftrags-Nr.: <i>Order no.:</i>	168293909	Seite 1 von 9 Page 1 of 9
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2020-12-22	
Auftraggeber: <i>Client:</i>	Amazon.com Services LLC 410 Terry Ave N, Seattle, Washington 98109, United States Of America			
Prüfgegenstand: <i>Test item:</i>	AMAZON LOCKER			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	ZL-ODIN-V1			
Auftrags-Inhalt: <i>Order content:</i>	Test Report			
Prüfgrundlage: <i>Test specification:</i>	47 CFR FCC Part 2.1091 RSS-102 Issue5			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2020-12-22	Please refer to photo documents		
Prüfmuster-Nr.: <i>Test sample no.:</i>	A002968891-001/002			
Prüfzeitraum: <i>Testing period:</i>	2020-12-22 – 2021-01-12			
Ort der Prüfung: <i>Place of testing:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: <i>tested by:</i>	genehmigt von: <i>authorized by:</i>			
Datum: <i>Date:</i> 2021-01-15	 Lin Lin		 Sam Lin	
Stellung / Position:	Senior Project Manager	Stellung / Position:	Technical Certifier	
Sonstiges / Other:	FCC ID: 2AWCC-5677 IC: 24273-5677 HVIN: ZL-ODIN-V1			
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. This test report does not entitle to carry any test mark.</i>				

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1 General Remarks

1.1 Complementary Materials

None.

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd.

362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of China

FCC Accreditation Designation No.: CN1260

ISED wireless device testing laboratory: 25069

2.2 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.3 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.4 Location of Original Data

The original copies of all test data taken during actual testing. A copy has been retained in the TÜV Rheinland (Shenzhen) Co., Ltd.. file for certification follow-up purposes.

2.5 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at 362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3 General Product Information

3.1 Product Function and Intended Use

The EUT is an Amazon Locker which supports Bluetooth LE functions.

Note: This product contains transmitter module.

Contains FCC ID: XMR201707BG96

Contains IC: 10224A-201709BG96

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 1: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment	AMAZON LOCKER
Type Designation	ZL-ODIN-V1
FCC ID	2AWCC-5677
IC	24273-5677
HVIN	ZL-ODIN-V1
Battery Specification	Model: 26S1024 Nominal Voltage: 6Vdc Typical Capacity: 40.8Ah
Testing Voltage	6Vdc
Work Temperature	-20°C ~ +55°C
Equipment Class	Class B
Bluetooth	
Bluetooth Version:	V5.0
Frequency Range:	2402-2480MHz
Type of Modulation:	GFSK
Data Rate:	1Mbps
Quantity of Channels	40
Channel Separation:	2MHz
Type of Antenna:	External Antenna
Antenna number:	1
Antenna Gain:	2.1dBi
GPRS/EGPRS	
Wireless Technology:	GPRS, EGPRS
Operation Frequency band(s)	GPRS/EGPRS: 850/1900
Power Class:	GPRS 900: Class 4 GPRS1800: Class 1 EGPRS 900/1800: E2
GPRS Class	Multi-slot:12
EGPRS Class	Multi-slot:12
Type of Modulation:	GPRS: GMSK EGPRS: GMSK, 8PSK
Channel separation	200KHz
Type of Antenna:	External Antenna

Antenna number:	1
Antenna Gain:	3.8dBi
HW version:	R1.0
SW version:	BG96MAR02A02M1G
eMTC	
Wireless Technology:	eMTC
Operation Frequency band(s)	Band 2/4/5/12/13/26
Power Class:	Class 3
Type of Modulation:	QPSK, 16QAM
Type of Antenna:	External Antenna
Antenna number:	1
Antenna Gain:	3.8dBi
HW version:	R1.0
SW version:	BG96MAR02A02M1G
NB-IoT	
Wireless Technology:	NB-IoT
Operation Frequency band(s)	Band 2/5/12/13/26
Power Class:	Class 3
Type of Modulation:	BPSK, QPSK
Type of Antenna:	External Antenna
Antenna number:	1
Antenna Gain:	3.8dBi
HW version:	R1.0
SW version:	BG96MAR02A02M1G

3.3 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.4 Submitted Documents

- FCC/IC Label and Location Info

- User Manual

4 RF Exposure Compliance

4.1 Test Standards

Test standard : FCC 47 CFR Part 2 Section 2.1091
 RSS-102 Issue 5 Section 3.2

4.2 MPE Limits of FCC and IC

MPE Limit for FCC

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f ²	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

MPE Limit for IC

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10 ²¹	83	90	-	Instantaneous*
0.1-10	-	0.73/ f	-	6**
1.1-10	87/ f ^{0.5}	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ f ^{0.25}	0.1540/ f ^{0.25}	8.944/ f ^{0.5}	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 f ^{0.3417}	0.008335 f ^{0.3417}	0.02619f ^{0.6834}	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ f ^{1.2}
150000-300000	0.158 f ^{0.5}	4.21 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616000/ f ^{1.2}

Note: f is frequency in MHz.

*Based on nerve stimulation (NS).

** Based on specific absorption rate (SAR).

4.3 Test Result

Test Result: PASS

This device is mobile device, and the applicant declares that the minimum separation distance is greater than 20cm, detail minimum distance refer to below calculation table. Therefore MPE measurement or computational modeling should be used to determine compliance.

MPE Calculation is based on the conducted power, and considering maximum power and antenna gain. The following formula is used to MPE evaluation.

- (1) The power density according to far-field model is:

$$S = \frac{P \times G_{(\theta,\phi)}}{4 \times \pi \times R^2}$$

Where:

- P = input power of the antenna.
 G = antenna gain relative to an isotropic antenna.
 θ, ϕ = elevation and azimuth angles.
 R = distance from the antenna to the point of investigation.

- (2) For single or multiple RF sources, the calculated power density should comply with following:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Where:

- S_i = the power density when the f is i .
 $S_{Limit,i}$ = the reference level requirement for power density when f is i .
 f = operating frequency.

A. Stand-alone operation mode

Operating Mode	Band	Maximum Conducted Output Power	Antenna Gain (dBi)	Min. Distance (cm)	Calculation (mW/cm ²)	FCC Limit (mW/cm ²)	Result
NB-IoT	2	24	3.8	20	0.12	1.0	PASS
	5	24	3.8	20	0.12	0.549	PASS
	12	24	3.8	20	0.12	0.466	PASS
	13	24	3.8	20	0.12	0.518	PASS
	26	24	3.8	20	0.12	0.543	PASS
eMTC	2	24	3.8	20	0.12	1.0	PASS
	4	23	3.8	20	0.095	1.0	PASS
	5	24	3.8	20	0.12	0.549	PASS
	12	24	3.8	20	0.12	0.466	PASS
	13	24	3.8	20	0.12	0.518	PASS
	26	24	3.8	20	0.12	0.543	PASS
GPRS/EGPRS	850	23.97	3.8	20	0.119	0.549	PASS
GPRS/EGPRS	1900	20.97	3.8	20	0.06	1.0	PASS
Bluetooth	2.4GHz	9	2.1	20	0.003	1.0	PASS

Operating Mode	Band	Maximum Conducted Output Power	Antenna Gain (dBi)	Distance (cm)	Calculation (W/m ²)	IC Limit (W/m ²)	Result
NB-IoT	2	24	3.8	20	1.198	4.476	PASS
	5	24	3.8	20	1.198	2.576	PASS
	12	24	3.8	20	1.198	2.302	PASS
	13	24	3.8	20	1.198	2.474	PASS
	26	24	3.8	20	1.198	2.554	PASS
eMTC	2	24	3.8	20	1.198	4.476	PASS
	4	23	3.8	20	0.95	4.242	PASS
	5	24	3.8	20	1.198	2.576	PASS
	12	24	3.8	20	1.198	2.302	PASS
	13	24	3.8	20	1.198	2.474	PASS
	26	24	3.8	20	1.198	2.554	PASS
GPRS/EGPRS	850	23.97	3.8	20	1.189	2.576	PASS
GPRS/EGPRS	1900	20.97	3.8	20	0.597	4.476	PASS
Bluetooth	2.4GHz	9	2.1	20	0.023	5.348	PASS

B. Simultaneous Transmission operation mode

FCC					
Operating Mode	Bluetooth Ratio	GPRS/eMTC/NB-IoT Ratio	Sum Ratio	Limit	Result
Bluetooth + GPRS	0.003	0.217	0.220	<1	Pass
Bluetooth + eMTC	0.003	0.258	0.261	<1	Pass
Bluetooth + NB-IoT	0.003	0.258	0.261	<1	Pass
IC					
Operating Mode	Bluetooth Ratio	GPRS/eMTC/NB-IoT Ratio	Sum Ratio	Limit	Result
Bluetooth + GPRS	0.004	0.462	0.466	<1	Pass
Bluetooth + eMTC	0.004	0.520	0.524	<1	Pass
Bluetooth + NB-IoT	0.004	0.520	0.524	<1	Pass

Note:

- The GPRS/EGPRS, eMTC and NB-IOT modes cannot transmit simultaneous.
- The GPRS/EGPRS, eMTC and NB-IOT RF output power refer to test reports RXA1706-0199RF01R1, RXA1706-0199RF02R1, RXA1706-0199RF03R1, RXA1706-0199RF04R1, RXA1706-0199RF05, RXA1706-0199RF06, RXA1706-0199RF07, RXA1706-0199RF08, RXA1709-0316RF01, RXA1709-0316RF02, RXA1709-0316RF03, RXA1709-0316RF05, RXA1709-0316RF06, RXA1709-0316RF07 issued by TA Technology (Shanghai) Co., Ltd.
- The Bluetooth LE RF output power refer to test report 60379462 005 issued by TÜV Rheinland (Shenzhen) Co., Ltd.
- The Bluetooth antenna gain is 2.1dBi
- The GPRS/EGPRS, eMTC and NB-IOT antenna gain is 3.8dBi.
- $R = 0.2m$