Certificate # 2861.01

Test Report

Verified code: 852356

Report No.: E20230117700901-4

Customer:	Lumi United Technology Co., Ltd
Address:	B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, China
Sample Name:	Smart Lock U100
Sample Model:	SDL-D01
Receive Sample Date:	Jan.18,2023
Test Date:	Jan.30,2023 ~ Feb.17,2023
Reference Document:	FCC 47 CFR Part 15 Subpart C
Test Result:	Pass

Prepared by: Chen XiaoCong Reviewed by: Wu Haoting Approved by: Zhao Zetian

Guangzhou GRG Metrology & Test Co., Ltd.

Issued Date: 2023-03-03

Guangzhou GRG Metrology & Test Co., Ltd.
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Statement

1. The report is invalid without "special seal for inspection and testing"; some copies are invalid; The report is invalid if it is altered or missing; The report is invalid without the signature of the person who prepared, reviewed and approved it.

2. The sample information is provided by the client and responsible for its authenticity; The content of the report is only valid for the samples sent this time.

3. When there are reports in both Chinese and English, the Chinese version will prevail when the language problems are inconsistent.

4. If there is any objection concerning the report, please inform us within 15 days from the date of receiving the report.

5. Without the agreement of the laboratory, the client is not authorized to use the test results for unapproved propaganda.

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REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E20230117700901-4	Original Issue	2023-02-22

---------- The following blanks ----------

1. TEST RESULT SUMMARY

Technical Requirements			
FCC Part 15 Subpart C			
Item	**FCC Standard Chapter**	**Report Chapter**	**Result**
Antenna requirements	§15.203	Chapter 5	Complied
Radiated Spurious Emissions	§15.225(a),(b),(c),(d) §15.209	Chapter 7	Complied
20dB Bandwidth	§15.215	Chapter 8	Complied
Frequency Stability Tolerance	§15.225(e)	Chapter 9	Complied
AC Conducted Emission	§15.207	Chapter 6	Complied

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2. GENERAL DESCRIPTION OF EUT

2.1 APPLICANT

Name:	Lumi United Technology Co., Ltd
Address:	B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, China

2.2 MANUFACTURER

Name:	Lumi United Technology Co., Ltd
Address:	B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, China

2.3 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment:	Smart Lock U100
Model No.:	SDL-D01
Adding Model:	DL-D01D
Model Differences:	That EUT (Smart Lock U100) Model Numbers SDL-D01 and DL-D01D have the same technical construction including circuit diagram PCB layout, hardware version and software version identical, except sales area, packaging and accessories are different, and all the tests were performed on the model SDL-D01.
Trade Name:	Aqara
FCC ID:	2AKIT-SDLD01
Power supply:	DC 6V power supplied by 4 AA batteries,DC 5V supplied by USB-C emergency port
Frequency Range:	13.56MHz
Modulation type:	ASK
Antenna Specification:	PCB Antenna
Temperature Range:	-35℃~66℃
Hardware Version:	V2.1
Software Version:	1.0.4_0007
Sample No:	E20230117700901-0007
Note:	/

2.4 TEST OPERATION MODE

Test Item	Mode No.	Description of the modes
Conducted Spurious Emission	2	EUT powered by USB-C emergency port Continuously Transmitting (13.56MHz TX)
Radiated Spurious Emission	1	EUT powered by DC 6V Continuously Transmitting (13.56MHz TX)
20dB Bandwidth	1	EUT powered by DC 6V Continuously Transmitting (13.56MHz TX)
Frequency Stability Tolerance	1	EUT powered by DC 6V Continuously Transmitting (13.56MHz TX)

Note: 1.The EUT is powered on to emit NFC signal.

2.5 LOCAL SUPPORTIVE

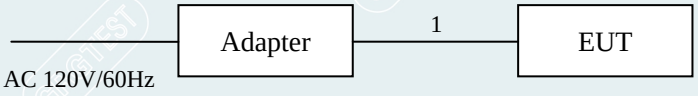
Name of Equipment	Manufacturer	Model	Serial Number	Note
Adapter	/	/	/	/

No.	Cable Type	Qty.	Shielded Type	Ferrite Core(Qty.)	Length
1	USB cable	1	No	0	1.5m

2.6 CONFIGURATION OF SYSTEM UNDER TEST

For Mode 1

For Mode 2



2.7 TEST SOFTWARE

Software version	Test level
/	/

3. LABORATORY AND ACCREDITATIONS

3.1 LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of Guangzhou GRG Metrology & Test Co., Ltd.

Add	:	Address: No.1301 Guanguang Road Xinlan Community, Guanlan Street, Longhua District Shenzhen, 518110, People's Republic of China
P.C.	:	518110
Tel	:	0755-61180008
Fax	:	0755-61180008

3.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to GB/T 27025(ISO/IEC 17025:2017)

USA	A2LA(Certificate #2861.01)

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada	ISED (Company Number: 24897，CAB identifier:CN0069)
USA	FCC (Registration Number: 759402，Designation Number:CN1198)

Copies of granted accreditation certificates are available for downloading from our web site, http://www.grgtest.com

3.3 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement		Frequency	Uncertainty
Radiated Emission	coaxial	9kHz～30MHz	4.46dB
	coplanar	9kHz～30MHz	4.46dB
	Horizontal	30MHz～1000MHz	4.3dB
	Vertical	30MHz～1000MHz	4.3dB

Measurement	Uncertainty
RF frequency	6.0×10^{-6}
Occupied channel bandwidth	0.4 dB
Humidity	6 %
Temperature	2℃

This uncertainty represents an expanded uncertainty factor of *k*=2.

4. LIST OF USED TEST EQUIPMENT AT GRGT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Radiated Spurious Emission				
Test S/W	EZ	CCS-2ANT	/	/
Test Receiver	R&S	ESR	102444	2023/09/02
Preamplifier	EMEC	EM330	I00426	2024/02/06
Bi-log Antenna	TESEQ	CBL6143A	26039	2024/10/23
Loop Antenna	schwarzbeck	FMZB 1513-60	1513-60-56	2023/08/06
Spectrum Analyzer	Agilent	N9010A	MY52221469	2023/06/29
Receiver	R&S	ESR26	101758	2023/10/27
Amplifier	Tonscend	TAP9E6343	AP20E806065	2023/05/08
Test S/W	Tonscend	JS36-RSE/2.5.1.5		
20dB Bandwidth &Frequency StabilityTolerance				
Spectrum Analyzer	Agilent	N9010A	MY52221469	2023/06/29
Temperature& humidity chamber	HOSON	HS01060SDF	201013401	2024/02/02
DC power source	KEYSIGHT	E36131A	MY59001135	2023/10/16
Conduction Emission				
EZ-EMC	EZ	CCS-3A1-CE	/	/
EMI Receiver	R&S	ESCI	100783	2023-08-28
LISN(EUT)	R&S	ENV216	101543	2023-09-13

Note: The calibration cycle of the above instruments is 12 months except for the Bi-log Antenna which is 24 months.

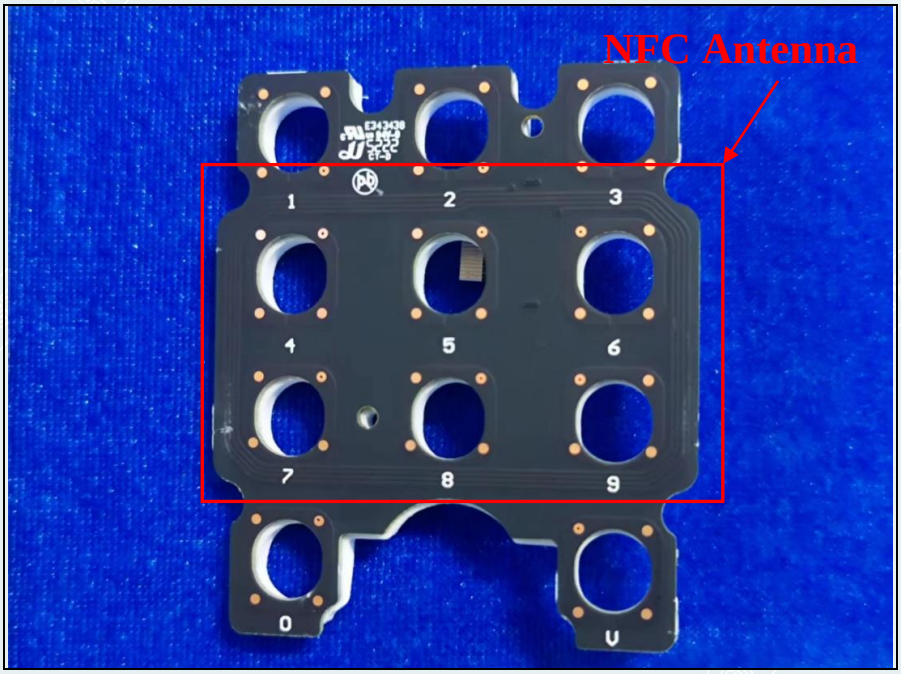
5. ANTENNA REQUIREMENTS

5.1 LIMIT

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

5.2 TEST RESULT

The antenna is PCB antenna, so compliance with antenna requirements.



6. CONDUCTED EMISSION MEASUREMENT

6.1 LIMITS

Frequency range	Limits (dBμV)	
	Quasi-peak	Average
150kHz～0.5MHz	66～56	56～46
0.5MHz～5MHz	56	46
5MHz～30MHz	60	50

NOTE: (1) The lower limit shall apply at the transition frequencies.

(2) The limit decreases in line with the logarithm of the frequency in the range of 150 kHz to 0.5MHz.

6.2 TEST PROCEDURES

Procedure of Preliminary Test

Test procedures follow ANSI C63.10:2013.

For measurement of the disturbance voltage the equipment under test (EUT) is connected to the power supply mains and any other extended network via one or more artificial network(s). An EUT, whether intended to be grounded or not, and which is to be used on a table is configured as follows:

– Either the bottom or the rear of the EUT shall be at a controlled distance of 40 cm from a reference ground plane. This ground plane is normally the wall or floor of a shielded room. It may also be a grounded metal plane of at least 2 m by 2 m. This is physically accomplished as follows:

1) place the EUT on a table of non-conducting material which is at least 80 cm high. Place the EUT so that it is 40 cm from the wall of the shielded room, or

2) place the EUT on a table of non-conducting material which is 40 cm high so that the bottom of the EUT is 40 cm above the ground plane;

– All other conductive surfaces of the EUT shall be at least 80 cm from the reference ground plane;

– The EUT are placed on the floor that one side of the housings is 40 cm from the vertical reference ground plane and other metallic parts;

– Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth forming a bundle 30 cm to 40 cm long, hanging approximately in the middle between the ground plane and the table.

– I/O cables that are connected to a peripheral shall be bundled in the centre. The end of the cable may be terminated if required using correct terminating impedance. The total length shall not exceed 1 m.

– Use serial board or connecting line to make EUT and notebook to communicate, according to the actual need to make EUT send constant frequency signal continuously.

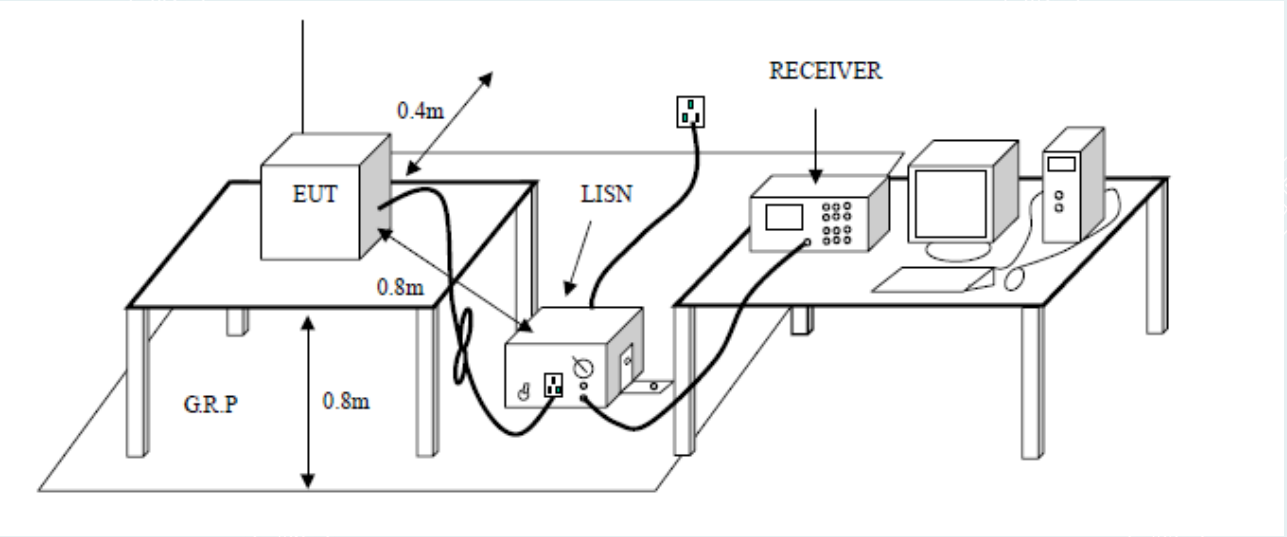
The test mode(s) described in Item 2.6 were scanned during the preliminary test. After the preliminary scan, we found the test mode described in Item 2.6 producing the highest emission level.The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

Procedure of Final Test

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test. A scan was taken on both power lines, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. The test data of the worst-case condition(s) was

recorded.

6.3 TEST SETUP



6.4 DATA SAMPLE

Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XXXX	32.69	25.65	11.52	44.21	37.17	65.78	55.79	-21.57	-18.62	Pass

Factor = Insertion loss of LISN + Cable Loss
Result = Quasi-peak Reading/ Average Reading + Factor
Limit = Limit stated in standard
Margin = Result (dBuV) – Limit (dBuV)

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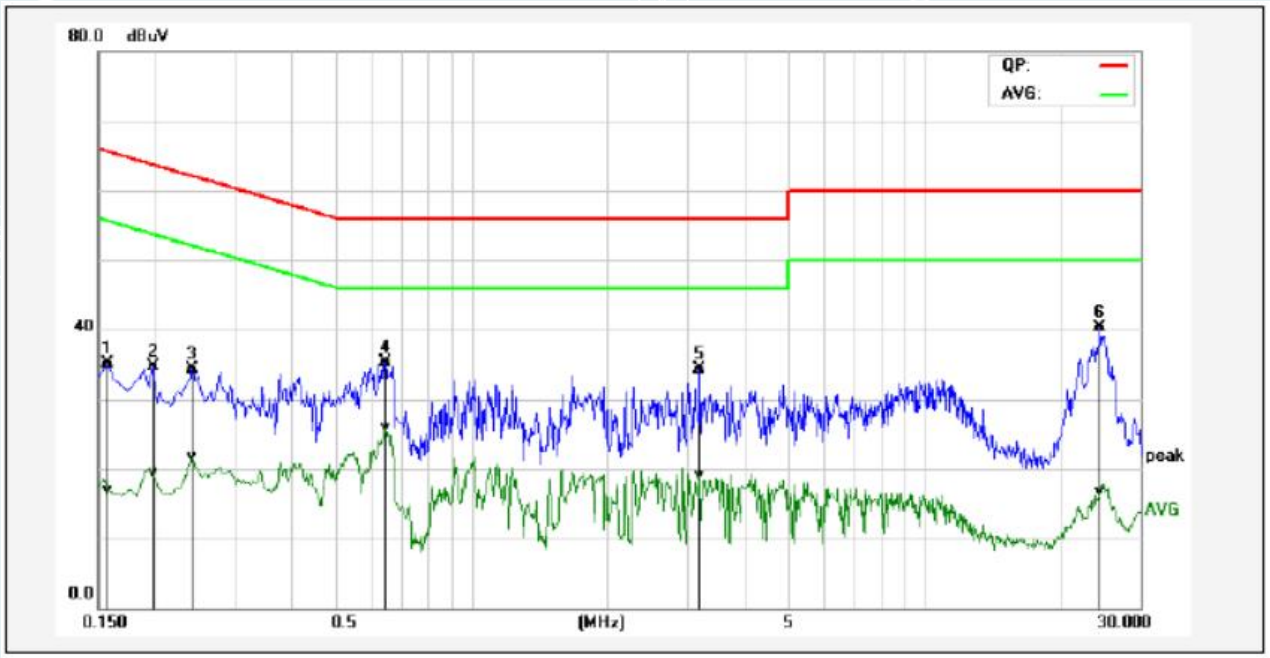
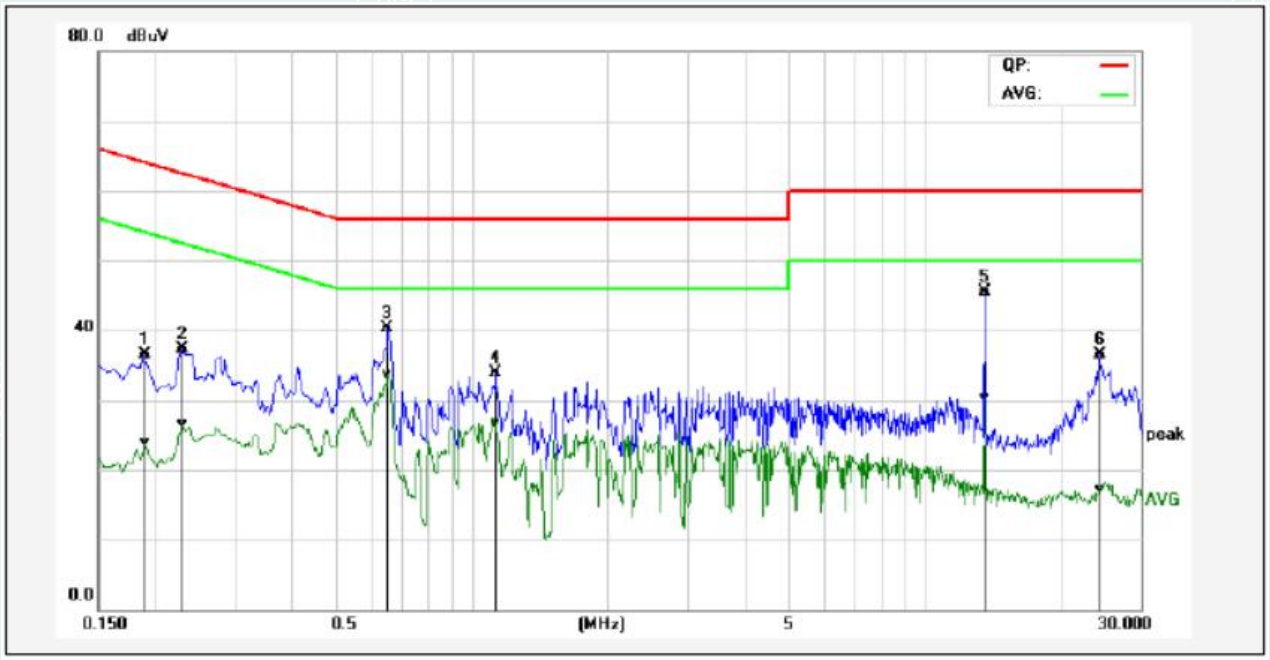
6.5 TEST RESULTS

Project Information			
Application No.:	E20230117700901	EUT:	Smart Lock U100
Model:	SDL-D01	SN:	E20230117700901-0007
Mode:	Mode 1	Voltage:	AC 120V/60Hz
Environment:	23.4℃/50%RH/101.0kPa	Engineer:	Wang Xinyuan
Test date:	2023-02-13	Line	L



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1	0.1580	25.53	7.29	9.61	35.14	16.90	65.56	55.57	-30.42	-38.67	Pass
2	0.1980	25.01	9.85	9.61	34.62	19.46	63.69	53.69	-29.07	-34.23	Pass
3	0.2420	24.78	12.00	9.61	34.39	21.61	62.02	52.03	-27.63	-30.42	Pass
4	0.6460	25.75	16.25	9.62	35.37	25.87	56.00	46.00	-20.63	-20.13	Pass
5	3.2020	24.63	9.53	9.67	34.30	19.20	56.00	46.00	-21.70	-26.80	Pass
6*	24.4980	30.42	6.82	9.94	40.36	16.76	60.00	50.00	-19.64	-33.24	Pass

Project Information			
Application No.:	E20230117700901	EUT:	Smart Lock U100
Model:	SDL-D01	SN:	E20230117700901-0007
Mode:	Mode 1	Voltage:	AC 120V/60Hz
Environment:	23.4℃/50%RH/101.0kPa	Engineer:	Wang Xinyuan
Test date:	2023-02-13	Line	N



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1	0.1900	26.81	14.36	9.60	36.41	23.96	64.03	54.04	-27.62	-30.08	Pass
2	0.2300	27.73	16.83	9.60	37.33	26.43	62.45	52.45	-25.12	-26.02	Pass
3*	0.6540	30.64	24.11	9.61	40.25	33.72	56.00	46.00	-15.75	-12.28	Pass
4	1.1300	24.32	17.11	9.63	33.95	26.74	56.00	46.00	-22.05	-19.26	Pass
5	13.5620	35.59	20.55	9.84	45.43	30.39	60.00	50.00	-14.57	-19.61	Pass
6	24.3540	26.53	7.12	10.07	36.60	17.19	60.00	50.00	-23.40	-32.81	Pass

7. RADIATED SPURIOUS EMISSIONS

7.1 LIMITS

IN BAND SPURIOUS EMISSIONS

(a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

OUT BAND RADIATED SPURIOUS EMISSIONS

Frequency (MHz)	Quasi-peak(μV/m)	Measurement distance(m)	Quasi-peak(dBμV/m)@distance 3m
0.009-0.490	2400/F(kHz)	300	128.5~93.8
0.490-1.705	24000/F(kHz)	30	73.8~63
1.705-30.0	30	30	69.5
30 ~ 88	100	3	40
88~216	150	3	43.5
216 ~ 960	200	3	46
Above 960	500	3	54

NOTE: (1) The lower limit shall apply at the transition frequencies.

7.2 TEST PROCEDURES

1) Sequence of testing 9 kHz to 30 MHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Pre measurement:

--- The turntable rotates from 0 °to 360 °.

--- The antenna height is 1.0 meter.

--- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement:

--- Identified emissions during the pre measurement the software maximizes by rotating the turntable position (0 °to 360 °) and by rotating the elevation axes (0 °to 360 °).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QP detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the pre measurement and the limit will be stored.

2) Sequence of testing 30 MHz to 1 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Pre measurement:

--- The turntable rotates from 0 °to 360 °.

--- The antenna is polarized vertical and horizontal.

--- The antenna height changes from 1 to 4 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of pre measurement the software maximize the peaks by changing turntable position (0 °to 360 °) and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the pre measurement with marked maximum final measurements and the limit will be stored.

Remark： Pre-scan all modes, mode 1 is the worst mode. Therefore, only the data of mode 1 is recorded in the report.

7.3 MEASURING INSTRUMENTS SETTING

Frequency (MHz)	Instrument	Detector	Resolution Bandwidth	Video Bandwidth
0.009 to 30	Receiver	QP	200Hz: 0.009 to 0.15MHz 10kHz: 0.15 to 30MHz	3*RBW
30 to 1000	Receiver	QP	120kHz	3*RBW

7.4 TEST SETUP

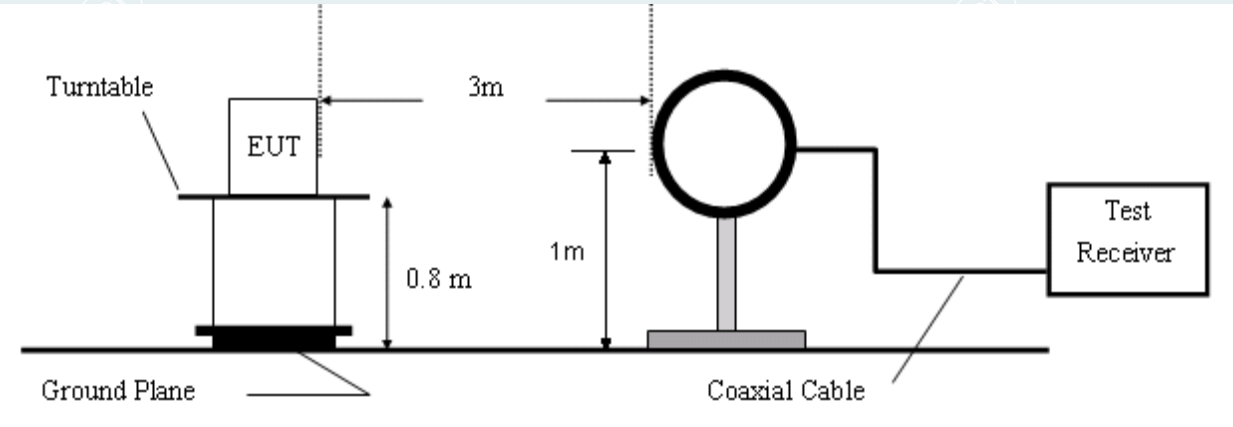


Figure 1. 9kHz to 30MHz radiated emissions test configuration

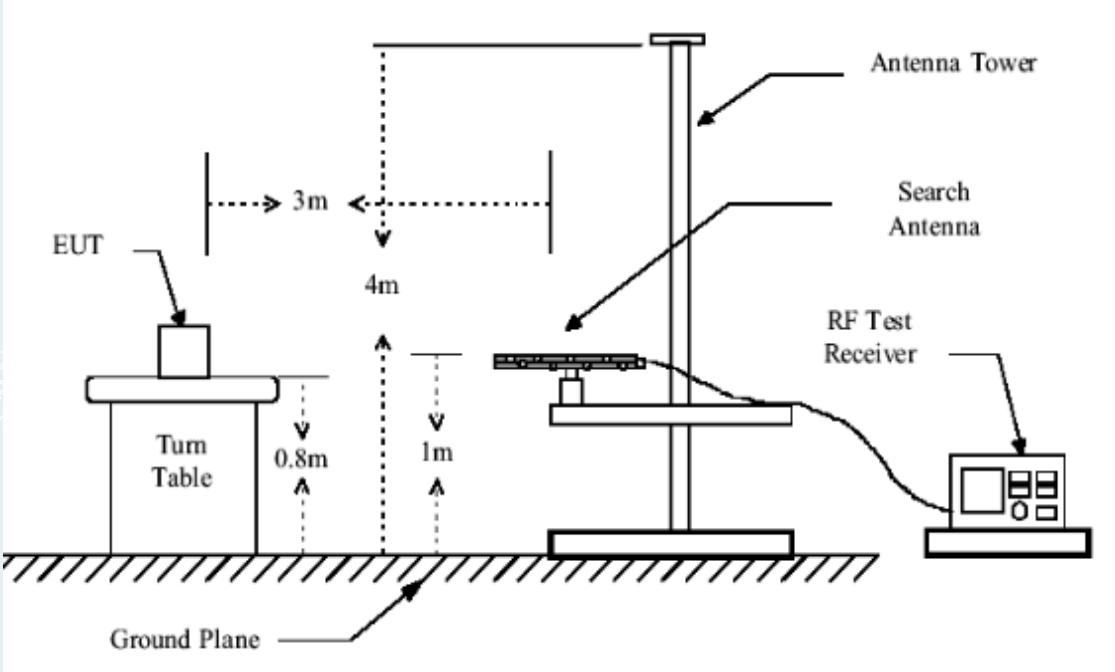


Figure 2. 30MHz to 1GHz radiated emissions test configuration

7.5 DATA SAMPLE

0.009MHz to 1GHz

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Pole
xxx	xxx	37.06	-15.48	21.58	40.00	-18.42	QP	Vertical

Frequency (MHz) = Emission frequency in MHz

Ant.Pol. (H/V/coaxial/coplanar) = Antenna polarization

Reading (dBuV) = Uncorrected Analyzer / Receiver reading

Correction Factor (dB/m) = Antenna factor + Cable loss – Amplifier gain

Result (dBuV/m) = Reading (dBuV) + Correction Factor (dB/m)

Limit (dBuV/m) = Limit stated in standard

Margin (dB) = Remark Result (dBuV/m) – Limit (dBuV/m)

QP = Quasi-peak Reading

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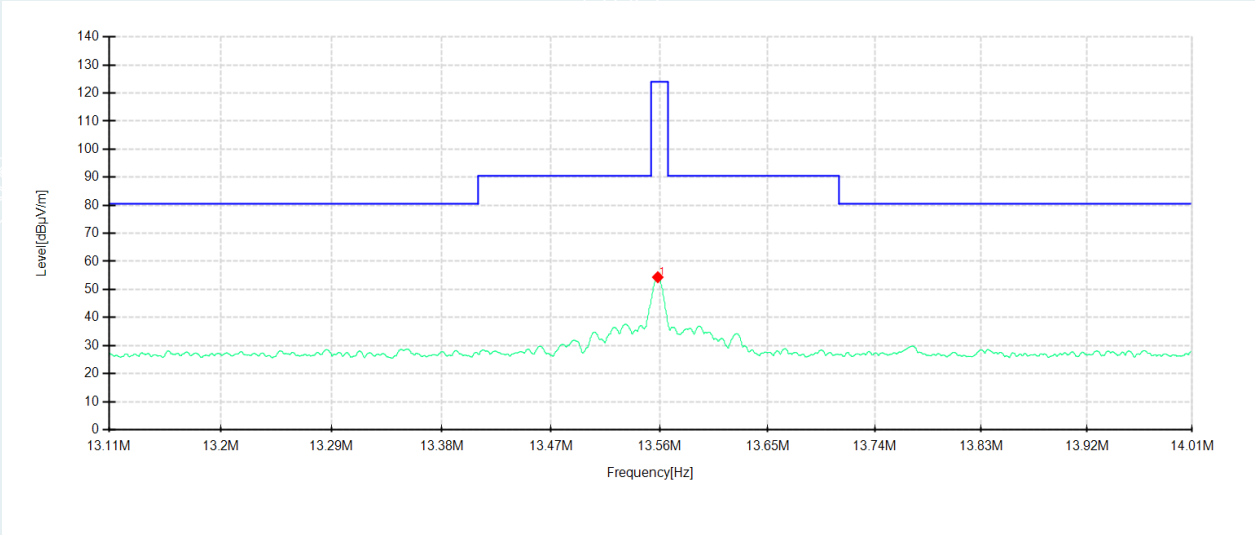
7.6 TEST RESULTS

7.6.1 IN BAND RADIATED SPURIOUS EMISSIONS

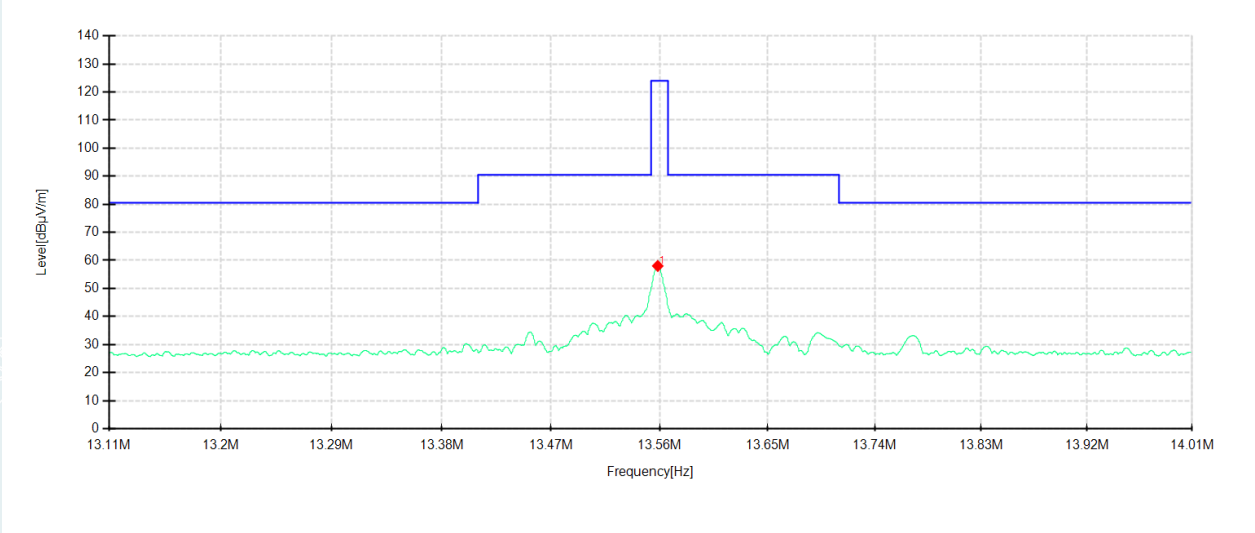
For adapter power supply

Project Information			
Application No.:	E20230117700901	EUT:	Smart Lock U100
Model:	SDL-D01	SN:	E20230117700901-0007
Mode:	Mode 1	Voltage:	AC 120V/60Hz
Environment:	25.2℃/57%RH/101.0kPa	Engineer:	Zhang Zishan
Test date:	2023-02-20	/	/



Suspected Data List									
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	13.558	31.47	55.37	22.90	124.00	69.63	100	82	coaxial

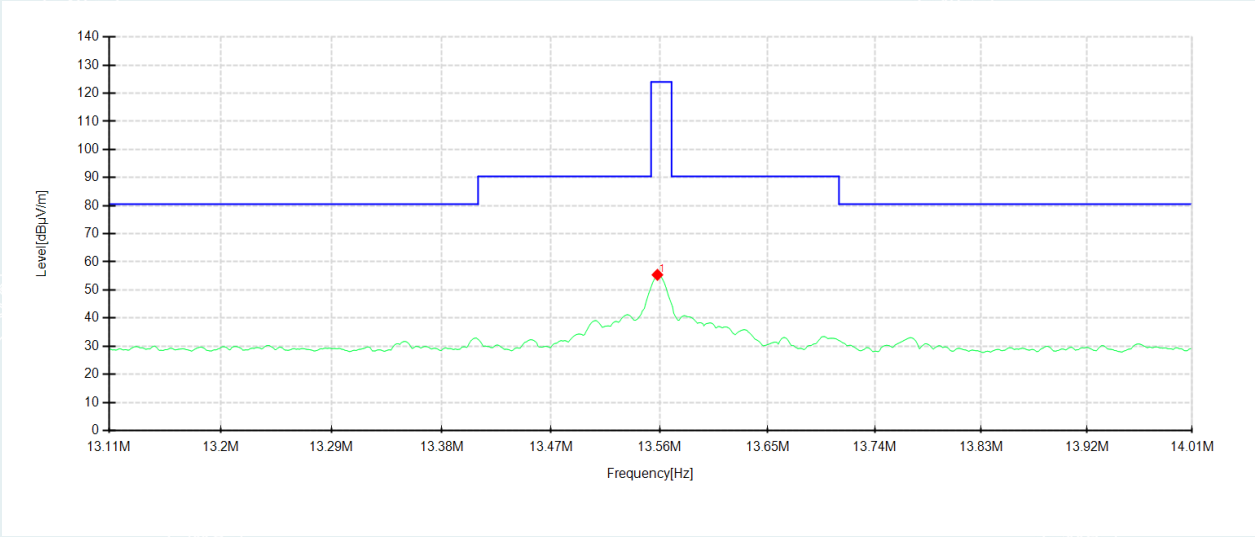
Project Information			
Application No.:	E20230117700901	EUT:	Smart Lock U100
Model:	SDL-D01	SN:	E20230117700901-0007
Mode:	Mode 1	Voltage:	AC 120V/60Hz
Environment:	25.2℃/57%RH/101.0kPa	Engineer:	Zhang Zishan
Test date:	2023-02-20	/	/



Suspected Data List									
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	13.558	35.12	58.02	22.90	124.00	65.98	100	360	coplanar

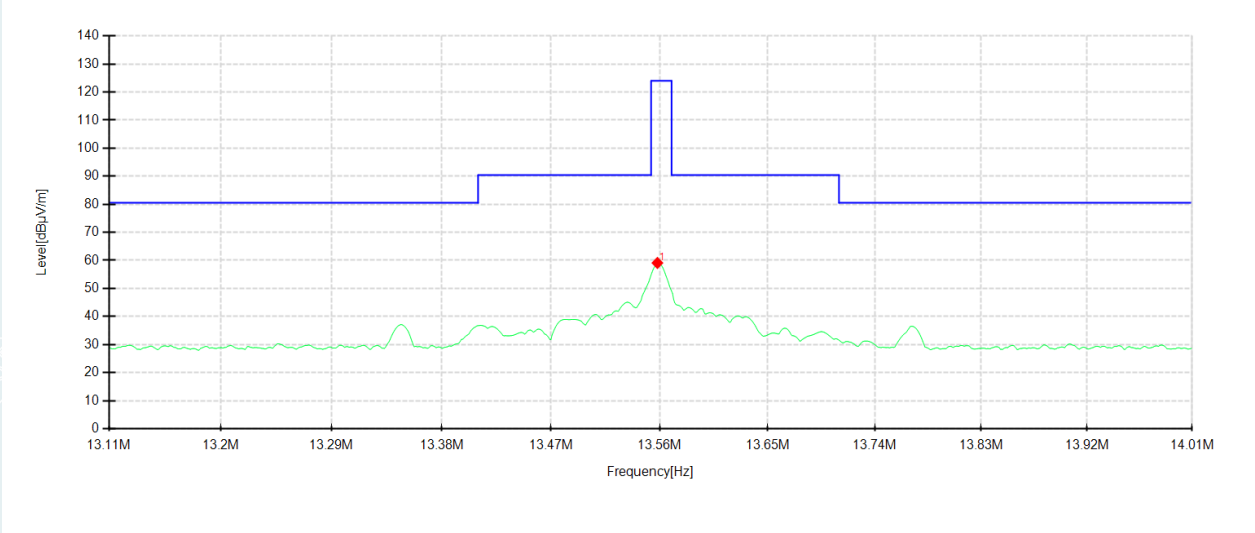
For battery power supply

Project Information			
Application No.:	E20230117700901	EUT:	Smart Lock U100
Model:	SDL-D01	SN:	E20230117700901-0007
Mode:	Mode 1	Voltage:	DC 6V
Environment:	25.0℃/60%RH/101.0kPa	Engineer:	Zhang Zishan
Test date:	2023-02-08	/	/



Suspected Data List									
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	13.558	32.50	55.38	22.88	124.00	68.62	100	82	coaxial

Project Information			
Application No.:	E20230117700901	EUT:	Smart Lock U100
Model:	SDL-D01	SN:	E20230117700901-0007
Mode:	Mode 1	Voltage:	DC 6V
Environment:	25.0℃/60%RH/101.0kPa	Engineer:	Zhang Zishan
Test date:	2023-02-08	/	/

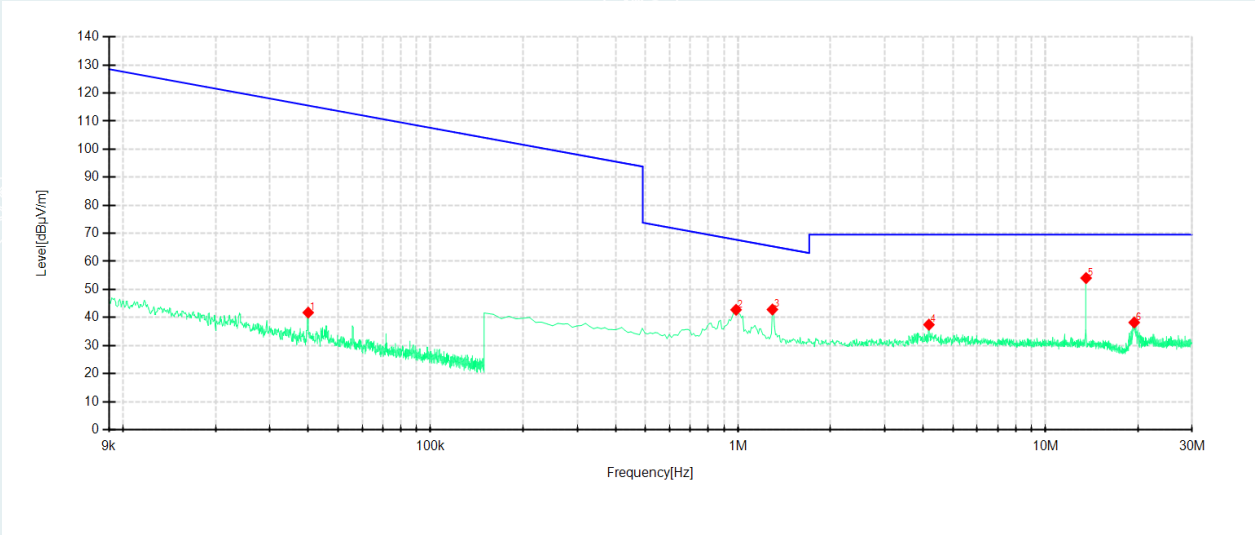


Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	13.558	36.21	59.09	22.88	124.00	64.91	100	360	coplanar

7.6.2 OUT BAND RADIATED SPURIOUS EMISSIONS

9kHz-30MHz
For adapter power supply

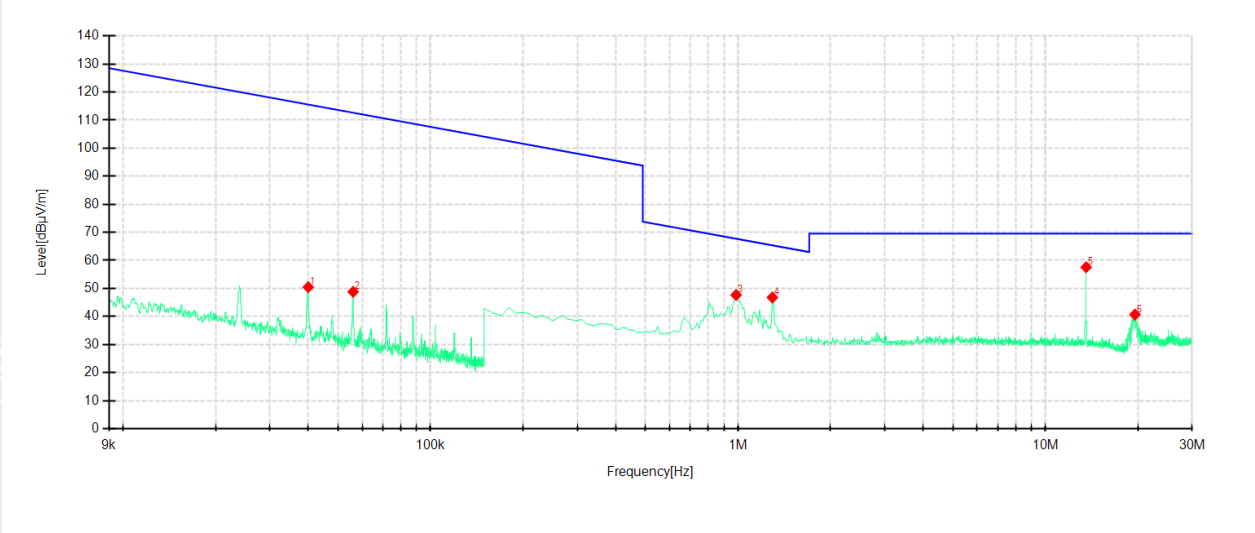
Project Information			
Application No.:	E20230117700901	EUT:	Smart Lock U100
Model:	SDL-D01	SN:	E20230117700901-0007
Mode:	Mode 1	Voltage:	AC 120V/60Hz
Environment:	25.2℃/57%RH/101.0kPa	Engineer:	Zhang Zishan
Test date:	2023-02-20	/	/



Suspected Data List									
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	0.04	20.09	41.74	21.65	115.57	73.83	100	16	coaxial
2	0.9858	20.36	42.73	22.37	67.73	25.00	100	221	coaxial
3	1.2942	20.47	42.84	22.37	65.36	22.52	100	238	coaxial
4	4.1798	14.85	37.43	22.58	69.50	32.07	100	2	coaxial
5	13.562	31.18	54.06	22.88	69.50	15.44	100	98	coaxial
6	19.453	15.97	38.21	22.24	69.50	31.29	100	345	coaxial

Note:NO.5 is the fundamental frequency point.

Project Information			
Application No.:	E20230117700901	EUT:	Smart Lock U100
Model:	SDL-D01	SN:	E20230117700901-0007
Mode:	Mode 1	Voltage:	AC 120V/60Hz
Environment:	25.2℃/57%RH/101.0kPa	Engineer:	Zhang Zishan
Test date:	2023-02-20	/	/

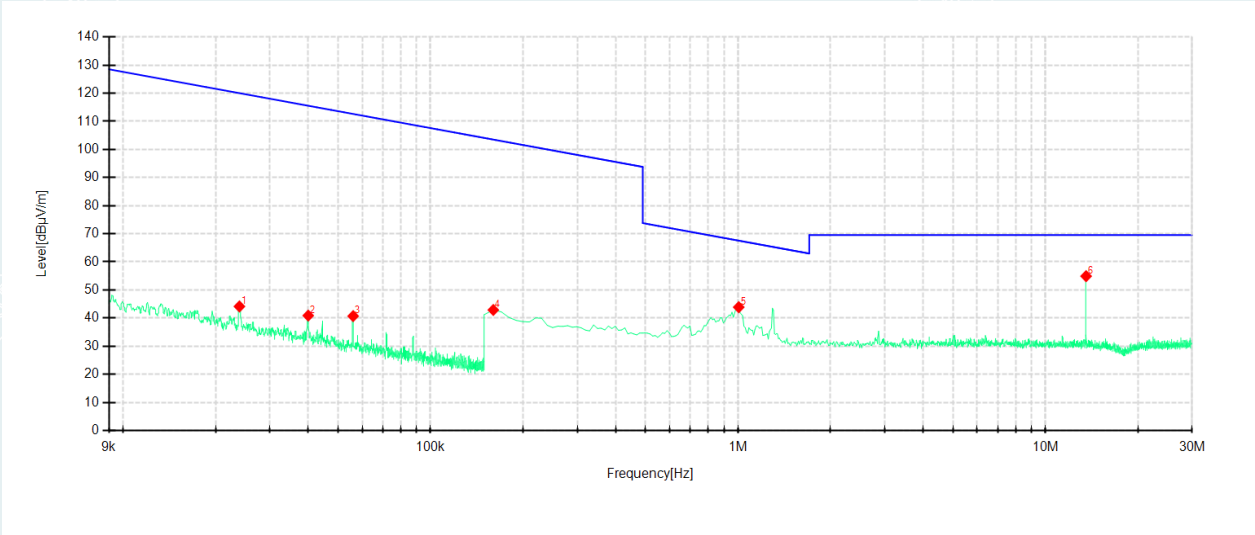


Suspected Data List									
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	0.04	28.82	50.47	21.65	115.57	65.10	100	15	coplanar
2	0.056	27.07	48.81	21.74	112.64	63.83	100	15	coplanar
3	0.9858	25.28	47.65	22.37	67.73	20.08	100	346	coplanar
4	1.2942	24.41	46.78	22.37	65.36	18.58	100	346	coplanar
5	13.562	34.68	57.56	22.88	69.50	11.94	100	346	coplanar
6	19.552	18.32	40.67	22.35	69.50	28.83	100	19	coplanar

Note:NO.5 is the fundamental frequency point.

For battery power supply

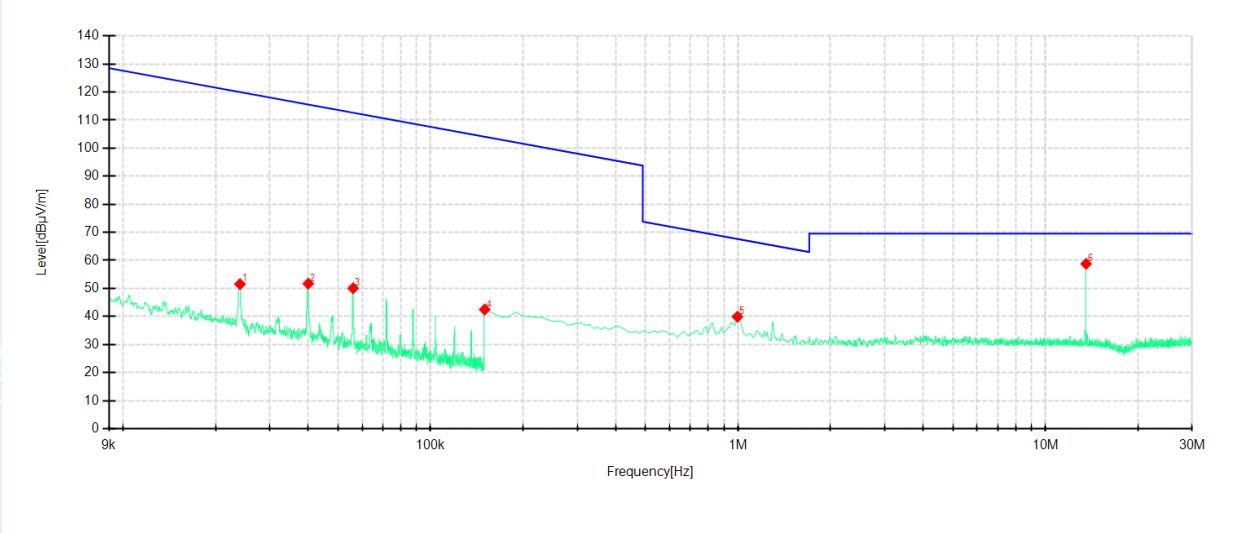
Project Information			
Application No.:	E20230117700901	EUT:	Smart Lock U100
Model:	SDL-D01	SN:	E20230117700901-0007
Mode:	Mode 1	Voltage:	DC 6V
Environment:	25.0℃/60%RH/101.0kPa	Engineer:	Zhang Zishan
Test date:	2023-02-08	/	/



Suspected Data List									
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	0.0239	22.30	44.14	21.84	120.02	75.88	100	147	coaxial
2	0.04	19.24	40.89	21.65	115.56	74.67	100	182	coaxial
3	0.056	18.97	40.71	21.74	112.64	71.93	100	360	coaxial
4	0.16	20.79	42.88	22.09	103.52	60.64	100	346	coaxial
5	1.0057	21.50	43.88	22.38	67.55	23.67	100	38	coaxial
6	13.562	32.03	54.91	22.88	69.50	14.59	100	266	coaxial

Note:NO.6 is the fundamental frequency point.

Project Information			
Application No.:	E20230117700901	EUT:	Smart Lock U100
Model:	SDL-D01	SN:	E20230117700901-0007
Mode:	Mode 1	Voltage:	DC 6V
Environment:	25.0℃/60%RH/101.0kPa	Engineer:	Zhang Zishan
Test date:	2023-02-08	/	/



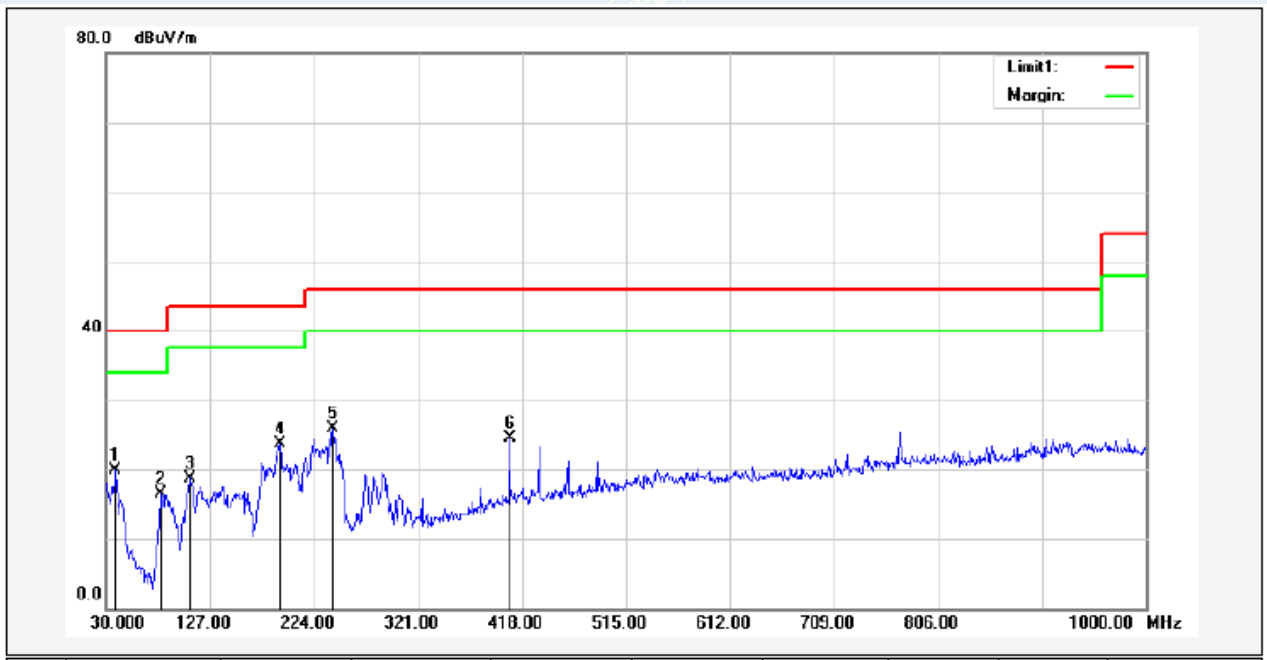
Suspected Data List									
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	0.024	29.69	51.53	21.84	120.00	68.47	100	15	coplanar
2	0.04	30.04	51.69	21.65	115.57	63.88	100	360	coplanar
3	0.056	28.32	50.06	21.74	112.64	62.58	100	360	coplanar
4	0.15	20.40	42.48	22.08	104.08	61.60	100	3	coplanar
5	0.9958	17.53	39.91	22.38	67.64	27.73	100	153	coplanar
6	13.562	35.88	58.76	22.88	69.50	10.74	100	0	coplanar

Note:NO.6 is the fundamental frequency point.

30MHz-1GHz
For adapter power supply

Project Information			
Application No.:	E20230117700901	EUT:	Smart Lock U100
Model:	SDL-D01	SN:	E20230117700901-0007
Mode:	Mode 1	Voltage:	AC 120V/60Hz
Environment:	23.1℃/46%RH/101.0kPa	Engineer:	Huang Xinlong
Test date:	2023-02-20	/	/

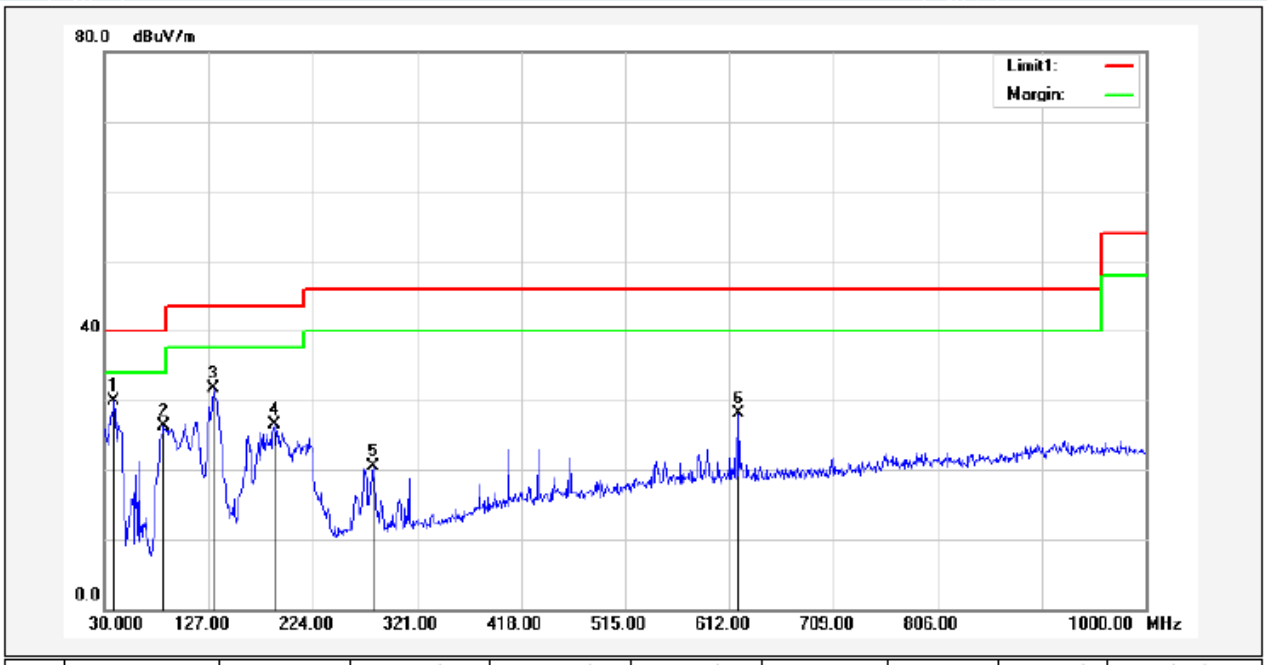
Polarity: Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Detector type
1	38.7300	40.83	-20.88	19.95	40.00	-20.05	360	187	QP
2	81.4100	48.14	-31.58	16.56	40.00	-23.44	31	400	QP
3	107.6000	46.06	-27.26	18.80	43.50	-24.70	360	305	QP
4*	191.9900	50.72	-27.03	23.69	43.50	-19.81	258	100	QP
5	241.4600	50.89	-25.00	25.89	46.00	-20.11	13	100	QP
6	406.3600	44.42	-19.83	24.59	46.00	-21.41	329	200	QP

Project Information			
Application No.:	E20230117700901	EUT:	Smart Lock U100
Model:	SDL-D01	SN:	E20230117700901-0007
Mode:	Mode 1	Voltage:	AC 120V/60Hz
Environment:	23.1℃/46%RH/101.0kPa	Engineer:	Huang Xinlong
Test date:	2023-02-20	/	/

Polarity: Vertical

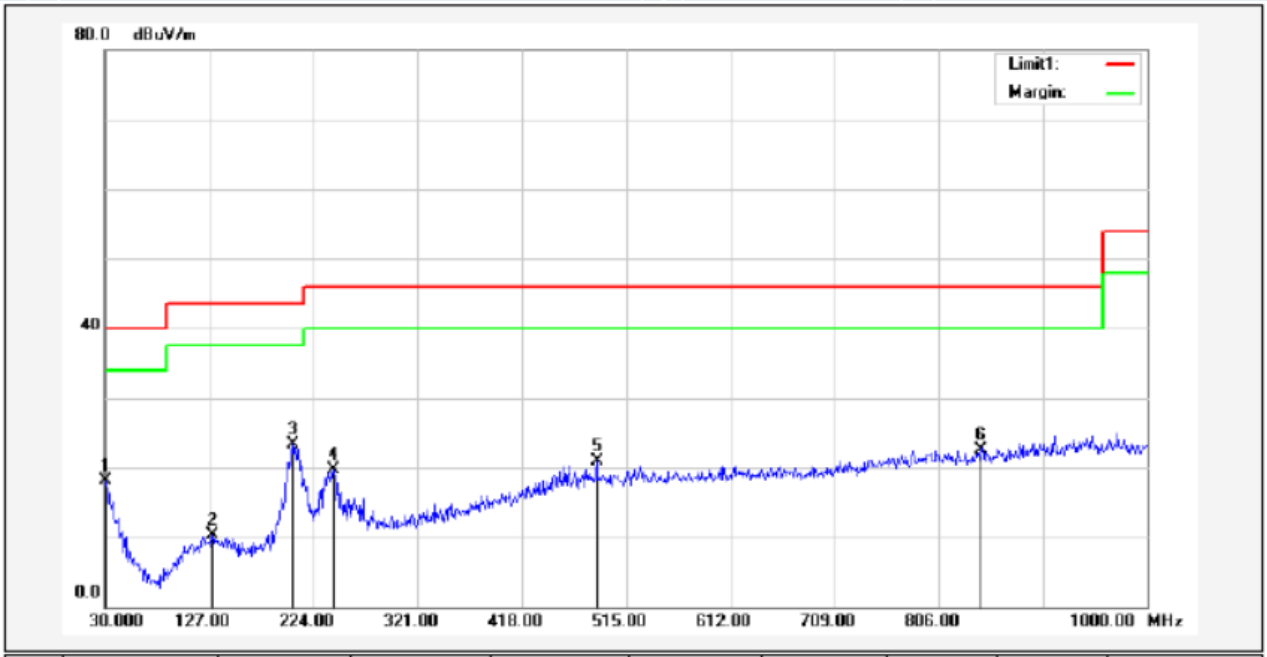


No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Detector type
1*	38.7300	50.86	-20.88	29.98	40.00	-10.02	4	100	QP
2	85.2900	57.36	-31.10	26.26	40.00	-13.74	268	100	QP
3	131.8500	57.32	-25.64	31.68	43.50	-11.82	72	100	QP
4	188.1100	53.69	-27.20	26.49	43.50	-17.01	24	100	QP
5	280.2600	44.48	-24.04	20.44	46.00	-25.56	111	200	QP
6	620.7300	44.02	-16.00	28.02	46.00	-17.98	106	100	QP

For battery power supply

Project Information			
Application No.:	E20230117700901	EUT:	Smart Lock U100
Model:	SDL-D01	SN:	E20230117700901-0007
Mode:	Mode 1	Voltage:	DC 6V
Environment:	25.1℃/62%RH/101.0kPa	Engineer:	Huang Xinlong
Test date:	2023-02-08	/	/

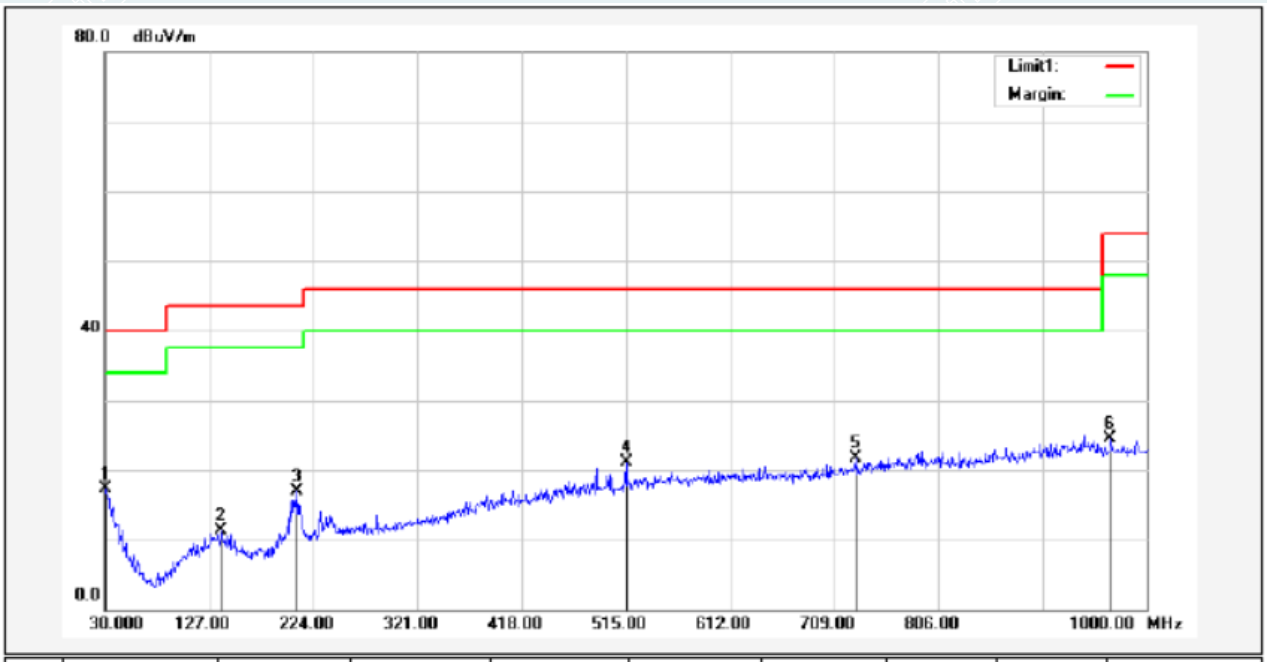
Polarity: Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Detector type
1	30.9700	35.15	-17.11	18.04	40.00	-21.96	100	400	QP
2	129.9100	35.94	-25.66	10.28	43.50	-33.22	360	301	QP
3*	204.6000	49.82	-26.46	23.36	43.50	-20.14	108	100	QP
4	242.4300	44.58	-24.97	19.61	46.00	-26.39	113	100	QP
5	487.8400	39.46	-18.54	20.92	46.00	-25.08	302	100	QP
6	844.8000	36.28	-13.82	22.46	46.00	-23.54	273	100	QP

Project Information			
Application No.:	E20230117700901	EUT:	Smart Lock U100
Model:	SDL-D01	SN:	E20230117700901-0007
Mode:	Mode 1	Voltage:	DC 6V
Environment:	25.0℃/60%RH/101.0kPa	Engineer:	Huang Xinlong
Test date:	2023-02-08	/	/

Polarity: Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Detector type
1*	30.0000	33.97	-16.65	17.32	40.00	-22.68	294	300	QP
2	138.6400	37.26	-25.90	11.36	43.50	-32.14	129	300	QP
3	209.4500	43.24	-26.26	16.98	43.50	-26.52	1	200	QP
4	515.0000	38.81	-17.80	21.01	46.00	-24.99	18	100	QP
5	728.4000	36.76	-15.02	21.74	46.00	-24.26	43	400	QP
6	966.0500	37.00	-12.55	24.45	54.00	-29.55	197	300	QP

8. 20dB BANDWIDTH

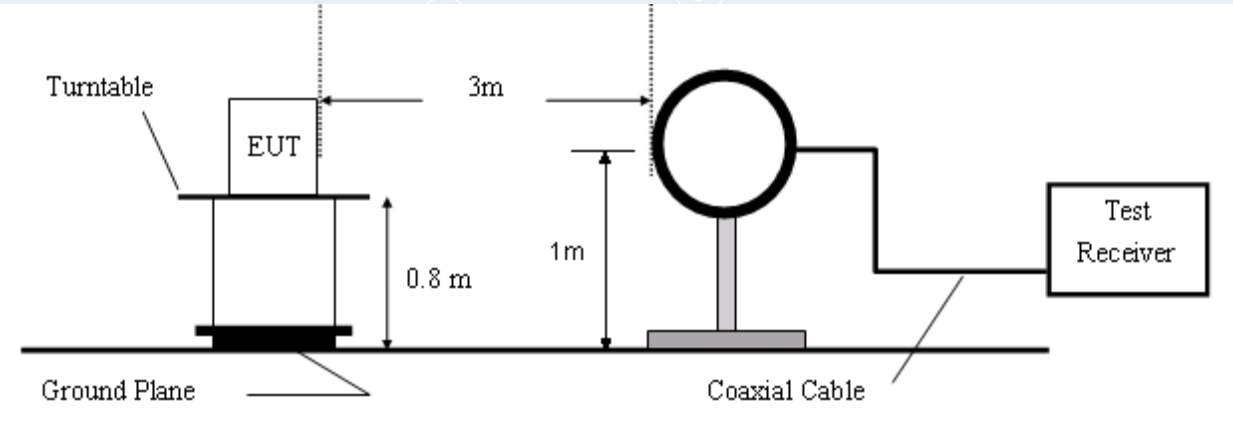
8.1 LIMITS

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. In the case of intentional radiators operating under the provisions of subpart E, the emission bandwidth may span across multiple contiguous frequency bands identified in that subpart. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

8.2 TEST PROCEDURES

1) The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
2) If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.
3) If the EUT is a floor standing device, it is placed on the ground.
4) Auxiliary equipment and cables were positioned to simulate normal operation conditions.
5) The measurement distance is 3 meter.
6) The EUT was set into operation.
7) Adjust the test instrument for the following setting
   RBW: 1% to 5% of the Necessary bandwidth
   VBW: at least 3 times of the RBW
   Detector: Peak
   Sweep time: Auto
   Trace Mode: Max hold
8) Allow trace to fully stabilize

8.3 TEST SETUP



8.4 TEST RESULTS

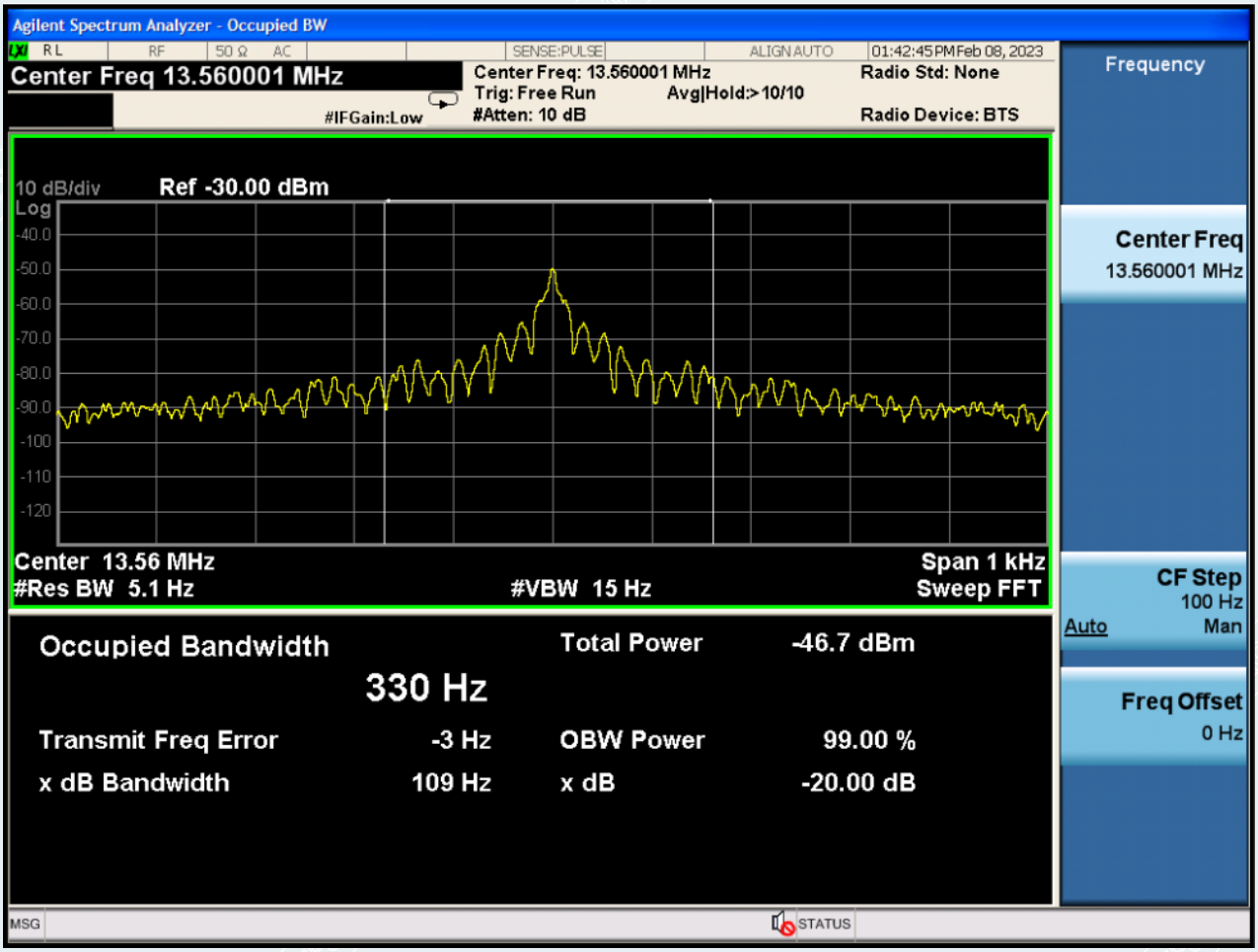
For adapter power supply

Test environment: Normal condition: 25.0℃/60%RH/101.0kPa

Engineer: Zhang Zishan

Test date: 2023-02-08

Frequency (MHz)	20dB Bandwidth (kHz)	Test Result
13.56	0.109	Complied



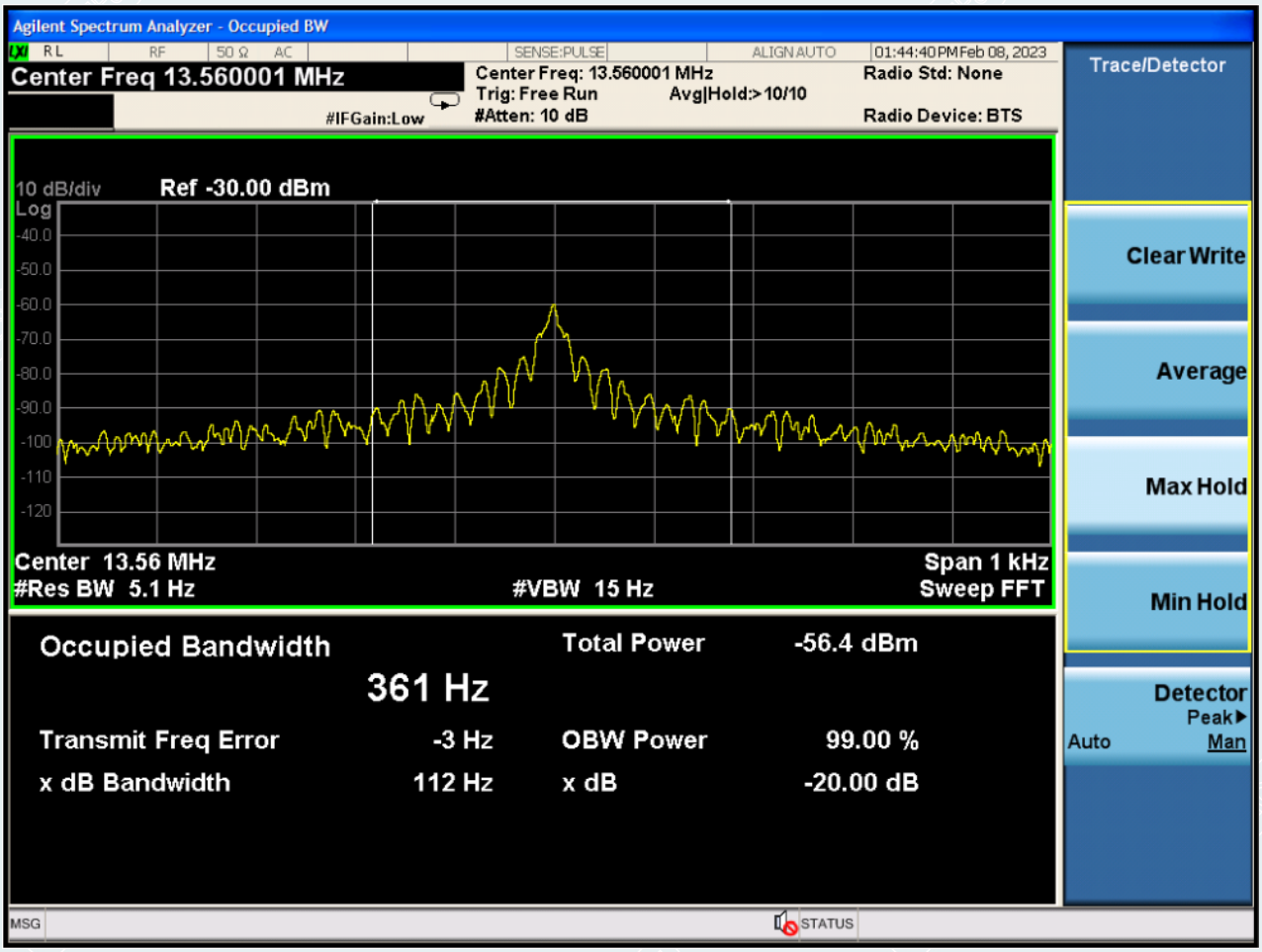
For battery power supply

Test environment: Normal condition: 25.0℃/60%RH/101.0kPa

Engineer: Zhang Zishan

Test date: 2023-02-08

Frequency (MHz)	20dB Bandwidth (kHz)	Test Result
13.56	0.112	Complied



9. FREQUENCY TOLERANCE (TEMPERATURE VARIATION AND VOLTAGE VARIATION)

9.1 LIMITS

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of operating frequency over a temperature variation of -20degrees to +50 degrees C at normal supply voltage , and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

9.2 TEST PROCEDURES

Frequency tolerance (Temperature variation)

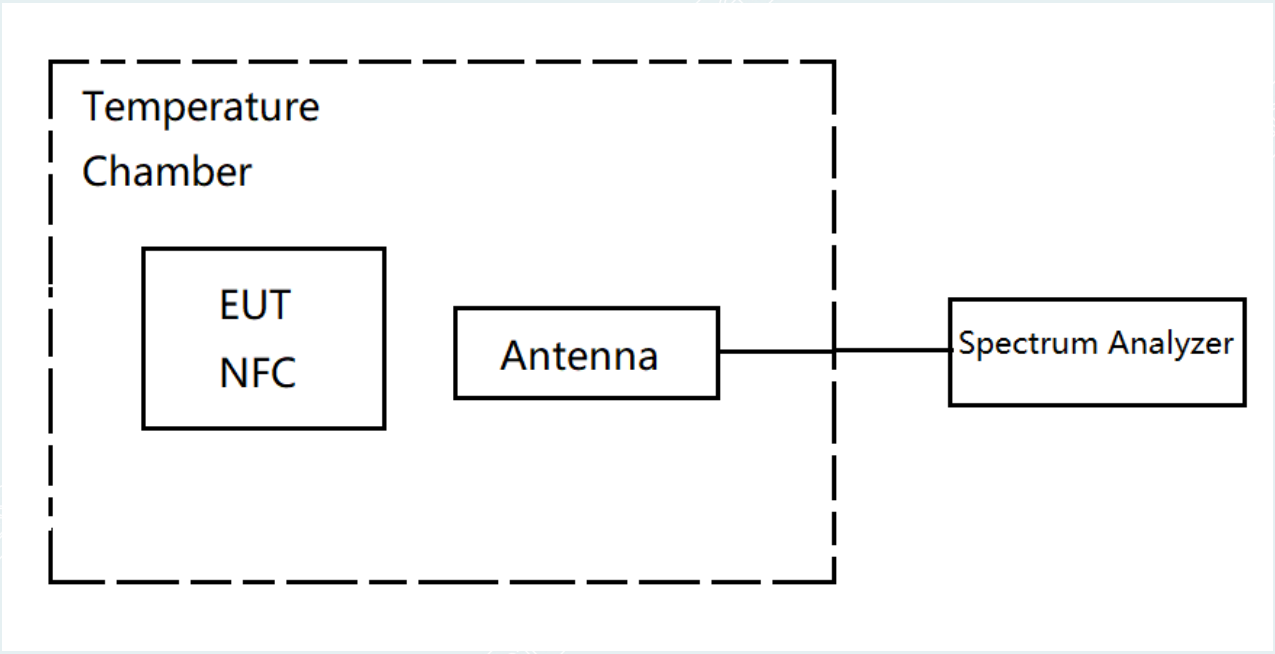
1) The EUT and test equipment were setup as shown on the following page.
2) Set the temperature -20 degrees C.
3) Leave the EUT for 1 hour after it become the temperature that was setup.
4) Setup the EUT to transmitting.
5) Measure the transmitting frequency (startup, 2min, 5min and 10min).
6) Set the temperature -20 degrees C to +50 degrees C.
7) Repeat test procedure the step 4 to 6, and record the test data after the testing finished.

Frequency tolerance (Voltage variation)

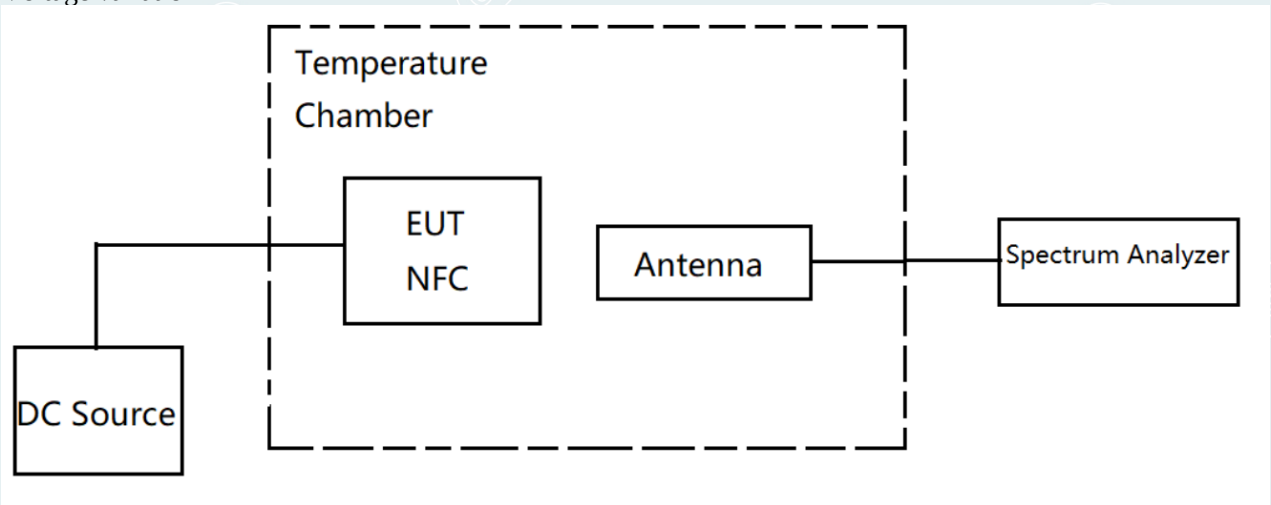
1) The EUT and test equipment (set the supply voltage 100%) were setup as shown on the following page.
2) Set the temperature 20 degrees C.
3) Leave the EUT for 1 hour after it become the temperature that was setup.
4) Setup the EUT to transmitting.
5) Measure the transmitting frequency.
6) Set the supply voltage 85% and 115%
7) Repeat test procedure the step 4 to 6, and record the test data after the testing finished.

9.3 TEST SETUP

Temperature Variation



Voltage variation



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9.4 TEST RESULTS

Test environment: Normal condition: 25.0℃/60%RH/101.0kPa

Engineer: Zhang Zishan

Test date: 2023-02-08

For adapter power supply,output DC 5V to the EUT USB-C emergency port

Temperature Variation

startup

Transmitting Frequency (MHz)	Temperature (Degree C)	Voltage (V)	Frequency (MHz)	Deviation(%)	Limit(±) (%)
13.56	-20	5.0	13.559808	0.001416	0.01
	-10	5.0	13.559881	0.000878	0.01
	0	5.0	13.559843	0.001158	0.01
	10	5.0	13.559861	0.001025	0.01
	20	5.0	13.559861	0.001025	0.01
	30	5.0	13.559881	0.000878	0.01
	40	5.0	13.559861	0.001025	0.01
	50	5.0	13.559861	0.001025	0.01

2min

Transmitting Frequency (MHz)	Temperature (Degree C)	Voltage (V)	Frequency (MHz)	Deviation(%)	Limit(±) (%)
13.56	-20	5.0	13.559861	0.001025	0.01
	-10	5.0	13.559861	0.001025	0.01
	0	5.0	13.559828	0.001268	0.01
	10	5.0	13.559854	0.001077	0.01
	20	5.0	13.559861	0.001025	0.01
	30	5.0	13.559861	0.001025	0.01
	40	5.0	13.559861	0.001025	0.01
	50	5.0	13.559854	0.001077	0.01

5min

Transmitting Frequency (MHz)	Temperature (Degree C)	Voltage (V)	Frequency (MHz)	Deviation(%)	Limit(±) (%)
13.56	-20	5.0	13.559854	0.001077	0.01
	-10	5.0	13.559854	0.001077	0.01
	0	5.0	13.559854	0.001077	0.01
	10	5.0	13.559881	0.000878	0.01
	20	5.0	13.559854	0.001077	0.01
	30	5.0	13.559861	0.001025	0.01
	40	5.0	13.559834	0.001224	0.01
	50	5.0	13.559864	0.001003	0.01

10min

Transmitting Frequency (MHz)	Temperature (Degree C)	Voltage (V)	Frequency (MHz)	Deviation(%)	Limit(±) (%)
13.56	-20	5.0	13.559854	0.001077	0.01
	-10	5.0	13.559861	0.001025	0.01
	0	5.0	13.559864	0.001003	0.01
	10	5.0	13.559864	0.001003	0.01
	20	5.0	13.559887	0.000833	0.01
	30	5.0	13.559864	0.001003	0.01
	40	5.0	13.559864	0.001003	0.01
	50	5.0	13.559864	0.001003	0.01

Frequency tolerance (Voltage variation)

Transmitting Frequency (MHz)	Temperature (Degree C)	Voltage (V)	Frequency (MHz)	Deviation(%)	Limit(±) (%)
13.56	20	4.25	13.559837	0.001202	0.01
	20	5.00	13.559864	0.001003	0.01
	20	5.75	13.559814	0.001372	0.01

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For battery power supply

Temperature Variation

startup

Transmitting Frequency (MHz)	Temperature (Degree C)	Voltage (V)	Frequency (MHz)	Deviation(%)	Limit(±) (%)
13.56	-20	6.0	13.559884	0.000855	0.01
	-10	6.0	13.559890	0.000811	0.01
	0	6.0	13.559890	0.000811	0.01
	10	6.0	13.559889	0.000819	0.01
	20	6.0	13.559890	0.000811	0.01
	30	6.0	13.559890	0.000811	0.01
	40	6.0	13.559887	0.000833	0.01
	50	6.0	13.559885	0.000848	0.01

2min

Transmitting Frequency (MHz)	Temperature (Degree C)	Voltage (V)	Frequency (MHz)	Deviation(%)	Limit(±) (%)
13.56	-20	6.0	13.559881	0.000878	0.01
	-10	6.0	13.559887	0.000833	0.01
	0	6.0	13.559889	0.000819	0.01
	10	6.0	13.559890	0.000811	0.01
	20	6.0	13.559890	0.000811	0.01
	30	6.0	13.559890	0.000811	0.01
	40	6.0	13.559888	0.000826	0.01
	50	6.0	13.559887	0.000833	0.01

5min

Transmitting Frequency (MHz)	Temperature (Degree C)	Voltage (V)	Frequency (MHz)	Deviation(%)	Limit(±) (%)
13.56	-20	6.0	13.559887	0.000833	0.01
	-10	6.0	13.559888	0.000826	0.01
	0	6.0	13.559890	0.000811	0.01
	10	6.0	13.559889	0.000819	0.01
	20	6.0	13.559889	0.000819	0.01
	30	6.0	13.559890	0.000811	0.01
	40	6.0	13.559889	0.000819	0.01
	50	6.0	13.559892	0.000796	0.01

10min

Transmitting Frequency (MHz)	Temperature (Degree C)	Voltage (V)	Frequency (MHz)	Deviation(%)	Limit(±) (%)
13.56	-20	6.0	13.559882	0.000870	0.01
	-10	6.0	13.559886	0.000841	0.01
	0	6.0	13.559890	0.000811	0.01
	10	6.0	13.559890	0.000811	0.01
	20	6.0	13.559889	0.000819	0.01
	30	6.0	13.559889	0.000819	0.01
	40	6.0	13.559893	0.000789	0.01
	50	6.0	13.559892	0.000796	0.01

Frequency tolerance (Voltage variation)

Transmitting Frequency (MHz)	Temperature (Degree C)	Voltage (V)	Frequency (MHz)	Deviation(%)	Limit(±) (%)
13.56	20	5.10	13.559889	0.000819	0.01
	20	6.00	13.559890	0.000811	0.01
	20	6.90	13.559889	0.000819	0.01

---------- The following blanks ----------

APPENDIX A. PHOTOGRAPH OF THE TEST CONNECTION DIAGRAM

Please refer to the attached document E20230117700901-11-Test Photo

APPENDIX B. PHOTOGRAPH OF THE EUT

Please refer to the attached document E20230117700901-12-EUT Photo.

---------- End of Report ----------