

FCC Test Report

APPLICANT	:	Lenovo (Shanghai) Electronics Technology Co., Ltd.
EQUIPMENT	:	Portable Tablet Computer
BRAND NAME	:	Lenovo
MODEL NAME	:	Lenovo TB-8505X
FCC ID	:	O57TB8505X
STANDARD	:	47 CFR Part 15 Subpart B
CLASSIFICATION	:	Certification
TEST DATE(S)	:	Jun. 06, 2022 ~ Jun. 13, 2022

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI C63.4-2014 and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

JasonJia

Approved by: Jason Jia



Sporton International Inc. (Kunshan) No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China



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APPENDIX A. SETUP PHOTOGRAPHS



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FC981204-22	Rev. 01	Initial issue of report	Jul. 22, 2022



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
					Under limit
3.1	15.107	AC Conducted Emission	< 15.107 limits	PASS	4.55 dB at
					0.694 MHz
					Under limit
3.2	3.2 15.109	Radiated Emission	< 15.109 limits	PASS	7.47 dB at
					31.940 MHz

Note: This is a variant report for Lenovo TB-8505X. The change note could be referred to the Class II permissive change letter which is exhibit separately. Based on the similarity between current and previous project, only the related test cases from original test report (Sporton Report Number FC981204-21) were verified for the differences.

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.



1. General Description

1.1. Applicant

Lenovo (Shanghai) Electronics Technology Co., Ltd. Section 304-305, Building No. 4, # 222, Meiyue Road, China (Shanghai) Pilot Free Trade Zone

1.2. Manufacturer

Lenovo PC HK Limited

23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong, China

1.3. Product Feature of Equipment Under Test

	Product Feature
Equipment	Portable Tablet Computer
Brand Name	Lenovo
Model Name	Lenovo TB-8505X
FCC ID	O57TB8505X
	GSM/WCDMA/LTE
	WLAN 2.4GHz 802.11b/g/n HT20/HT40
FUT comparts Dadies emplication	WLAN 5GHz 802.11a/n HT20/HT40
EUT supports Radios application	WLAN 5GHz 802.11ac VHT20/VHT40/VHT80
	Bluetooth BR / EDR / LE
	FM Receiver and GNSS
	Conduction:
	862854054460750 for sample 1
IMEI Code	861219040010005 for sample 2
INELCODE	Radiation:
	862854054460818 for sample 1
	861219040009676 for sample 2
HW Version	Lenovo TB-8505X
SW Version	TB-8505X_RF01_220408
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.



1.4. Product Specification of Equipment Under Test

Standards-related Product Specification			
Tx Frequency	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz LTE Band 2 : 1850.7 MHz ~ 1909.3 MHz LTE Band 4 : 1710.7 MHz ~ 1754.3 MHz LTE Band 5 : 824.7 MHz ~ 848.3 MHz LTE Band 7 : 2502.5 MHz ~ 2567.5 MHz LTE Band 38 : 2572.5 MHz ~ 2617.5 MHz 802.11b/g/n: 2412 MHz ~ 2462 MHz 802.11a/n/ac: 5180 MHz ~ 5240 MHz; 5500 MHz ~ 5320 MHz; 5500 MHz ~ 5700 MHz 5745 MHz ~ 2825 MHz Bluetooth: 2402 MHz ~ 2480 MHz		
Bluetooth: 2402 MHz ~ 2480 MHz GSM850: 869.2 MHz ~ 893.8 MHz GSM1900: 1930.2 MHz ~ 1989.8 MHz WCDMA Band V: 871.4 MHz ~ 891.6 MHz WCDMA Band II: 1932.4 MHz ~ 1987.6 MHz LTE Band 2 : 1930.7 MHz ~ 1989.3 MHz LTE Band 4 : 2110.7 MHz ~ 1989.3 MHz LTE Band 5 : 869.7 MHz ~ 1989.3 MHz LTE Band 5 : 869.7 MHz ~ 2154.3 MHz LTE Band 5 : 869.7 MHz ~ 893.3 MHz LTE Band 7 : 2622.5 MHz ~ 2687.5 MHz LTE Band 38: 2572.5 MHz ~ 2617.5 MHz 802.11b/g/n: 2412 MHz ~ 2462 MHz 802.11b/g/n: 2412 MHz ~ 5240 MHz; 5260 MHz ~ 5320 MHz; 5500 MHz ~ 5320 MHz Bluetooth: 2402 MHz ~ 2480 MHz			
Antenna Type	FM: 87.5 MHz ~ 108 MHz WWAN : LDS Antenna WLAN : IFA Antenna Bluetooth : IFA Antenna GNSS: IFA Antenna FM : External Earphone Antenna		
Type of Modulation	GSM: GMSK GPRS: GMSK EDGE(MCS 0-4): GMSK / (MCS 5-9): 8PSK WCDMA : BPSK HSDPA/DC-HSDPA : QPSK HSUPA : QPSK HSPA+ : 16QAM (16QAM uplink is not supported) DC-HSDPA : 64QAM LTE: QPSK / 16QAM / 64QAM 802.11b : DSSS (BPSK / QPSK / CCK) 802.11a/g/n/ac : OFDM (BPSK / QPSK / 16QAM / 64QAM /256QAM)		



Bluetooth LE : GFSK
Bluetooth (1Mbps) : GFSK
Bluetooth (2Mbps) :π/4-DQPSK
Bluetooth (3Mbps) : 8-DPSK
FM
GNSS : BPSK

Note: GNSS Rx = BDS + GLONASS + GPS

1.5. Modification of EUT

No modifications are made to the EUT during all test items.

1.6. Test Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)				
	No. 1098, Pengxi North Road, Kunshan Economic Development Zone				
Test Site Location	Jiangsu Province 215300 People's Republic of China				
Test Sile Location	TEL : +86-512-57900158	1			
	FAX : +86-512-57900958				
			FCC Test Firm		
Test Site No.	Sporton Site No.	FCC Designation No.	Registration No.		
	CO01-KS 03CH08-KS	CN1257	314309		

1.7. Test Software

ltem	Site	Manufacturer	Name	Version
1.	03CH08-KS	AUDIX	E3	6.2009-8-24
2.	CO01-KS	AUDIX	E3	6.2009-8-24



1.8. Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 15 Subpart B
- ANSI C63.4-2014

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.



2. Test Configuration of Equipment Under Test

2.1. Test Mode

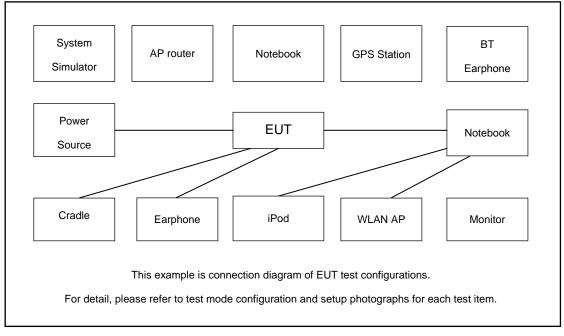
The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (30MHz to the 5th harmonic of the highest frequency or to 40 GHz, whichever is lower).

Test Items	Function Type		
	Mode 1: PCS 1900 Rx + Bluetooth Idle + WLAN Idle(5G) + Earphone + Camera(Rear) + USB Cable 2(Charging from Adapter 3) + Battery for Sample 1		
AC Conducted Emission	Mode 2: PCS 1900 Rx + Bluetooth Idle + WLAN Idle(5G) + Earphone + Camera(Front) + USB Cable 2(Charging from Adapter 4) + Battery for Sample 1		
	Mode 3: PCS 1900 Rx + Bluetooth Idle + WLAN Idle(5G) + Earphone + Camera(Front) + USB Cable 2(Charging from Adapter 4) + Battery for Sample 2		
	Mode 1: WCDMA Band V Rx(Low) + Bluetooth Idle + WLAN Idle(2.4G) + Earphone + Camera(Rear) + USB Cable 1(Charging from Adapter 3) + Battery for Sample 1		
Radiated	Mode 2: WCDMA Band V Rx(Low) + Bluetooth Idle + WLAN Idle(2.4G) + Earphone + Camera(Front) + USB Cable 1(Charging from Adapter 4) + Battery for Sample 1		
Emissions	Mode 3: WCDMA Band V Rx(Low) + Bluetooth Idle + WLAN Idle(2.4G) + Earphone + MPEG4 + USB Cable 1(Charging from Adapter 3) + Battery for Sample 1		
	Mode 4: WCDMA Band V Rx(Low) + Bluetooth Idle + WLAN Idle(2.4G) + Earphone + MPEG4 + USB Cable 1(Charging from Adapter 3) + Battery for Sample 2		
Remark:			
1. The worst	case of AC is mode 2; only the test data of this mode is reported.		
2. The worst	The worst case of RE is mode 3; only the test data of this mode is reported.		



2.2.Connection Diagram of Test System



The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application

2.3. Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8m
2.	WLAN AP	D-link	DIR-655	KA21R655B1	N/A	Unshielded,1.8m
3.	Bluetooth Earphone	Xiaomi	LYEJ02LM	N/A	N/A	N/A
4.	Bluetooth Earphone	Lenovo	LBH308	N/A	N/A	N/A
5.	Notebook	Lenovo	V130-15IKB005	N/A	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
6.	SD Card	Kingston	8GB	N/A	N/A	N/A



2.4. EUT Operation Test Setup

The EUT was in GSM or WCDMA idle mode during the testing. The EUT was synchronized to the BCCH, and is in continuous receiving mode by setting system simulator's paging reorganization.

At the same time, the EUT was attached to the Bluetooth earphone or WLAN AP, and the following programs installed in the EUT were programmed during the test.

- 1. Turn on camera to capture images.
- 2. Turn on MPEG4 function.



3. Test Result

3.1. Test of AC Conducted Emission Measurement

3.1.1 Limits of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

<Class B Limit>

Frequency of emission	of emission Conducted limit (dBuV)	
(MHz)	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

3.1.2 Measuring Instruments

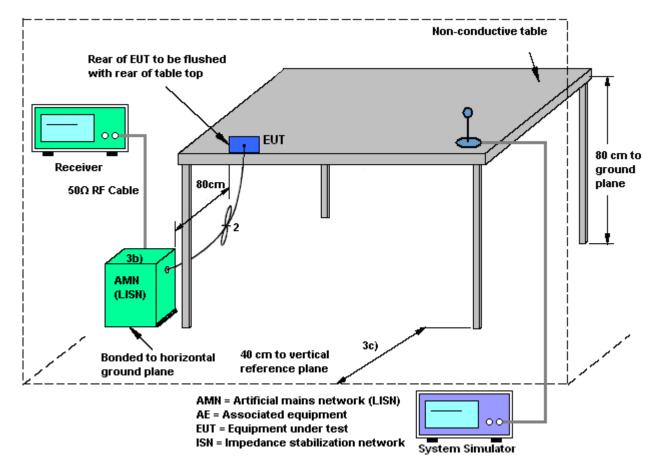
The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedure

- 1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- 2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- 3. All the support units are connecting to the other LISN.
- 4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- 5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- 6. Both sides of AC line were checked for maximum conducted interference.
- 7. The frequency range from 150 kHz to 30 MHz was searched.
- Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.



3.1.4 Test Setup

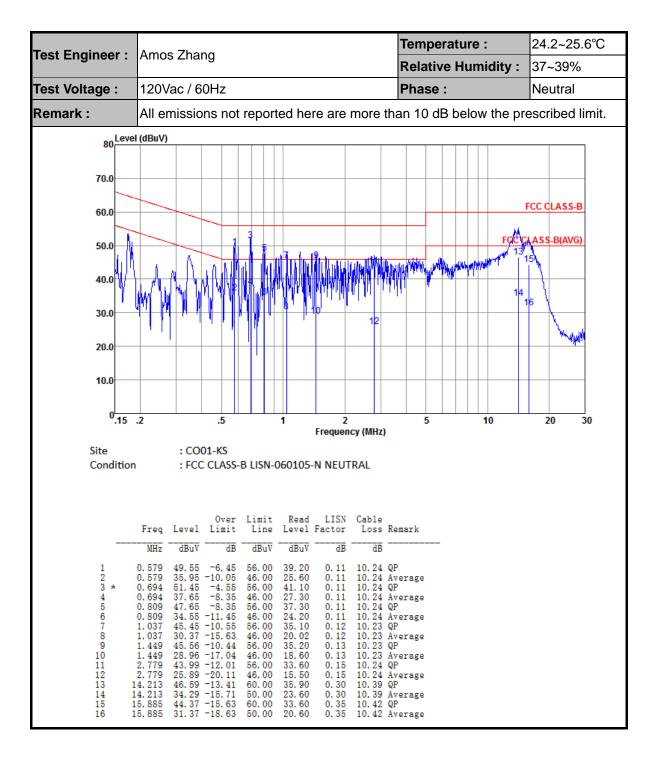




lost Engineer	Amos Zhang		Temperature :	24.2~25.6°0
fest Engineer :	Amos Zhang		Relative Humidity :	37~39%
fest Voltage :	120Vac / 60Hz		Phase :	Line
Remark :	All emissions not	reported here are more	than 10 dB below the p	rescribed limi
80	(dBuV)			
80				
70.0				
<u> </u>				FCC CLASS-B
60.0				
50.0			FCC	CLASS-B(AVG)
	h h	5 I I I I		Y#45
40.0		1. A. white half moves be sweeten	Million March Mar	11
30.0	NU WINY LAAMAG		10	12
	W W I W V '' 1			12 Yring
20.0				
10.0				
0.15	.2 .5	1 2 Frequency (MHz	5 10)	20 30
Site	: CO01-KS			
Condition	: FCC CLASS-E	LISN-060105-L LINE		
		Limit Read LISN Cable	Banank	
	Freq Level Limit 	Line Level Factor Loss	Remark	
1	0.172 43.65 -21.21	64.86 33.20 0.03 10.42		
3	0.172 28.95 -25.91 0.601 39.54 -16.46	56.00 29.19 0.11 10.24		
5 *	0.686 42.15 -13.85	56.00 31.80 0.11 10.24		
7 1	0.686 25.95 -20.05 2.784 40.84 -19.16 2.784 26.34 -23.66	60.00 30.20 0.27 10.37	Average QP Average	
9 1	4. 063 42. 77 -17. 23 4. 063 29. 57 -20. 43	60.00 32.09 0.29 10.39		
	6.312 36.38 -23.62	60.00 25.61 0.35 10.42		

3.1.5 Test Result of AC Conducted Emission





Note:

- 1. Level(dB μ V) = Read Level(dB μ V) + LISN Factor(dB) + Cable Loss(dB)
- 2. Over Limit(dB) = Level(dB μ V) Limit Line(dB μ V)





3.2. Test of Radiated Emission Measurement

3.2.1. Limit of Radiated Emission

The emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table:

<Class B Limit>

Frequency	Field Strength	Measurement Distance	
(MHz)	(microvolts/meter)	(meters)	
30 – 88	100	3	
88 – 216	150	3	
216 - 960	200	3	
Above 960	500	3	

3.2.2. Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.2.3. Test Procedures

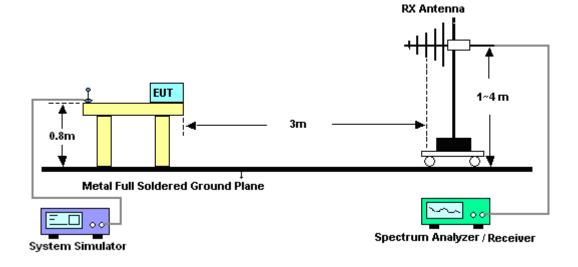
- 1. The EUT was placed on a turntable with 0.8 meter above ground.
- 2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
- 3. The table was rotated 360 degrees to determine the position of the highest radiation.
- 4. The antenna is a Bi-Log antenna and its height is adjusted between one to four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
- 5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
- Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120kHz/VBW=300kHz for frequency below 1GHz; RBW=1MHz VBW=3MHz (Peak), RBW=1MHz/VBW=10Hz (Average) for frequency above 1GHz).
- 7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
- 8. Emission level (dB μ V/m) = 20 log Emission level (μ V/m)
- 9. Corrected Reading: Antenna Factor + Cable Loss + Read Level Preamp Factor = Level



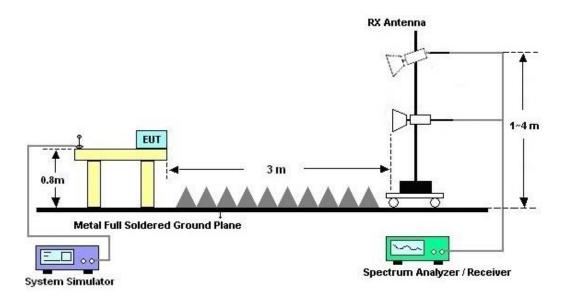
10. Exploratory radiated emissions testing of handheld and/or body-worn devices shall include rotation of the EUT through three orthogonal axes (X/Y/Z Plane) to determine the orientation (attitude) that maximizes the emissions.

3.2.4. Test Setup of Radiated Emission

For radiated emissions from 30MHz to 1GHz



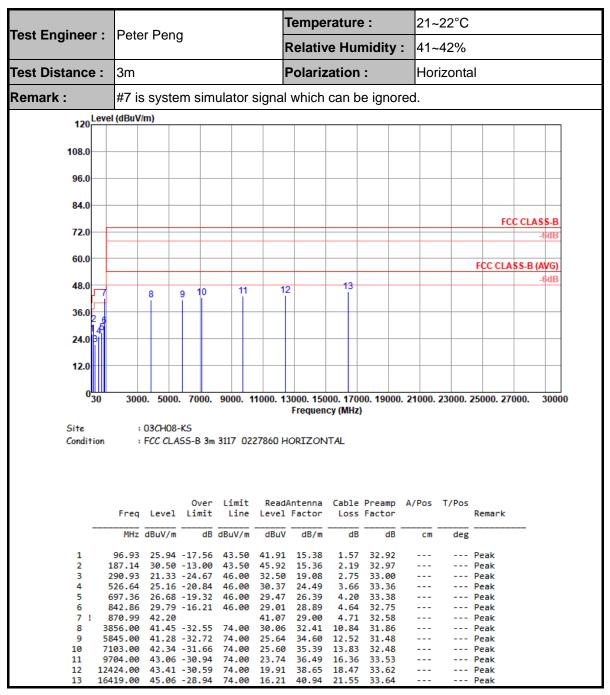
For radiated emissions above 1GHz



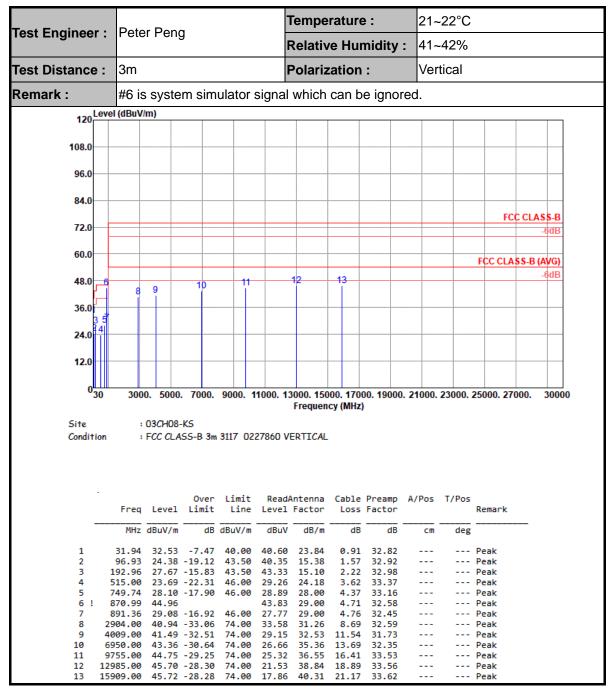
Sporton International Inc. (Kunshan) TEL : +86-512-57900158 FAX : +86-512-57900958 FCC ID : O57TB8505X



3.2.5. Test Result of Radiated Emission







Note:

- Level(dBµV/m) = Read Level(dBµV) + Antenna Factor(dB/m) + Cable Loss(dB) Preamp Factor(dB)
- 2. Over $Limit(dB) = Level(dB\mu V/m) Limit Line(dB\mu V/m)$



4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Ma x 30dBm	Oct. 16, 2021	Jun. 13, 2022	Oct. 15, 2022	Radiation (03CH08-KS)
EXA Spectrum Analyzer	Keysight	N9010B	MY57471084	10Hz-44G,MAX 30dB	Jul. 12, 2021	Jun. 13, 2022	Jul. 11, 2022	Radiation (03CH08-KS)
Bilog Antenna	TESEQ& VGT	CBL 61110	59915	30MHz-1GHz	Sep. 02, 2021	Jun. 13, 2022	Sep. 01, 2022	Radiation (03CH08-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75959	1GHz~18GHz	Dec. 24, 2021	Jun. 13, 2022	Dec. 23, 2022	Radiation (03CH08-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2022	Jun. 13, 2022	Jan. 04, 2023	Radiation (03CH08-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 05, 2022	Jun. 13, 2022	Jan. 04, 2023	Radiation (03CH08-KS)
Amplifier	SONOMA	310N	413741	9KHz-1GHz	Jan. 13, 2022	Jun. 13, 2022	Jan. 12, 2023	Radiation (03CH08-KS)
Amplifier	Keysight	83017A	MY53270389	500MHz~26.5G Hz	Jan. 05, 2022	Jun. 13, 2022	Jan. 04, 2023	Radiation (03CH08-KS)
AC Power Source	Chroma	61601	61601000247 3	N/A	NCR	Jun. 13, 2022	NCR	Radiation (03CH08-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Jun. 13, 2022	NCR	Radiation (03CH08-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Jun. 13, 2022	NCR	Radiation (03CH08-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	May 24, 2022	Jun. 06, 2022	May 23, 2023	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 14, 2021	Jun. 06, 2022	Oct. 13, 2022	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	May 24, 2022	Jun. 06, 2022	May 23, 2023	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP0000008 11	AC 0V~300V, 45Hz~1000Hz	Oct. 14, 2021	Jun. 06, 2022	Oct. 13, 2022	Conduction (CO01-KS)

NCR: No Calibration Required



5. Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence	2.94dB
of 95% (U = 2Uc(y))	2.94uB

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence	4.9dB
of 95% (U = 2Uc(y))	4.908

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence	5.0dB
of 95% (U = 2Uc(y))	5.00B

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence	5.0dB
of 95% (U = 2Uc(y))	5.00B