Prüfbericht-Nr.: *Test report no.:*	**CN22KXC5 001**	**Auftrags-Nr.:** *Order no.:*	168364494	Seite 1 von 22 *Page 1 of 22*
Kunden-Referenz-Nr.: *Client reference no.:*	**N/A**	**Auftragsdatum:** *Order date:*	2022-03-21	
Auftraggeber: *Client:*	**Lenovo (Beijing) Limited** 201-H2-6, Floor 2, Building 2, No.6 Shangdi West Road, Haidian District, 100085 Beijing , P.R.China			
Prüfgegenstand: *Test item:*	ThinkBook Wireless Multi-Device Charging Mat			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	L01WC012-CS-H			
Auftrags-Inhalt: *Order content:*	Test report			
Prüfgrundlage: *Test specification:*	CFR47 FCC Part 15: Subpart C Section 15.207 CFR47 FCC Part 15: Subpart C Section 15.209			

Wareneingangsdatum: *Date of sample receipt:*	2022-03-28	Please refer to Photo Document
Prüfmuster-Nr.: *Test sample no:*	A003220119-001 to 004	
Prüfzeitraum: *Testing period:*	2022-03-28 – 2022-04-09	
Ort der Prüfung: *Place of testing:*	TÜV Rheinland (Shenzhen) Co., Ltd.	
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (Shenzhen) Co., Ltd.	
Prüfergebnis*: *Test result*:*	Pass	

geprüft von: *tested by:*	X Alex Lan Signed by: Alex Lan	**genehmigt von:** *authorized by:*	X Winnie Hou Signed by: Winnie Hou
Datum: *Date:* 2022-04-28		**Ausstellungsdatum:** *Issue date:* 2022-04-29	
Stellung */ Position:*	Senior Project Engineer	**Stellung** */ Position:*	Department Manager
Sonstiges */ Other:*	FCC ID: A5ML01WC012CSH		

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery:*	Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
** Legend:*	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Test Summary

5.1.1 ANTENNA REQUIREMENT
RESULT: Pass

5.1.2 99% BANDWIDTH
RESULT: Pass

5.1.3 20DB BANDWIDTH
RESULT: Pass

5.1.4 RADIATED SPURIOUS EMISSION
RESULT: Pass

5.1.5 CONDUCTED EMISSION ON AC MAINS
RESULT: Pass

Table of Contents

1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Photographs of the Test Set-up

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, CAB identifier: CN0078

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Unwanted Emission Testing (TS9975)				
Equipment	**Manufacturer**	**Model**	**Serial No.**	**Cal. until**
EMI Test Receiver	R&S	ESR 7	102021	10.08.2022
Signal Analyzer	R&S	FSV 40	101439	09.08.2022
System Controller Interface	R&S	SCI-100	S10010038	N/A
Filterbank	R&S	Wlan	100759	09.08.2022
OSP	R&S	OSP 120	102040	N/A
Pre-amplifier	R&S	SCU08F1	08320031	09.08.2022
Amplifier	R&S	SCU-18F	180070	09.08.2022
Amplifier	R&S	SCU40A	100475	09.08.2022
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	08.08.2022
Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	08.08.2022
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	08.08.2022
Active Loop Antenna	Schwarzbeck	FMZB 1513	302	13.09.2022
Test software	R&S	EMC32 (V10.60.10)	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NV9P2	N/A
3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	22.06.2024
EMI Test Receiver	R&S	ESR 7	102021	10.08.2022
Conducted Emission				
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Until**
EMI Test Receiver	R&S	ESR3	102428	10.08.2022
Artificial Mains Network	R&S	ENV216	102333	10.08.2022
EMC32 test software	R&S	EMC32(Ver.10.50.00)	N/A	N/A

2.3 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.

2.4 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 basics using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Parameter	Uncertainty
Conducted Emission, (9kHz to 150kHz)/(150kHz to 30MHz)	±3.70 dB / ±3.30 dB
Radiated Emission (3m SAC), 30MHz to 1000MHz	± 4.52 dB

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A & B of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) Co., Ltd. file for certification follow-up purposes.

2.7 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 a ThinkBook Wireless Multi-Device Charging Mat which supports wireless charging (WPT) technology.

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

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

General Information of EUT	Value
FCC ID:	A5ML01WC012CSH
Product name:	ThinkBook Wireless Multi-Device Charging Mat
Type Number:	L01WC012-CS-H
Operating Voltage:	Input: DC 20V, 5A max Wired Output (Charging Mat): DC 20V, 3.25A Wireless output: 10W max
Testing Voltage:	AC 120V, 60Hz via external AC/DC Adapter
Technical Specification of WPT	
Frequency Range:	111~205KHz
Type of Modulation:	FSK
Wireless output:	10W maximum

3.3 Independent Operation Modes

The basic operation modes are:

A. WPT (Wireless load)

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- User Manual
- Application Form
- ID Label and Location Info
- Operation Description

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All tests were performed according to the procedures in ANSI C63.10: 2013.

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4.3 Special Accessories and Auxiliary Equipment

Table 3: Auxiliary Equipment Used during Test

Description	Manufacturer	Model	S/N or Rating
AC/DC Adapter	Lenovo	ADLX95YLC3A	Input: AC 100-240V, 50/60Hz, 1.6A max Output: DC 20V, 4.75A or DC15V, 3A or DC 9V, 3A or DC 5V, 3A
Wireless charge Load	YBZ	/	/
Lenovo Wireless USB-C Adapter Dongle	Lenovo	L01UD040-CS-H	DC 20V, 3.25A input via Lenovo Wireless USB-C Charging Mat
Laptop	Lenovo	ThinkPad T14	10Q67059

4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 30MHz)

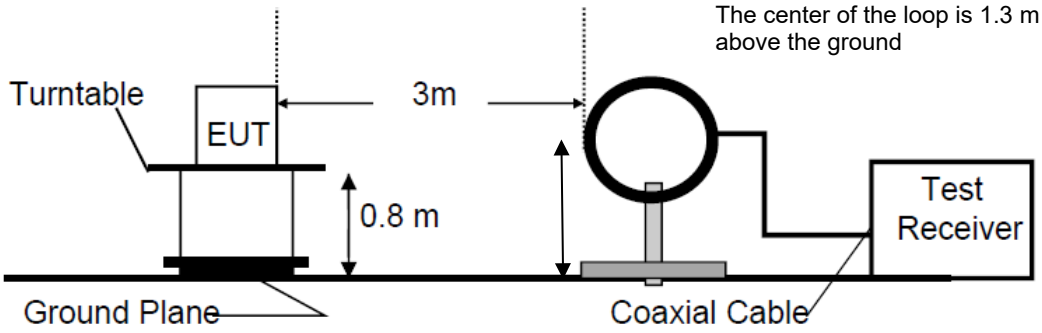


Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

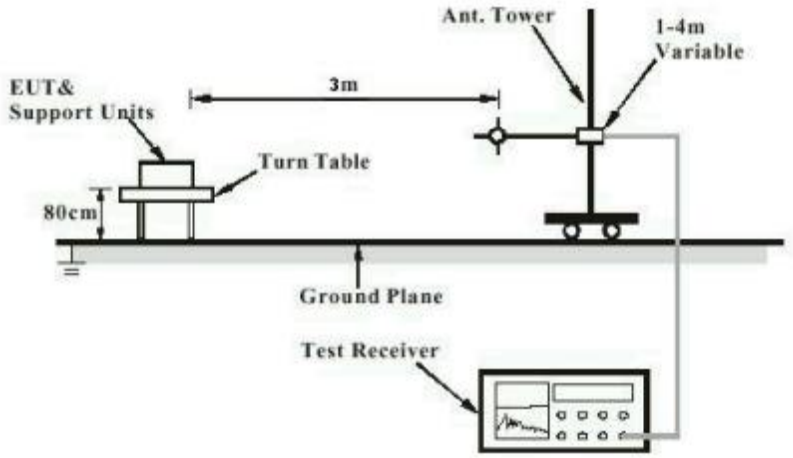
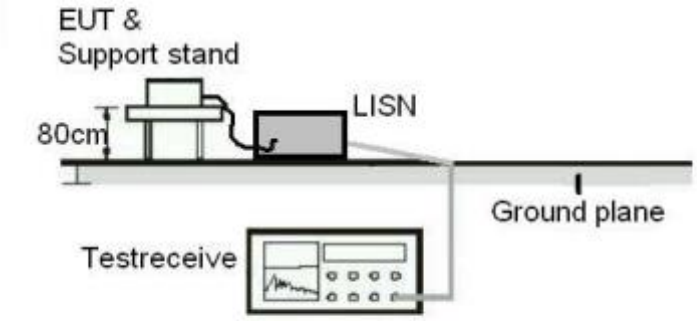


Diagram of Measurement Configuration for Mains Conduction Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.203 RSS-Gen Clause 6.8
Limit	:	the use of antennas with directional gains that do not exceed 6 dBi

According to the manufacturer declared, the EUT has an internal antenna, and the antenna is permanent attachment and no consideration of replacement.

Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

5.1.2 99% Bandwidth

RESULT: **Pass**

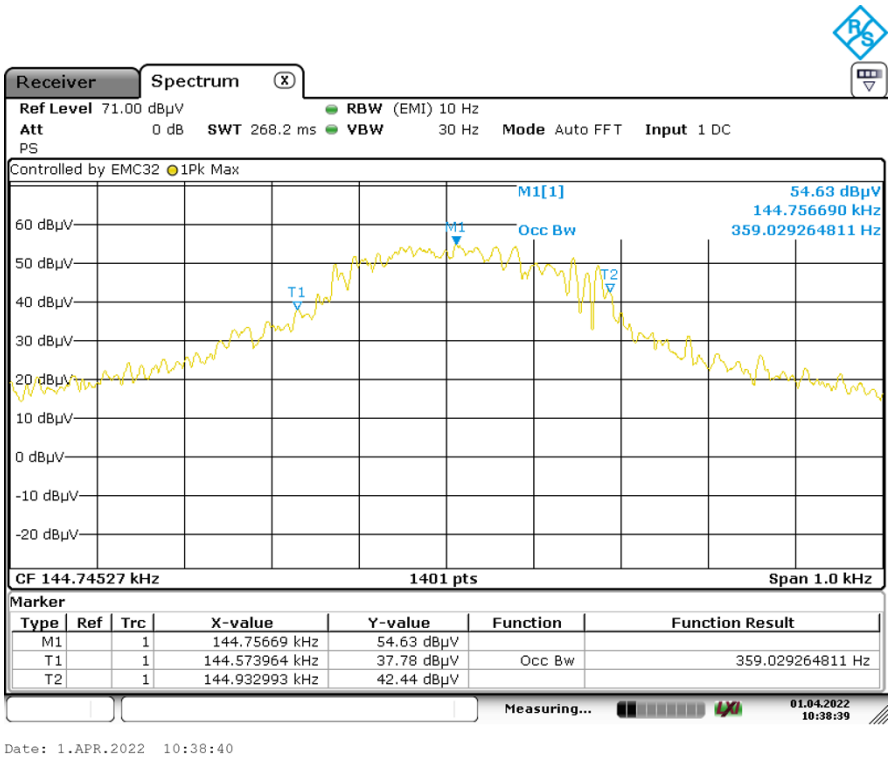
Test Specification

Test standard	:	RSS-Gen Clause 6.7
Basic standard	:	ANSI C63.10: 2013
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2022-04-01
Input voltage	:	AC 120V, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	22 ℃
Relative humidity	:	52 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the following test plots.



Date: 1.APR.2022 10:38:40

5.1.3 20dB Bandwidth

RESULT: **Pass**

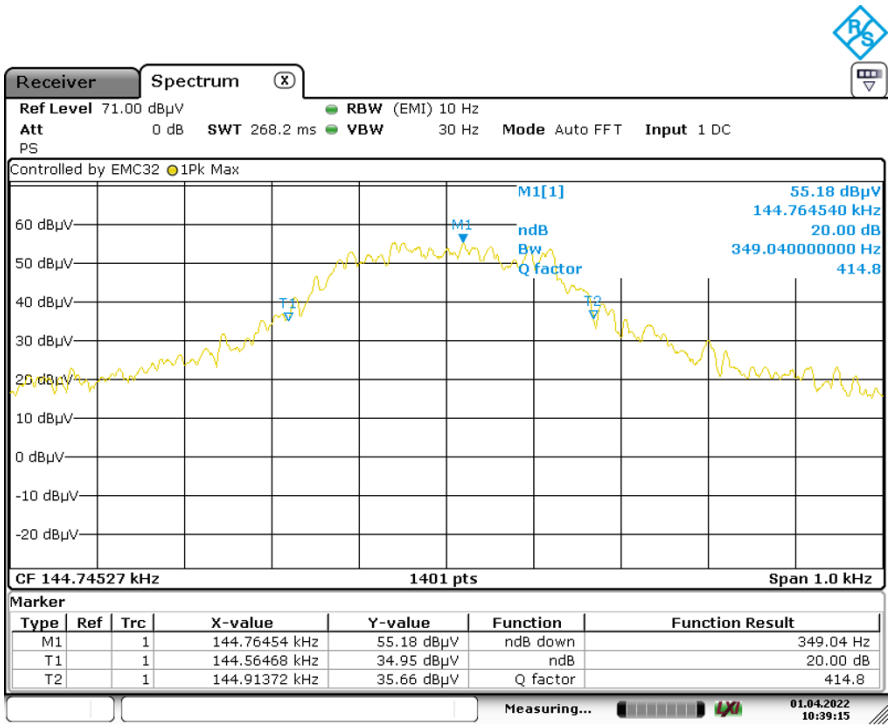
Test Specification

Test standard	:	FCC Part 15.215(c)
Basic standard	:	ANSI C63.10: 2013
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2022-04-01
Input voltage	:	AC 120V, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	22 ℃
Relative humidity	:	52 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the following test plots.



Date: 1.APR.2022 10:39:15

5.1.4 Radiated Spurious Emission

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.209 & 15.205 RSS-216 Clause 6.2.2.2
Basic standard	:	ANSI C63.10: 2013
Limits	:	Refer to 15.209(a) RSS-216 Clause 6.2.2.2 & 6.2.3
Kind of test site	:	3m Semi-anechoic Chamber

Test Setup

Date of testing	:	2022-04-01
Input voltage	:	AC 120V, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	22 ℃
Relative humidity	:	52 %
Atmospheric pressure	:	101 kPa

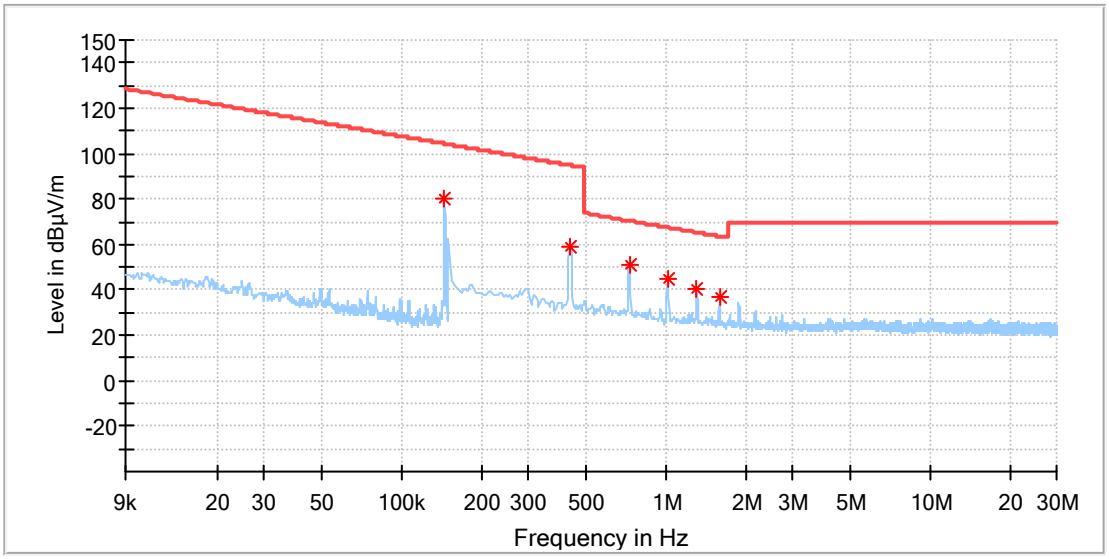
For the measurement records, refer to the following test plots.

Note1:
Measurements are to be taken in dBuV/m, corrected, and the end result shall be mathematically converted to the dBuA/m for RSS and presented against the correct limit.
E [dBμA/m] = AF [dBS/m] + V [dBμV] + Cable loss [dB]
E [dBμA/m] is the magnetic field strength (Final Test results)
AF [dBS/m] is the magnetic antenna factor of the antenna (H-field)
V [dBμV] is the reading level on the spectrum analyzer
Note that when using the AF [dBS/m] the 51.5 dB is already account for into the antenna factor.

9kHz-30MHz

EUT Information

EUT Name:	ThinkBook Wireless Multi-Device Charging Mat
Model:	L01WC012-CS-H
Test Mode:	WPT
Order No/Sample No:	168364494/A003220119-004
Test Voltage::	AC 120V/60Hz
Remark:	Temp 22 Humi:52%
Test Standard:	FCC Part 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

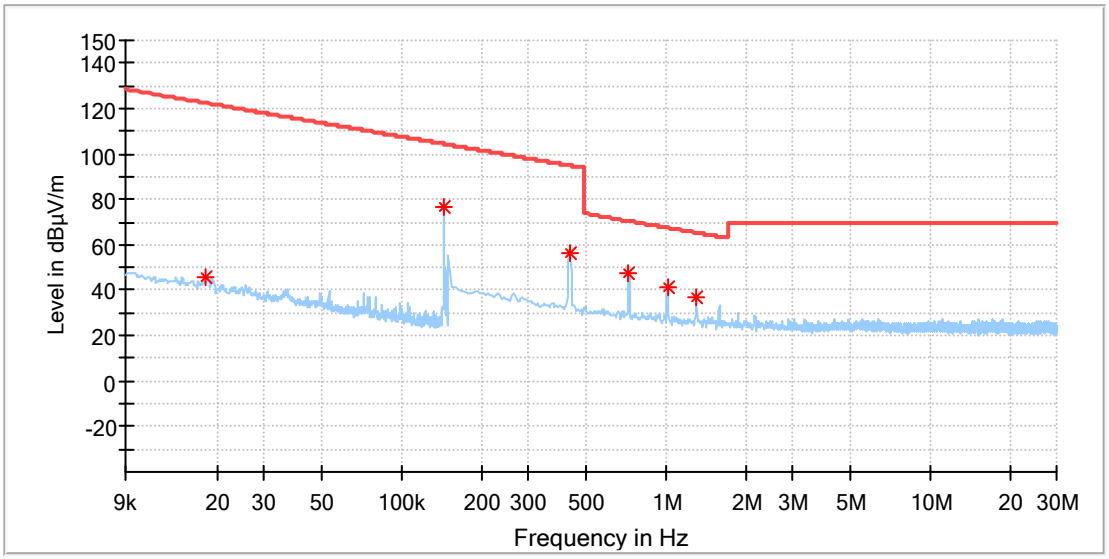


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.145065	80.62	104.37	23.75	100.0	X	123.0	20.1
0.430941	59.36	94.92	35.55	100.0	X	116.0	20.1
0.725052	51.03	70.41	19.38	100.0	X	124.0	20.1
1.014772	45.01	67.49	22.49	100.0	X	146.0	20.1
1.304493	40.26	65.32	25.06	100.0	X	129.0	20.1
1.594213	37.20	63.58	26.39	100.0	X	135.0	20.2

EUT Information

EUT Name:	ThinkBook Wireless Multi-Device Charging Mat
Model:	L01WC012-CS-H
Test Mode:	WPT
Order No/Sample No:	168364494/A003220119-004
Test Voltage::	AC 120V/60Hz
Remark:	Temp 22 Humi:52%
Test Standard:	FCC Part 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

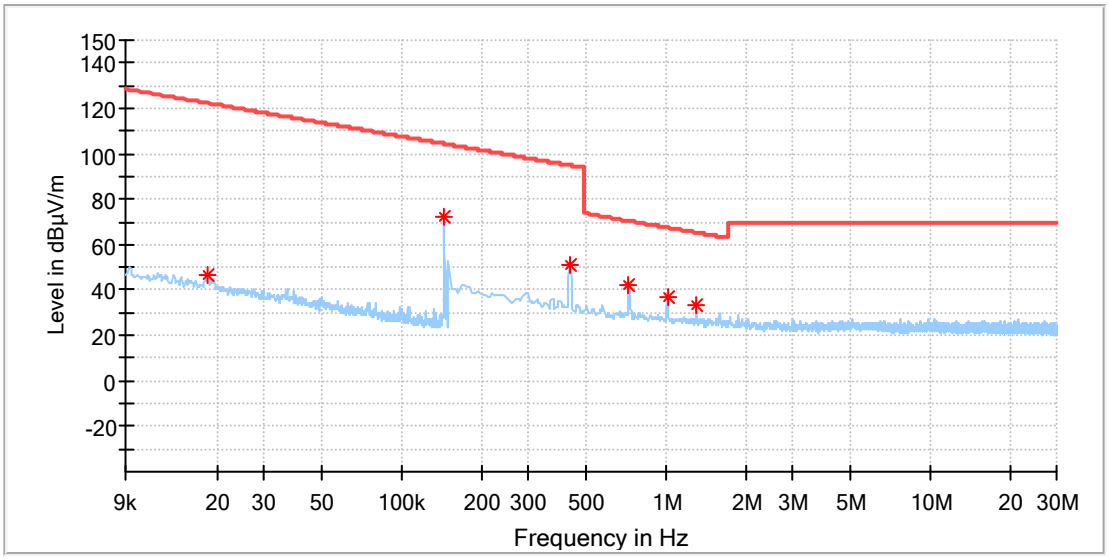


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.018165	45.96	122.40	76.44	100.0	Y	213.0	20.1
0.144864	77.08	104.38	27.30	100.0	Y	48.0	20.1
0.430941	55.91	94.92	39.00	100.0	Y	50.0	20.1
0.720662	47.25	70.46	23.21	100.0	Y	50.0	20.1
1.010383	41.58	67.53	25.95	100.0	Y	36.0	20.1
1.304493	36.93	65.32	28.39	100.0	Y	46.0	20.1

EUT Information

EUT Name:	ThinkBook Wireless Multi-Device Charging Mat
Model:	L01WC012-CS-H
Test Mode:	WPT
Order No/Sample No:	168364494/A003220119-004
Test Voltage::	AC 120V/60Hz
Remark:	Temp 22 Humi:52%
Test Standard:	FCC Part 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



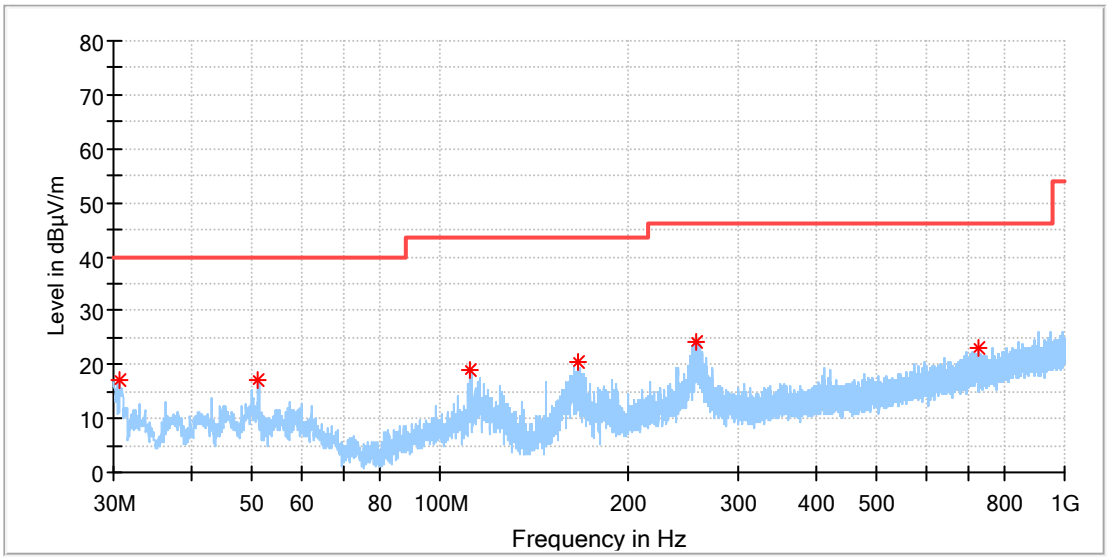
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.018266	46.48	122.36	75.88	100.0	Z	88.0	20.1
0.144964	72.34	104.37	32.04	100.0	Z	325.0	20.1
0.430941	50.77	94.92	44.15	100.0	Z	317.0	20.1
0.720662	41.94	70.46	28.52	100.0	Z	328.0	20.1
1.014772	36.85	67.49	30.65	100.0	Z	328.0	20.1
1.304493	32.95	65.32	32.37	100.0	Z	335.0	20.1

30MHz-1GHz

EUT Information

EUT Name:	ThinkBook Wireless Multi-Device Charging Mat
Model:	L01WC012-CS-H
Test Mode:	WPT
Order No/Sample No:	168364494/A003220119-004
Test Voltage::	AC 120V/60Hz
Remark:	Temp 22 Humi:52%
Test Standard:	FCC Part 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

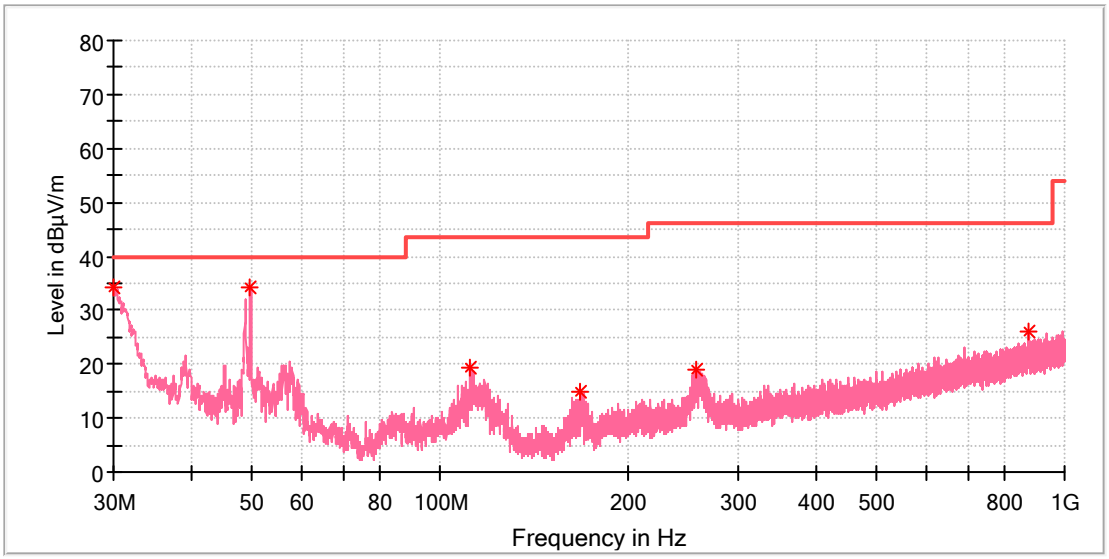


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.708846	17.01	40.00	22.99	100.0	H	204.0	-23.2
51.116154	17.15	40.00	22.85	100.0	H	297.0	-18.6
111.890385	18.92	43.50	24.58	100.0	H	297.0	-19.7
166.620769	20.62	43.50	22.88	100.0	H	51.0	-21.7
257.017308	24.03	46.00	21.97	100.0	H	0.0	-17.5
728.138846	22.93	46.00	23.07	100.0	H	297.0	-7.9

EUT Information

EUT Name:	ThinkBook Wireless Multi-Device Charging Mat
Model:	L01WC012-CS-H
Test Mode:	WPT
Order No/Sample No:	168364494/A003220119-004
Test Voltage::	AC 120V/60Hz
Remark:	Temp 22 Humi:52%
Test Standard:	FCC Part 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.074615	34.14	40.00	5.86	100.0	V	196.0	-23.3
49.735769	34.21	40.00	5.79	100.0	V	165.0	-18.6
111.703846	19.51	43.50	23.99	100.0	V	261.0	-19.6
168.038462	14.88	43.50	28.62	100.0	V	223.0	-21.7
257.875385	18.91	46.00	27.09	100.0	V	58.0	-17.5
874.086539	25.95	46.00	20.05	100.0	V	223.0	-5.6

5.1.5 Conducted Emission on AC Mains

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.207 RSS-216 Clause 6.2
Basic standard	:	ANSI C63.10: 2013
Frequency range	:	150KHz - 30MHz
Limits	:	FCC Part 15.207(a) RSS-216 Clause 6.2.2.1
Kind of test site	:	Shielded Room

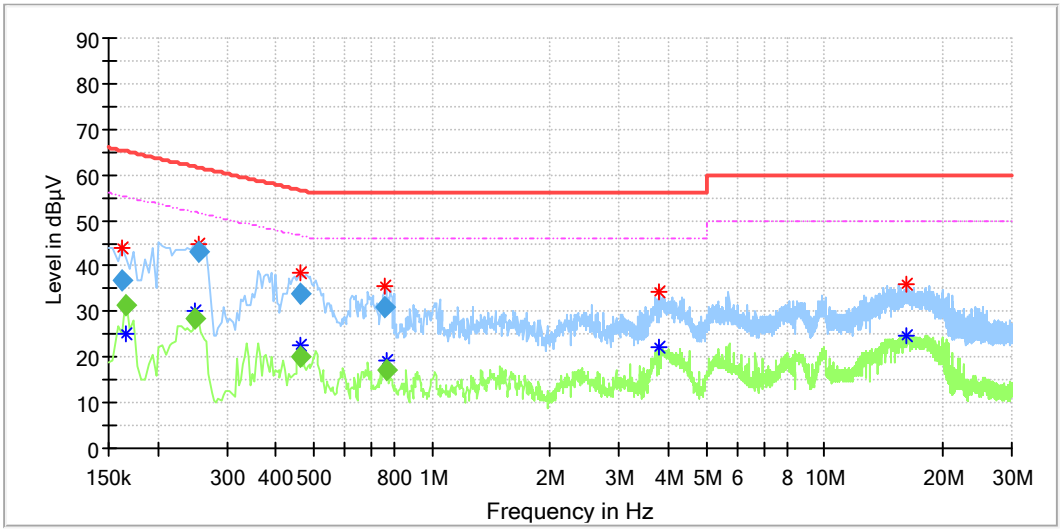
Test Setup

Date of testing	:	2022-04-09
Input voltage	:	AC 120V, 60Hz
Operation mode	:	A
Earthing	:	Connected
Ambient temperature	:	23.1 ℃
Relative humidity	:	52 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the following test plots.

EUT Information

EUT Name:	ThinkBook Wireless Multi-Device Charging Mat
Order No:	168364494_P00633075
Model:	L01WC012-CS-H
Test mode:	WPT + Charging mat
Test Voltage:	AC 120V/60Hz
Test By:	Soloman Wu
Review By:	Gary Chen
Tem./Hum./Pressure:	23.8°C/52%/101kPa



Critical_Freqs

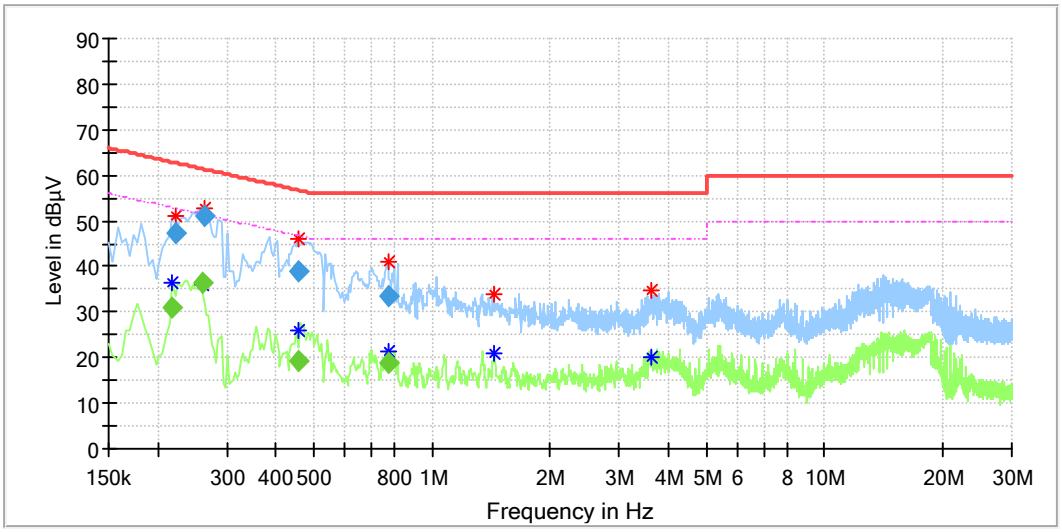
Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
3.806000	34.50	---	56.00	21.50	L1	10.2
3.806000	---	22.09	46.00	23.91	L1	10.2
16.158000	36.16	---	60.00	23.84	L1	10.4
16.158000	---	24.69	50.00	25.31	L1	10.4

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.161500	36.97	---	65.39	28.42	1000.0	9.000	L1	9.9
0.166500	---	31.52	55.13	23.62	1000.0	9.000	L1	9.9
0.249500	---	28.27	51.77	23.50	1000.0	9.000	L1	9.9
0.253500	43.11	---	61.64	18.54	1000.0	9.000	L1	9.9
0.461500	---	20.14	46.67	26.53	1000.0	9.000	L1	10.0
0.461500	34.10	---	56.67	22.57	1000.0	9.000	L1	10.0
0.757500	31.04	---	56.00	24.96	1000.0	9.000	L1	10.0
0.766500	---	17.21	46.00	28.79	1000.0	9.000	L1	10.0

EUT Information

EUT Name:	ThinkBook Wireless Multi-Device Charging Mat
Order No:	168364494_P00633075
Model:	L01WC012-CS-H
Test mode:	WPT + Charging mat
Test Voltage:	AC 120V/60Hz
Test By:	Soloman Wu
Review By:	Gary Chen
Tem./Hum./Pressure:	23.8°C/52%/101kPa



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
1.442000	---	21.11	46.00	24.89	N	9.8
1.442000	33.72	---	56.00	22.28	N	9.8
3.606000	---	20.01	46.00	25.99	N	9.9
3.606000	34.63	---	56.00	21.37	N	9.9

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.217500	---	30.79	52.91	22.12	1000.0	9.000	N	9.8
0.221500	47.12	---	62.76	15.64	1000.0	9.000	N	9.8
0.261500	---	36.55	51.38	14.84	1000.0	9.000	N	9.8
0.262500	51.07	---	61.35	10.29	1000.0	9.000	N	9.8
0.457500	38.79	---	56.74	17.94	1000.0	9.000	N	9.8
0.457500	---	19.18	46.74	27.56	1000.0	9.000	N	9.8
0.773500	33.29	---	56.00	22.71	1000.0	9.000	N	9.8
0.778500	---	18.87	46.00	27.13	1000.0	9.000	N	9.8

6 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix A.

7 List of Tables