Variant FCC Test Report

Report No.:	RFBERD-WTW-P22060334-3
FCC ID:	HD5-CK65L0N
Test Model:	CK65L0N
Received Date:	Jun. 09, 2022
Test Date:	Jun. 25, 2022
Issued Date:	Jul. 27, 2022
Applicant:	Honeywell International Inc.
Address:	9680 Old Bailes Road, Fort Mill, SC 29707 USA
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location:	No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration / Designation Number:	788550 / TW0003

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Release Control Record

Issue No.	Description	Date Issued
RFBERD-WTW-P22060334-3	Original Release	Jul. 27, 2022

1 Certificate of Conformity

Product:	Mobile computer
Brand:	Honeywell
Test Model:	CK65L0N
Sample Status:	Engineering Sample
Applicant:	Honeywell International Inc.
Test Date:	Jun. 25, 2022
Standards:	47 CFR FCC Part 15, Subpart E (Section 15.407) ANSI C63.10:2013

This report is issued as a supplementary report to BV CPS report no.: RFBERD-WTW-P21020547-3. This report shall be used by combining with its original report.

Prepared by : Gina Liu , **Date:** Jul. 27, 2022

Gina Liu / Specialist

Approved by : Jeremy Lin , **Date:** Jul. 27, 2022

Jeremy Lin / Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (Section 15.407)			
FCC Clause	**Test Item**	**Result**	**Remarks**
15.407(b)(9)	AC Power Conducted Emissions	N/A	Without AC power port of the EUT.
15.407(b) (1/2/3/4(i/ii)/ 9)	Radiated Emissions & Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -7.4 dB at 576.17 MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	N/A	Refer to Note
---	Occupied Bandwidth Measurement	-	Reference only
15.407(a)(1/2/3)	Peak Power Spectral Density	N/A	Refer to Note
15.407(e)	6 dB Bandwidth	N/A	Refer to Note
15.407(g)	Frequency Stability	N/A	Refer to Note
15.203	Antenna Requirement	N/A	Refer to Note

Note:

1. Only Radiated Emissions test was performed for this addendum. Refer to original report for other test data.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 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**	**Expanded Uncertainty (k=2) (±)**
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Mobile computer
Brand	Honeywell
Test Model	CK65L0N
Model Description	For India (BIS & WPC) information only : - Standard Version : CK65-L0N - Cold Storage Version : CK65-L0N-CS
Status of EUT	Engineering Sample
Power Supply Rating	3.6 Vdc or 3.7 Vdc (Battery)
Modulation Type	256QAM, 64QAM, 16QAM, QPSK, BPSK
Modulation Technology	OFDM
Transfer Rate	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0 Mbps 802.11n: up to 300.0 Mbps 802.11ac: up to 867.0 Mbps
Operating Frequency	5180 ~ 5240 MHz, 5260 ~ 5320 MHz, 5500 ~ 5720 MHz, 5745 ~ 5825 MHz
Number of Channel	5180 ~ 5240 MHz: 4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80) 5260 ~ 5320 MHz: 4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80) 5500 ~ 5720 MHz: 12 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 6 for 802.11n (HT40), 802.11ac (VHT40) 3 for 802.11ac (VHT80) 5745 ~ 5825 MHz: 5 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80)
Antenna Type	Refer to Note as below
Antenna Connector	Refer to Note as below
Accessory Device	Refer to Note as below
Data Cable Supplied	N/A
HW Version	V1.1
HW P/N	DVT1
SW Version	01.04.00.1392
SW P/N	91.00.00-DEBUG-(0574)

Note:

1. This report is issued as a supplementary report to BV CPS report no.: RFBERD-WTW-P21020547-3. The differences compared with original report is changing NFC chip and add new scanner (S0703VE、Gen8), and the change list is listed as below. Therefore, only Radiated Emissions test was verified on the worst case of original report and recorded in this report.

2. Change list:

Original Source			Second Source			
Vender	Vender P/N	Location	Vender	Vender P/N	TYPE	
					Phase 2	Phase 3
HON	N6703SR-WS-103-O	N/A	HON	S0703SR-W4-103O	v	v
NXP	NQ310A1EV/C101Y	U901	NXP	NQ410A1EV/C101Y	v	v
NXP	PCA9412AUKZ	U902	SGMICRO	SGM66055A-5.4YG/TR	v	v
ST	LSM6DSMTR	U1502	TDK	ICM-42607	v	x
			Bosch	BMI270	x	v
VISHAY	SIA483DJ-T1-GE3	Q2201,Q2204,Q2205	VISHAY	SIA483ADJ-T1-GE3	v	v
DIODES	DMN3730UFB4-7	Q1401,Q2203,Q2206,Q2303,Q2401	DIODES	DMN3731UFB4-7B	v	v
SAMSUNG MURATA	CL05A475KP5NRNC GRM15SR61A475KEAAD	STD: C2311 CS: C2311, C2515	Darfon	C1005X5R475KDTS	v	v
SIWARD	XTL741-E149-094	Y2001	Taitien	06172-W-087-3	v	v
YAGEO	CC0201MRX5R5BB225	CAM: C1308 No CAM: N/A	Darfon	C0603X5R225MCTS	v	v

3. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

Modulation Mode	Tx Function
802.11a	2TX
802.11n (HT20)	2TX
802.11n (HT40)	2TX
802.11ac (VHT20)	2TX
802.11ac (VHT40)	2TX
802.11ac (VHT80)	2TX

* The modulation and bandwidth are similar for 802.11n mode for HT20 / HT40 and 802.11ac mode for VHT20 / VHT40, therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

4. The EUT contains following accessory devices.

Product	Brand	Model	Description
Battery 1	Intermec Technologies Corporation	AB18	3.7 Vdc, 5.1 Ah, 18.9 Wh
Battery 2	Honeywell	CK65-BTCS	3.6 Vdc, 5200 mAh, 18.7 Wh
Battery 3	Honeywell	CK65-BTSC	3.6 Vdc, 7000 mAh,25.2 Wh R5480(RICHO)
Battery 4	Honeywell	CK65-BTSC	3.6 Vdc, 7000 mAh,25.2 Wh MM3722(MITSUMI)

5. There’re 8 configurations for the EUT listed as below. (New configuration is marked in gray.)

Sample	Scanner	Keypad	Antenna Type			
			Type	Connector	Gain (dBi)	
					Chain 0	Chain 1
A	N6703	Alpha/Num	FPC antenna	POGO pin	2.62	2.85
B	EX20	Alpha/Num	FPC antenna	POGO pin	2.62	2.85
C	N6703	Num	FPC antenna	POGO pin	2.64	2.88
D	EX20	Num	FPC antenna	POGO pin	2.64	2.88
E	S0803	Alpha/Num	FPC antenna	POGO pin	2.53	2.66
F	S0703	Alpha/Num	FPC antenna	POGO pin	2.56	2.61
G	S0703VE	Alpha/Num	FPC antenna	POGO pin	2.56	2.61
H	Gen8	Alpha	FPC antenna	POGO pin	2.62	2.85

*From the above samples the worst cases were found in sample H. therefore only the test of the mode was recorded in the report.

6. The above Antenna information refers to the manufacturer's antenna specifications, the laboratory shall not be held responsible.
7. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

For 5180 ~ 5240 MHz

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20) and 802.11ac (VHT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
40	5200	48	5240

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40) and 802.11ac (VHT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	46	5230

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency (MHz)
42	5210

For 5260 ~ 5320 MHz

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20) and 802.11ac (VHT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
52	5260	60	5300
56	5280	64	5320

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40) and 802.11ac (VHT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
54	5270	62	5310

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency (MHz)
58	5290

For 5500 ~ 5720 MHz

12 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
100	5500	124	5620
104	5520	128	5640
108	5540	132	5660
112	5560	136	5680
116	5580	140	5700
120	5600	144	5720

6 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
102	5510	126	5630
110	5550	134	5670
118	5590	142	5710

3 channels are provided for 802.11ac (VHT80):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
106	5530	138	5690
122	5610		

For 5745 ~ 5825 MHz:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	161	5805
153	5765	165	5825
157	5785		

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755	159	5795

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency (MHz)
155	5775

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To	Description
	Radiated Emission below 1 GHz	
-	√	-

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane**.

2. "-" means no effect.

Radiated Emission Test (Below 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Frequency Band (MHz)	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	5500-5720	802.11a	100 to 144	100	OFDM	BPSK	6.0

Test Condition:

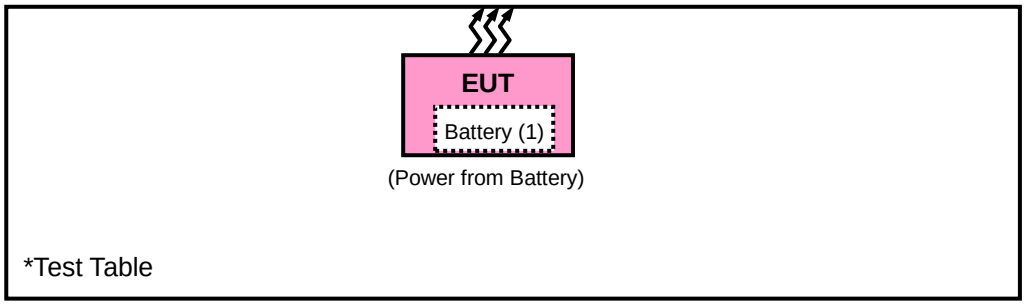
Applicable To	Environmental Conditions	Input Power	Tested by
RE<1G	22 deg. C, 66 % RH	3.6 Vdc	Thomas Cheng

3.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Battery	Honeywell	CK65-BTCS	N/A	N/A

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards and References

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards and references:

Test Standard:

FCC Part 15, Subpart E (15.407)
ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

References Test Guidance:

KDB 789033 D02 General UNII Test Procedures New Rules v02r01
KDB 662911 D01 Multiple Transmitter Output v02r01

All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1.705	24000/F (kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

Limits of Unwanted Emission Out of the Restricted Bands

Applicable To			Limit	
789033 D02 General UNII Test Procedures New Rules v02r01			Field Strength at 3 m	
			PK: 74 (dBμV/m)	AV: 54 (dBμV/m)
Frequency Band	**Applicable To**		**EIRP Limit**	**Equivalent Field Strength at 3 m**
5150~5250 MHz	15.407(b)(1)		PK: -27 (dBm/MHz)	PK: 68.2 (dBμV/m)
5250~5350 MHz	15.407(b)(2)			
5470~5725 MHz	15.407(b)(3)			
5725~5850 MHz	☒	15.407(b)(4)(i)	PK:-27 (dBm/MHz) *1 PK:10 (dBm/MHz) *2 PK:15.6 (dBm/MHz) *3 PK:27 (dBm/MHz) *4	PK: 68.2 (dBμV/m) *1 PK:105.2 (dBμV/m) *2 PK: 110.8 (dBμV/m) *3 PK:122.2 (dBμV/m) *4
	☐	15.407(b)(4)(ii)	Emission limits in section 15.247(d)	

*1 beyond 75 MHz or more above of the band edge.

*2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.

*3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.

*4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Note:

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts).

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Spectrum Analyzer Agilent	N9010A	MY52220314	2021/12/03	2022/12/02
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	2021/11/14	2022/11/13
BILOG Antenna SCHWARZBECK	VULB 9168	9168-472	2021/10/28	2022/10/27
Fixed Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	2022/04/05	2023/04/04
Preamplifier EMCI	EMC 012645	980115	2021/10/05	2022/10/04
Preamplifier EMCI	EMC 330H	980112	2021/10/05	2022/10/04
RF Coaxial Cable EMCI	EMC104-SM-SM-8000	171005	2021/10/05	2022/10/04
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1000(140807)	2021/10/05	2022/10/04
RF Coaxial Cable WOKEN	8D-FB	Cable-Ch10-01	2021/10/05	2022/10/04
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Chamber 10.

4.1.3 Test Procedures

For Radiated Emission below 30 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

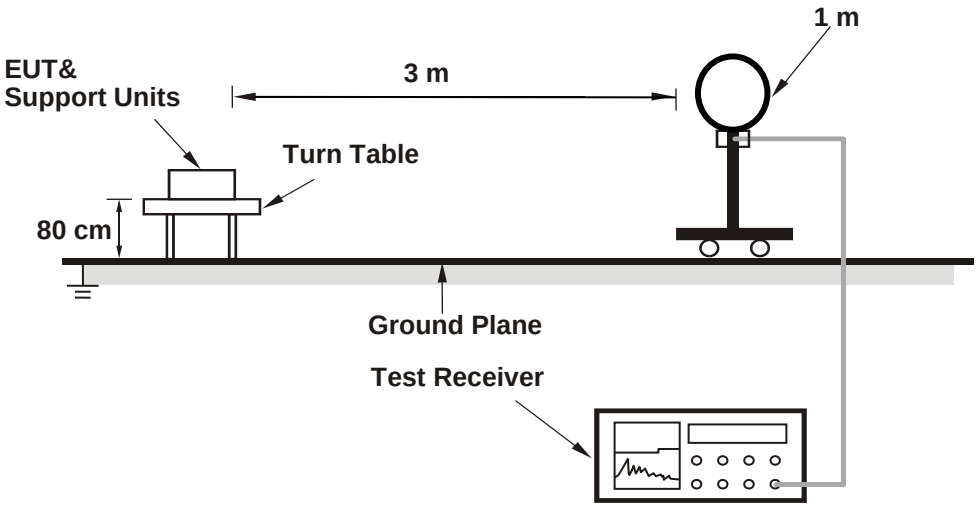
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30 MHz.

4.1.4 Deviation from Test Standard

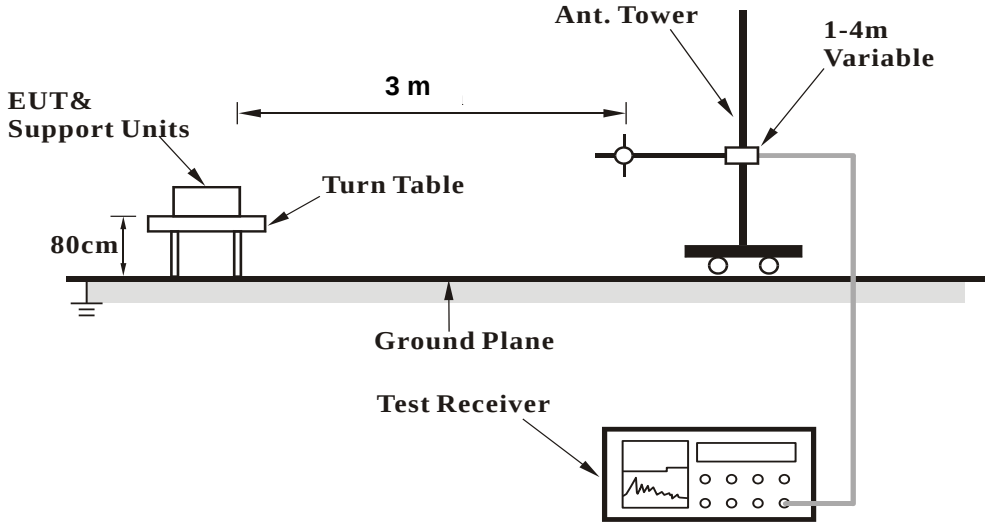
No deviation.

4.1.5 Test Setup

<Radiated Emission below 30 MHz>



<Radiated Emission 30 MHz to 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Conditions

a. Placed the EUT on a testing table.
b. Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

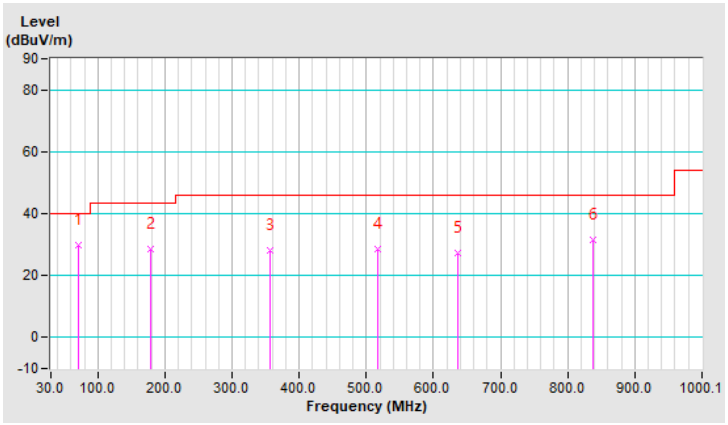
9 kHz ~ 1 GHz Worst-Case Data:

RF Mode	TX 802.11a	**Channel**	CH 100：5500 MHz
Frequency Range	30 MHz ~ 1 GHz	**Detector Function & Bandwidth**	(QP) RB = 120kHz
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	22°C, 66% RH
Tested By	Thomas Cheng	**Test Date**	2022/6/25

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	70.74	30.0 QP	40.0	-10.0	1.93 H	1	45.1	-15.1
2	178.43	28.5 QP	43.5	-15.0	3.47 H	54	42.6	-14.1
3	355.95	28.2 QP	46.0	-17.8	3.62 H	336	38.5	-10.3
4	516.99	28.7 QP	46.0	-17.3	1.37 H	182	34.5	-5.8
5	636.31	27.4 QP	46.0	-18.6	1.71 H	182	30.1	-2.7
6	838.09	31.7 QP	46.0	-14.3	1.58 H	226	30.5	1.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

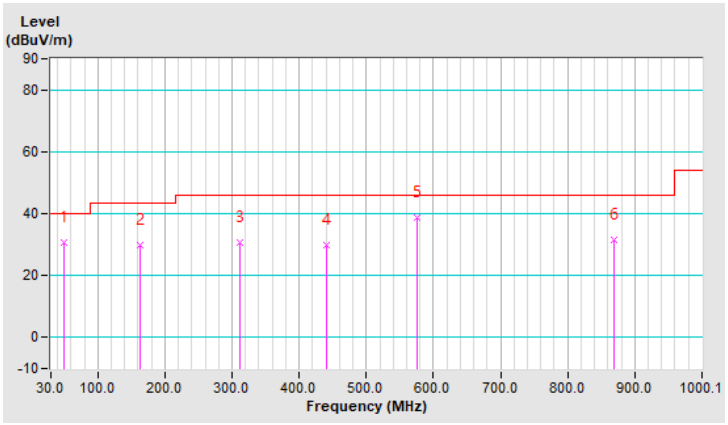


RF Mode	TX 802.11a	Channel	CH 100：5500 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	22°C, 66% RH
Tested By	Thomas Cheng	Test Date	2022/6/25

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	50.37	30.6 QP	40.0	-9.4	1.08 V	208	43.2	-12.6
2	162.90	29.7 QP	43.5	-13.8	2.77 V	330	42.3	-12.6
3	311.33	30.8 QP	46.0	-15.2	2.38 V	236	42.3	-11.5
4	441.32	29.7 QP	46.0	-16.3	1.60 V	356	37.2	-7.5
5	**576.17**	**38.6 QP**	**46.0**	**-7.4**	**1.88 V**	**100**	**43.0**	**-4.4**
6	869.14	31.5 QP	46.0	-14.5	2.16 V	95	30.2	1.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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