

# VARIANT FCC TEST REPORT

## (Part 15, Subpart E)



Applicant:	FIH International Co., Ltd.
Address:	No.18, Tongji zhonglu, Beijing Economic & Technological Development Area

Manufacturer or Supplier:	HMD Global Oy
Address:	Karaportti 2 02610 Espoo FINLAND
Product:	GSM/WCDMA/LTE Mobile Phone
Brand Name:	Nokia
Model Name:	TA-1049
FCC ID:	2AJOTTA-1049
Date of tests:	Jun. 05, 2018 ~ Oct. 19, 2018

The tests have been carried out according to the requirements of the following standard:

**FCC Part 15, Subpart E, Section 15.407**

**CONCLUSION: The submitted sample was found to COMPLY with the test requirement**

Prepared by Roger Li Engineer / Mobile Department	Approved by Sam Tung Manager / Mobile Department
	
Date: Oct. 19, 2018	Date: Oct. 19, 2018

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**BUREAU**  
**VERITAS**

Test Report No.: RF180604W006-7

## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF180604W006-7	Original release	Oct. 19, 2018



# 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART E (SECTION 15.407)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
15.407(b)(5)	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -9.59dB at 0.516000MHz.
15.407(b) (1/2/3/4/6)	Radiated Emission & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -4.08dB at 5470MHz.
15.407(a/1/2/3)	Maximum conducted output Power	N/A	N/A
15.407(a/1/2/3)	Peak Power Spectral Density	N/A	N/A
15.407(e)	6 dB Bandwidth	N/A	N/A
15.407(g)	Frequency Stability	N/A	N/A
15.203	Antenna Requirement	N/A	N/A

## 1.1 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	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.66dB
Radiated emissions	9KHz ~ 30MHz	2.68dB
	30MHz ~ 1GMHz	3.26dB
	1GHz ~ 18GHz	4.48dB
	18GHz ~ 40GHz	4.12dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .



## 2 GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

<b>EUT</b>	GSM/WCDMA/LTE Mobile Phone
<b>MODEL NO.</b>	TA-1049
<b>POWER SUPPLY</b>	5.0Vdc (adapter or host equipment) 3.9Vdc (Li-ion, battery)
<b>MODULATION TYPE</b>	64QAM, 16QAM, QPSK, BPSK
<b>MODULATION TECHNOLOGY</b>	OFDM
<b>TRANSFER RATE</b>	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to MCS7
<b>OPERATING FREQUENCY</b>	5150 ~ 5250MHz, 5250 ~ 5350MHz, 5470 ~ 5725MHz, 5725 ~ 5850MHz
<b>NUMBER OF CHANNEL</b>	5180 ~ 5240MHz: 4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz) 5260 ~ 5320MHz: 4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz) 5500 ~ 5700MHz: 8 for 802.11a, 802.11n (20MHz) 3 for 802.11n (40MHz) 5745 ~ 5850MHz: 5 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
<b>ANTENNA TYPE</b>	PIFA Antenna with -1.98dBi gain
<b>HW VERSION</b>	HW0309
<b>SW VERSION</b>	000C_0_34A
<b>I/O PORTS</b>	Refer to user's manual
<b>CABLE SUPPLIED</b>	USB cable: non-shielded, detachable, 1.0m Earphone cable: non-shielded, detachable, 1.5m

**NOTE:**

- For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
- The EUT incorporates a SISO function. Physically, the EUT provides one completed transmitter and one receiver.

MODULATION MODE	TX FUNCTION
802.11a	1TX/1RX
802.11n (20MHz)	1TX/1RX
802.11n (40MHz)	1TX/1RX

- This report is issued as a supplementary report to the original report RF180131W003-7. The differences compared with original report are updated HW and adding 2<sup>nd</sup> Manufacturer of components and antenna.



**List of Accessories:**

<b>ACCESSORIES</b>	<b>BRAND</b>	<b>MANUFACTURER</b>	<b>MODEL</b>	<b>SPECIFICATION</b>
Adapter 1	Salcomp	Salcomp (Shenzhen) Co., Ltd.	FC0202	I/P: 100-240Vac, 150mA O/P: 5Vdc, 1000mA
Adapter 2	Aohai	DONGGUAN AOHA TECHNOLOGY CO., LTD.	AD-5WU	I/P: 100-240Vac, 150mA O/P: 5Vdc, 1000mA
Battery	SCUD	SCUD (Fujian) Electronics CO., Ltd.	HE336	Rating: 3.85Vdc, 2900mAh
Earphone 1	Nokia	FIT	WH-108	1.5m non-shielded cable w/o core
Earphone 2	Nokia	OBO	WH-108	1.5m non-shielded cable w/o core
USB Cable	Nokia	FIH	CA-190CD	1.0m non-shielded cable w/o core



## 2.2 DESCRIPTION OF TEST MODES

### FOR 5150 ~ 5250MHz

4 channels are provided for 802.11a, 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

2 channels are provided for 802.11n (40MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
38	5190 MHz	46	5230 MHz

### FOR 5250 ~ 5350MHz

4 channels are provided for 802.11a, 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
52	5260 MHz	60	5300 MHz
56	5280 MHz	64	5320 MHz

2 channels are provided for 802.11n (40MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
54	5270 MHz	62	5310 MHz

### FOR 5470 ~ 5725MHz

8 channels are provided for 802.11a, 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
100	5500 MHz	116	5580 MHz
104	5520 MHz	132	5660 MHz
108	5540 MHz	136	5680 MHz
112	5560 MHz	140	5700 MHz

3 channels are provided for 802.11n (40MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
102	5510 MHz	134	5670 MHz
110	5550 MHz		



**FOR 5725 ~ 5850MHz**

5 channels are provided for 802.11a, 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
149	5745 MHz	161	5805 MHz
153	5765 MHz	165	5825 MHz
157	5785 MHz		

2 channels are provided for 802.11n (40MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
151	5755 MHz	159	5795 MHz





### 2.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
A	√	√	√	-	Powered by Adapter with wifi(5G) link
B	-	-	-	-	Powered by Battery with wifi(5G) link
C	-	-	-	-	Powered by USB with wifi(5G) link

Where **RE≥1G**: Radiated Emission above 1GHz      **RE<1G**: Radiated Emission below 1GHz  
**PLC**: Power Line Conducted Emission      **APCM**: Antenna Port Conducted Measurement

**NOTE:**  
The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.  
**NOTE:** "-" means no effect.

#### **RADIATED EMISSION TEST (ABOVE 1GHz):**

- 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	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11n (40MHz)	5470-5725	102 to 134	102	OFDM	BPSK	MCS0

#### **RADIATED EMISSION TEST (BELOW 1GHz):**

- 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	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11n (40MHz)	5470-5725	102 to 134	102	OFDM	BPSK	MCS0

#### **POWER LINE CONDUCTED EMISSION TEST:**

- 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	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11n (40MHz)	5470-5725	102 to 134	102	OFDM	BPSK	MCS0



**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE<1G	23deg. C, 62%RH	DC 5V By Adapter	Vincent
RE≥1G	23deg. C, 62%RH	DC 5V By Adapter	Vincent
PLC	24deg. C, 61%RH	DC 5V By Adapter	John Wen

**2.3 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.

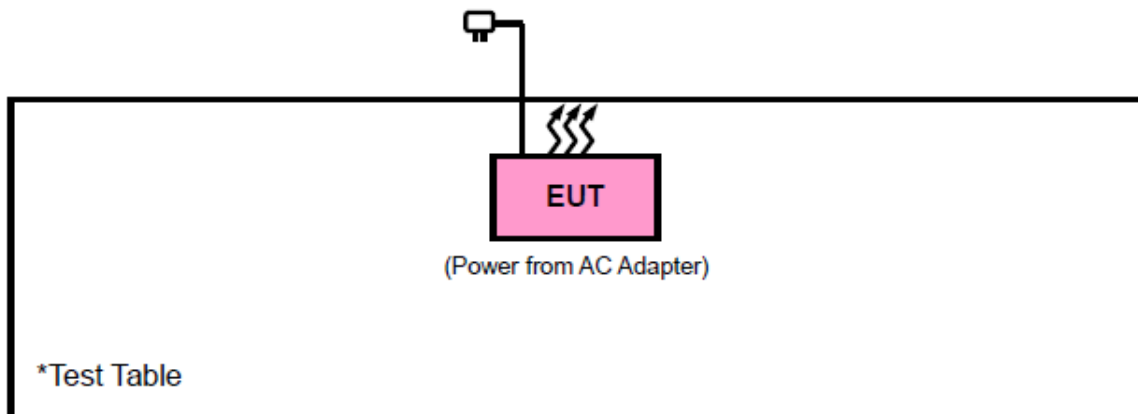
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	PC	HP	A6608CN	3CR83825X3	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	AC Line: Unshielded, Detachable 1.5m

**NOTE:**

1. All power cords of the above support units are non shielded (1.8m).

**2.3.1 CONFIGURATION OF SYSTEM UNDER TEST**





## 2.4 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

**FCC Part 15, Subpart E (15.407)**

**KDB 789033 D02 General U-NII Test Procedures New Rules v02r01**

ANSI C63.10-2013

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

**NOTE:** The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (Certification). The test report has been issued separately.



### 3 TEST TYPES AND RESULTS

#### 3.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT

##### 3.1.1 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 1000MHz, 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 20dB under any condition of modulation.

##### 3.1.2 LIMITS OF UNWANTED EMISSION

RESTRICTED BANDS	APPLICABLE TO	LIMIT	
	789033 D02 General UNII Test Procedures New Rules v01r02	FIELD STRENGTH AT 3m (dBµV/m)	
	PK : 74	AV : 54	
OUT OF THE RESTRICTED BANDS	APPLICABLE TO	EIRP LIMIT (dBm/MHz)	EQUIVALENT FIELD STRENGTH AT 3m (dBµV/m)
	15.407(b)(1)	PK : -27	PK : 68.3
	15.407(b)(2)		
	15.407(b)(3)		
15.407(b)(4)	See note 2 (FCC 16-24)		



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

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

2. All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

### 3.1.3 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	Euroshieldpn-CT0001143-1216	Apr. 21,18	Apr. 20,19
Bilog Antenna	ETS-LINDGREN	3143B	00161965	Nov. 26,16	Nov. 25,18
Horn Antenna	ETS-LINDGREN	3117	00168728	Nov. 26,16	Nov. 25,18
Loop antenna	Daze	ZN30900A	0708	Nov. 20,17	Nov. 19,18
Horn Antenna (18GHz-40GHz)	N/A	QWH-SL-18-40-K-SG/QMS-00361	15433	Dec. 16,16	Dec. 15,18
Test Software	E3	V 9.160323	N/A	N/A	N/A
Test Software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A	N/A
10dB Attenuator	JFW/USA	50HF-010-SMA	1505	Jul. 09,18	Jul. 08,19
MXE EMI Receiver	KEYSIGHT	N9038A-544	MY54450026	Mar. 16,18	Mar. 15,19
Signal Pre-Amplifier	EMSI	EMC 9135	980249	Jul. 09,18	Jul. 08,19
Signal Pre-Amplifier	EMSI	EMC 012645B	980257	Jul. 09,18	Jul. 08,19
Signal Pre-Amplifier	EMSI	EMC 184045B	980259	Jul. 09,18	Jul. 08,19

**NOTE:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed in 3m Chamber.
3. The FCC Site Registration No. is 525120.



### 3.1.4 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. 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. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters 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 Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

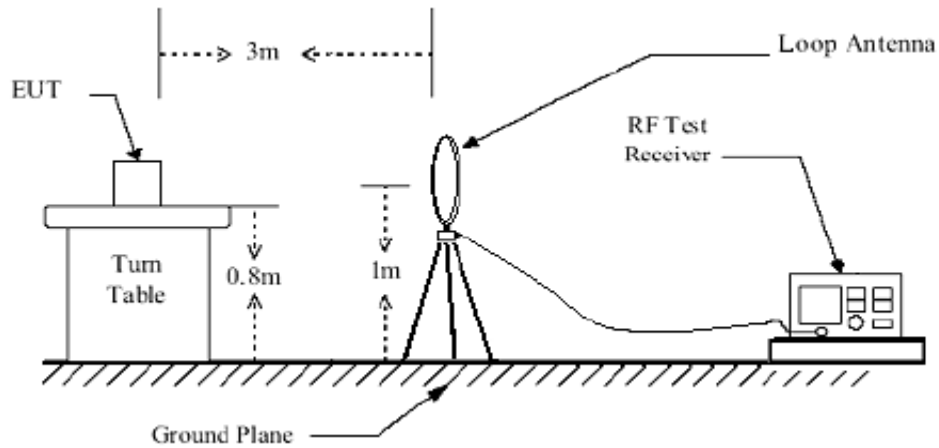
### 3.1.5 DEVIATION FROM TEST STANDARD

No deviation.

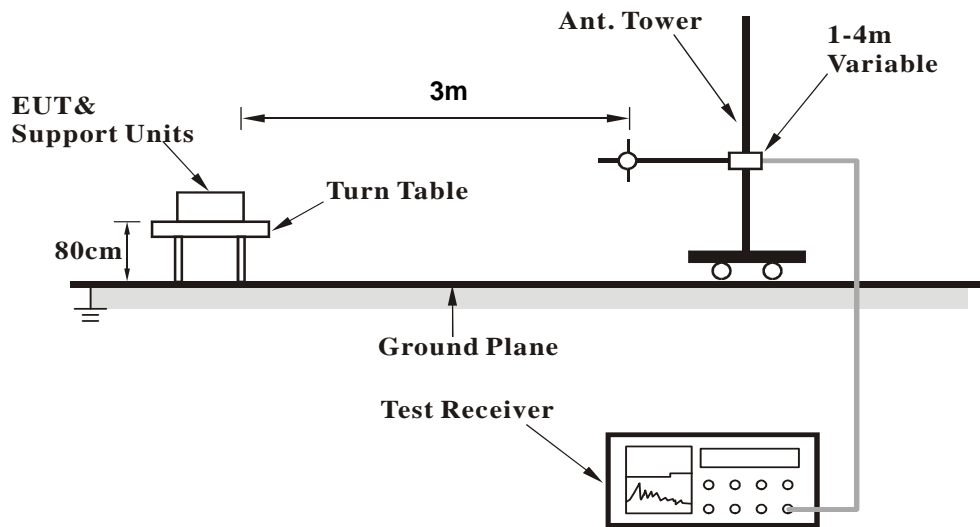


### 3.1.6 TEST SETUP

#### < Frequency Range below 30MHz >

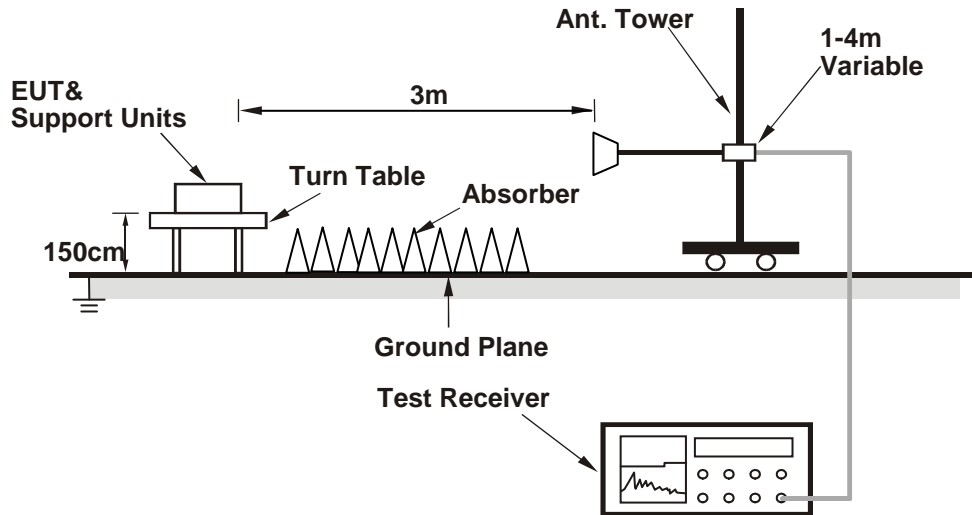


#### < Frequency Range 30MHz~1GHz >





<Frequency Range above 1GHz>



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

### 3.1.7 EUT OPERATING CONDITION

- a. Set the EUT under full load condition and placed them on a testing table.
- b. Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.
- c. The necessary accessories enable the EUT in full functions.





### 3.1.8 TEST RESULTS

#### BELOW 1GHz WORST-CASE DATA:

**9 KHz – 30 MHz data:** the amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required in the report.

**30 MHz – 1GHz data:**

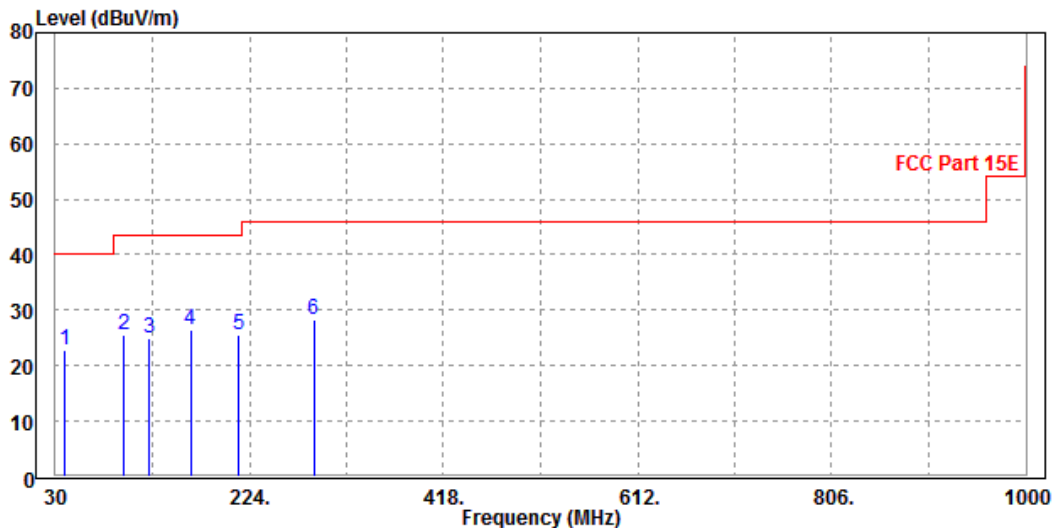
**802.11n (40MHz)**

<b>CHANNEL</b>	TX Channel 102	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
40.02	22.75	49.11	40	-17.25	10.19	0.93	37.48	200	0	QP
98.77	25.41	53.02	43.5	-18.09	7.86	1.53	37	200	0	QP
122.96	25.05	52.89	43.5	-18.45	7.39	1.7	36.93	200	0	QP
165	26.43	51.08	43.5	-17.07	10.12	1.96	36.73	200	0	QP
212.36	25.45	49.08	43.5	-18.05	10.67	2.24	36.54	200	0	QP
288.13	28.25	49.23	46	-17.75	12.86	2.66	36.5	200	0	QP

#### 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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



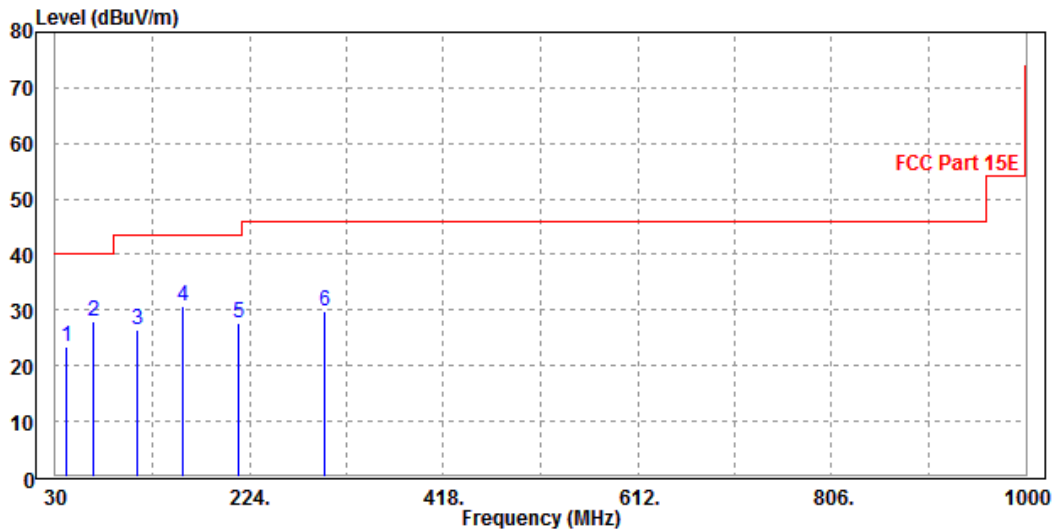


<b>CHANNEL</b>	Channel 102	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
41.56	23.3	50.19	40	-16.7	9.62	0.96	37.47	100	0	QP
68.29	27.87	57.07	40	-12.13	6.81	1.26	37.27	100	0	QP
111.24	26.49	54.22	43.5	-17.01	7.61	1.62	36.96	100	0	QP
156.98	30.73	55.68	43.5	-12.77	9.9	1.91	36.76	100	0	QP
212.39	27.54	51.17	43.5	-15.96	10.67	2.24	36.54	100	0	QP
298.56	29.82	50.63	46	-16.18	12.98	2.71	36.5	100	0	QP

**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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.





**ABOVE 1GHz WORST-CASE DATA:**

**Note:** For higher frequency, the emission is too low to be detected.

**Band 3**

**802.11n (40MHz)**

<b>CHANNEL</b>	TX Channel 102	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5460	46.32	43.14	54	-7.68	34.85	14.6	46.27	180	318	Average
5460	59.42	56.24	74	-14.58	34.85	14.6	46.27	180	318	Peak
#5470	62.18	58.97	68.3	-6.12	34.86	14.62	46.27	180	318	Peak
5510	90.73	87.32			34.91	14.78	46.28	180	318	Average
5510	100.94	97.53			34.91	14.78	46.28	180	318	Peak
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5460	47.41	44.23	54	-6.59	34.85	14.6	46.27	227	318	Average
5460	61.09	57.91	74	-12.91	34.85	14.6	46.27	227	318	Peak
#5470	<b>64.22</b>	<b>61.01</b>	<b>68.3</b>	<b>-4.08</b>	<b>34.86</b>	<b>14.62</b>	<b>46.27</b>	<b>227</b>	<b>318</b>	<b>Peak</b>
5510	89.62	86.21			34.91	14.78	46.28	227	318	Average
5510	101.91	98.5			34.91	14.78	46.28	227	318	Peak

**REMARKS:**

- Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
- 5510MHz: Fundamental frequency.
- #: Out of restricted band.



### 3.2 CONDUCTED EMISSION MEASUREMENT

#### 3.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBµV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	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 0.15 to 0.50MHz.
  3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

#### 3.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESR3	101900	Mar. 15,18	Mar. 14,19
EMC32 test software	Rohde&Schwarz	EMC32	NA	NA	NA
LISN network	Rohde&Schwarz	ENV216	101922	Mar. 15,18	Mar. 14,19

- NOTE:**
1. The test was performed in CE shielded room.
  2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

#### 3.2.3 TEST PROCEDURES

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

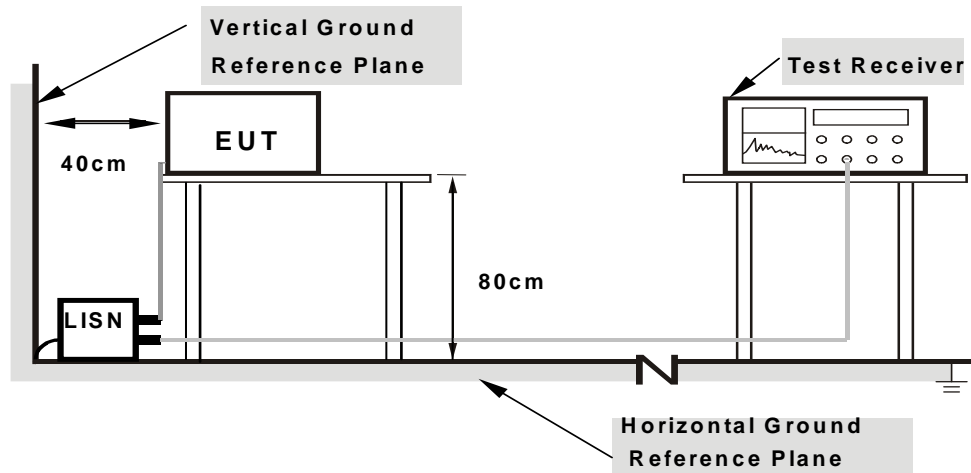
**NOTE:** All modes of operation were investigated and the worst-case emissions are reported.



### 3.2.4 DEVIATION FROM TEST STANDARD

No deviation.

### 3.2.5 TEST SETUP



- Note:**
- 1.Support units were connected to second LISN.
  - 2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

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

### 3.2.6 EUT OPERATING CONDITIONS

Same as 3.1.6.



### 3.2.7 TEST RESULTS

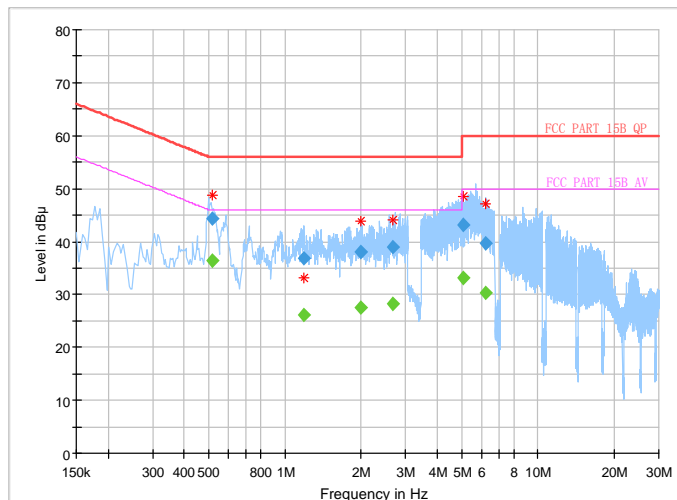
**CONDUCTED WORST-CASE DATA :**

<b>Frequency Range</b>	150KHz ~ 30MHz	<b>Detector Function &amp; Resolution Bandwidth</b>	Quasi-Peak (QP) / Average (AV), 9 kHz
<b>Input Power</b>	120Vac, 60Hz	<b>Environmental Conditions</b>	24deg. C, 55RH
<b>Tested By</b>	John Wen	<b>TEST DATE</b>	2018/6/20

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
<b>0.516000</b>	---	<b>36.41</b>	<b>46.00</b>	<b>-9.59</b>	<b>L</b>	<b>ON</b>	<b>9.7</b>
0.516000	44.29	---	56.00	-11.71	L	ON	9.7
1.192000	---	26.11	46.00	-19.89	L	ON	9.7
1.192000	36.96	---	56.00	-19.04	L	ON	9.7
1.992000	---	27.50	46.00	-18.50	L	ON	9.7
1.992000	38.11	---	56.00	-17.89	L	ON	9.7
2.672000	---	28.27	46.00	-17.73	L	ON	9.7
2.672000	38.95	---	56.00	-17.05	L	ON	9.7
5.072000	---	33.02	50.00	-16.98	L	ON	9.7
5.072000	43.16	---	60.00	-16.84	L	ON	9.7
6.196000	---	30.32	50.00	-19.68	L	ON	9.8
6.196000	39.69	---	60.00	-20.31	L	ON	9.8

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.

Full Spectrum



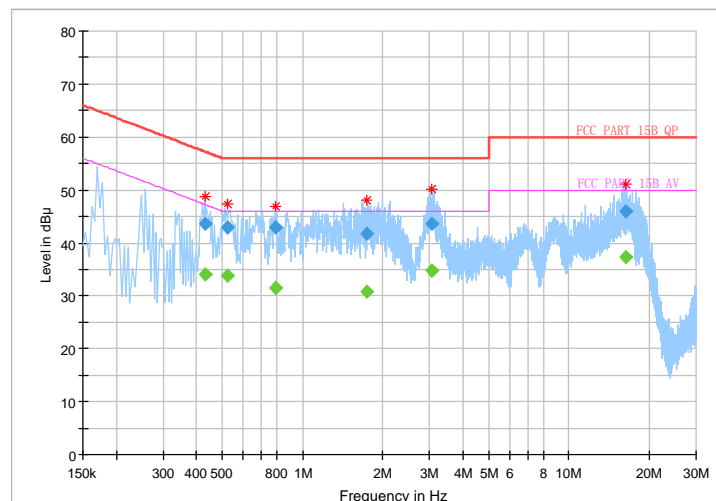


<b>Frequency Range</b>	150KHz ~ 30MHz	<b>Detector Function &amp; Resolution Bandwidth</b>	Quasi-Peak (QP) / Average (AV), 9 kHz
<b>Input Power</b>	120Vac, 60Hz	<b>Environmental Conditions</b>	24deg. C, 55RH
<b>Tested By</b>	John Wen	<b>TEST DATE</b>	2018/6/20

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	CAverage (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Line	Filter	Corr. (dB)
0.432000	---	34.11	47.21	-13.10	N	ON	10.1
0.432000	43.70	---	57.21	-13.51	N	ON	10.1
0.520000	---	33.81	46.00	-12.19	N	ON	10.1
0.520000	42.83	---	56.00	-13.17	N	ON	10.1
0.792000	---	31.40	46.00	-14.60	N	ON	10.0
0.792000	42.94	---	56.00	-13.06	N	ON	10.0
1.734000	---	30.90	46.00	-15.10	N	ON	9.8
1.734000	41.74	---	56.00	-14.26	N	ON	9.8
3.064000	---	34.69	46.00	-11.31	N	ON	9.8
3.064000	43.60	---	56.00	-12.40	N	ON	9.8
16.432000	---	37.40	50.00	-12.60	N	ON	10.0
16.432000	45.84	---	60.00	-14.16	N	ON	10.0

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.

Full Spectrum





## 4 PHOTOGRAPHS OF THE TEST CONFIGURATION

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





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## 5 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.

---END---