



BUREAU  
VERITAS

Test Report No.: RF181022W002-2



# FCC TEST REPORT

## (Part 15, Subpart C)



Applicant:	Lenovo(Shanghai) Electronics Technology Co., Ltd.
Address:	NO.68 BUILDING, 199 FENJU RD, China (Shanghai) Pilot Free Trade Zone, 200131, CHINA

Manufacturer or Supplier:	Lenovo PC HK Limited
Address:	23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong
Product:	Portable Tablet Computer
Brand Name:	Lenovo
Model Name:	Lenovo TB-X605F
FCC ID:	O57TBX605F
Date of tests:	Oct. 23, 2018 ~ Nov. 03, 2018

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

- ☒ FCC Part 15, Subpart C, Section 15.247
- ☒ ANSI C63.10-2013

**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: Nov. 05, 2018	Date: Nov. 05, 2018

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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF180626C04 & RF180626C04-3	Original release	Aug. 01, 2018
RF181022W002-2	Based on the original reports RF180626C04 & RF180626C04-3 add a battery / two speakers & Lenovo Smart Dock and its adapter.	Nov. 05, 2018



## 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -27.46dB at 0.356000MHz.
15.205 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -5.05dB at 2483.5MHz.
15.247(d)	Out of band Emission Measurement	N/A(see note)	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	N/A(see note)	Meet the requirement of limit.
15.247(b)	Conducted Output power	N/A(see note)	Meet the requirement of limit.
15.247(e)	Power Spectral Density	N/A(see note)	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used

**NOTE:** Reports RF180626C04 & RF180626C04-3 were test in Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch.

### 1.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in ETSI TR 100 028-2001:

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>PRODUCT</b>	Portable Tablet Computer
<b>BRAND NAME</b>	Lenovo
<b>MODEL NAME</b>	Lenovo TB-X605F
<b>NOMINAL VOLTAGE</b>	5.0Vdc (adapter or host equipment) 3.85Vdc (Li-ion) DC 5V (HA200)
<b>MODULATION TECHNOLOGY</b>	DSSS, OFDM, DTS
<b>MODULATION TYPE</b>	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM BT-LE(GFSK) for DTS
<b>TRANSMISSION RATE</b>	802.11b: 11/ 5.5/ 2.0 / 1.0 Mbps 802.11g: 54/ 48/ 36 / 24 / 18 / 9/ 6 Mbps 802.11n: up to 135 Mbps BT_LE: 1 Mbps
<b>OPERATING FREQUENCY</b>	2412-2462MHz for 11b/g/n(HT20) 2422-2452MHz for 11n(HT40) 2402-2480MHz for BT-LE(GFSK)
<b>MAX. OUTPUT POWER</b>	WLAN: 138.357mW (Maximum) BT-LE: TB-X605F:1.521mW (Maximum) HA-200:0.47mW (Maximum)
<b>ANTENNA TYPE</b>	Monopole Antenna with -5dBi gain
<b>HW VERSION</b>	Lenovo Tablet TB-X605F
<b>SW VERSION</b>	TB-X605F_RF01_20180615
<b>I/O PORTS</b>	Refer to user's manual
<b>CABLE SUPPLIED</b>	USB cable: non-shielded, detachable, 1.0m

**NOTE:**

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.



2. The EUT incorporates a SISO function. Physically, the EUT provides one transmitter and one receiver.

MODULATION MODE	TX/RX FUNCTION
802.11b	1TX /1RX
802.11g	1TX /1RX
802.11n (20MHz)	1TX /1RX
802.11n (40MHz)	1TX /1RX
BT_LE	1TX /1RX

3. There were Sample A, B, C, D, E and F for this project, the difference is as below:

SAMPLE	EUT CONFIGURATION INFORMATION
A	LCD Panel 2+Photo Camera 1+Photo Camera 3+CPU 1+EMMC1+DDR1+speaker 1+speaker 2+ motor2 + Main Broad 1+BT/WLAN Module+ Battery
B	LCD Panel 2+Photo Camera 2+Photo Camera 4+CPU 1+EMMC2+DDR2+speaker 1+speaker 2+motor1 + Main Broad 2 +BT/WLAN Module+ Battery
C	LCD Panel 2+Photo Camera 1+Photo Camera 3+CPU 1+EMMC3+DDR3+speaker 1+speaker 2 +motor2 + Main Broad 1+BT/WLAN Module+ Battery
D	LCD Panel 2+Photo Camera 2+Photo Camera 4+CPU 1+EMMC4+DDR4+speaker 1+speaker 2+motor1 + Main Broad 2+BT/WLAN Module+ Battery
E	LCD Panel 2+Photo Camera 1+Photo Camera 3+CPU 1+EMMC5+DDR5+speaker 1+speaker 2+motor2 + Main Broad 1+BT/WLAN Module+ Battery
F	LCD Panel 2+Photo Camera 2+Photo Camera 4+CPU 1+EMMC6+DDR6+speaker 1+speaker 2+motor1 + Main Broad 2+BT/WLAN Module+ Battery

4. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.



**List of Accessories:**

ACCESSORIES	BRAND	MODEL	SPECIFICATION	Manufacturer
AC Adapter 1	Salom	SC-42, SC-43	I/P:100-240Vac, 300mA O/P: 5Vdc, 2000mA	-
AC Adapter 2	AcBel	SC-42, SC-43	I/P:100-240Vac, 300mA O/P: 5Vdc, 2000mA	-
AC Adapter 1 (For Dock)	XinSPower	A241-1202000U	I/P:100-240Vac, 800mA O/P: 12Vdc, 2000mA	-
AC Adapter 2 (For Dock)	N/A	CYSE20-120200U	I/P:100-240Vac, 600mA O/P: 12Vdc, 2000mA	-
Lenovo Smart Dock	Lenovo	Lenovo HA-200	I/P: 12Vdc, 2000mA O/P: 5Vdc, 1500mA	
Battery 1	Lenovo	L18D1P32	Rating: 3.85Vdc, 4850mAh	Amperex
Battery 2	Lenovo	L18D1P32	Rating: 3.85Vdc, 4850mAh	Sunwoda
USB Cable 1(White)	LiQi	LQ-02300039	1.0m shielded cable w/o core	-
USB Cable 2(Black)	LiQi	LQ-02300040	1.0m shielded cable w/o core	-
LCD Panel1 (Black)	BOE	TV101WUM-LL2	10.1 "	-
LCD Panel2(White)	BOE	TV101WUM-LL3	10.1 "	-
EMMC1+DDR1	SAMSUNG	KMQE60013M-B318(2+16)	16G	-
EMMC2+DDR2	HYNIX	H9TQ17ABJTCCUR-KUM(2+16)	16G	-
EMMC3+DDR3	SAMSUNG	KMGD6001BM-B421(3+32)	32G	-
EMMC4+DDR4	HYNIX	H9TQ27ADFTMCUR-KUM(3+32)	32G	-
EMMC5+DDR5	SAMSUNG	KMRH60014A-B614(4+64)	64G	-
EMMC6+DDR6	HYNIX	H9TQ52ACLTMCUR-KUM(4+64)	64G	-
Speaker 1	Keysound	QM171219AW84	-	-
Speaker 2	Keysound	QM171219AW85	-	-
Speaker 3	Honghua	SB9655B	-	-
Speaker 4	Honghua	SB9655A	-	-
motor1	AWA	YK2455R	-	-
Motor2	Baolong	BLX-431320S	-	-
Photo Camera 1	Lcetron	LE5143AM	5M AF	-
Photo Camera 2	Holitek	MF81Q	5M AF	-
Photo Camera 3	Lcetron	ZRT2509V-P102F	2M FF	-
Photo Camera 4	Holitech	HSU1005	2M FF	-
CPU	Qualcomm	SDA450	792nsp	-
Main Broad 1	huashen	W93M71B2-3-03	-	-
Main Broad 2	yilianda	W93M71B2-3-05	-	-
BT/WLAN Module	Qualcomm	WCN3680B	-	-

**Remark:**

1. USB cabel 1 and USB cable 2 is identical, difference models are for color distinguished.  
Therefore, only USB cable 1 is as a representative for final test.
2. LCD Panel 1 and LCD Panel 2 is identical, difference models are for color distinguished.  
Therefore, only LCD Panel 2 is as a representative for final test.





## 2.2 DESCRIPTION OF TEST MODES

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412 MHz	7	2442 MHz
2	2417 MHz	8	2447 MHz
3	2422 MHz	9	2452 MHz
4	2427 MHz	10	2457 MHz
5	2432 MHz	11	2462 MHz
6	2437 MHz		

7 channels are provided for 802.11n (HT40):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		

40 channels are provided for BT-LE (GFSK):

CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480



## 2.2.1 CONFIGURATION OF SYSTEM UNDER TEST

Please see section 5 photographs of the test configuration for reference.

## 2.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports.

The worst case was found when positioned on Y axis for radiated emission. Following test modes were selected for the final test, and the final worst case is marked in boldface and recorded in the report:

EUT CONFIGURE MODE	APPLICABLE TO				MODE
	RE<1G	RE≥1G	PLC	APCM	
-	√	√	√	√	-

Where **RE<1G**: Radiated Emission below 1GHz

**RE≥1G**: Radiated Emission above 1GHz

**PLC**: Power Line Conducted Emission

**APCM**: Antenna Port Conducted Measurement

**NOTE**: No need to concern of Conducted Emission due to the EUT is powered by battery.

**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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n HT40	3 to 9	9	OFDM	BPSK	13.5
BT-LE	0 to 39	0	DSS	GFSK	1



**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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	CCK	DBPSK	1.0
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
802.11n HT20	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n HT40	3 to 9	3, 6, 9	OFDM	BPSK	13.5
BT-LE	0 to 39	0, 19, 39	DTS	GFSK	1

**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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n HT40	3 to 9	9	OFDM	BPSK	13.5

**BANDEDGE MEASUREMENT:**

☒ 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 11	CCK	DBPSK	1.0
802.11g	1 to 11	1, 11	OFDM	BPSK	6.0
802.11n HT20	1 to 11	1, 11	OFDM	BPSK	6.5
802.11n HT40	3 to 9	3, 9	OFDM	BPSK	13.5
BT-LE	0 to 39	0, 39	DTS	GFSK	1

### ANTENNA PORT CONDUCTED MEASUREMENT:

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	CCK	DBPSK	1.0
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
802.11n HT20	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n HT40	3 to 9	3, 6, 9	OFDM	BPSK	13.5
BT-LE	0 to 39	0, 19, 39	DTS	GFSK	1

### TEST CONDITION:

#### TB-X605F

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE (SYSTEM)	TESTED BY
RE<1G	22deg. C, 54%RH	DC 5V By Adapter	Rose Ma
RE≥1G	22deg. C, 54%RH	DC 5V By Adapter	Rose Ma
PLC	24deg. C, 55%RH	DC 5V By Adapter	John Wen
APCM	25deg. C, 60%RH	DC 3.85V from battery	Rain Wang

#### HA200

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE (SYSTEM)	TESTED BY
RE<1G	22deg. C, 54%RH	DC 12V	Vincent
RE≥1G	22deg. C, 54%RH	DC 12V	Vincent
PLC	24deg. C, 55%RH	DC 12V	John Wen
APCM	25deg. C, 60%RH	DC 12V	Bert Ma

### 2.3 Duty Cycle of Test Signal

The test results were recorded in Reports No.: RF180626C04-2.

## 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 C, Section 15.247**

**KDB 558074 D01 DTS Meas Guidance v04**

**ANSI C63.10-2013**

Note:

1. All test items have been performed and recorded as per the above standards.
2. 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.

## 2.5 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



### 3 TEST TYPES AND RESULTS

#### 3.1 CONDUCTED EMISSION MEASUREMENT

##### 3.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB $\mu$ V)	
	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.

##### 3.1.2 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, GREGT/CHINA and NIM/CHINA.



### 3.1.3 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.

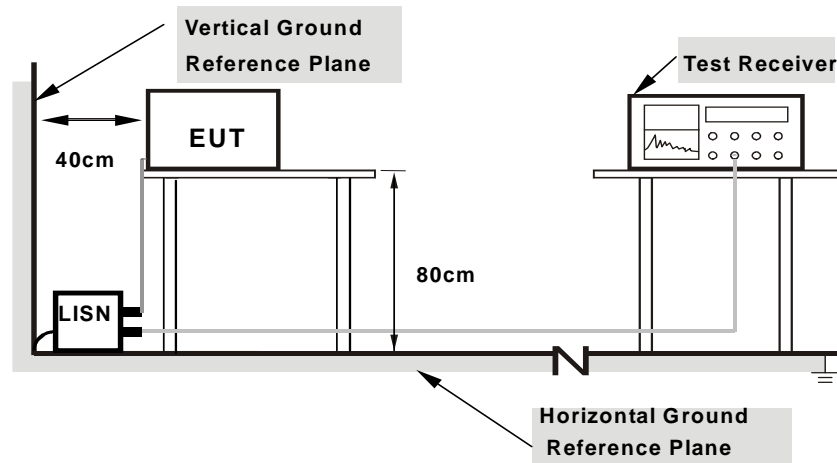
**NOTE:** All modes of operation were investigated and the worst-case emissions are reported.

### 3.1.4 DEVIATION FROM TEST STANDARD

No deviation.



### 3.1.5 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 from other units and other metal planes

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

### 3.1.6 EUT OPERATING CONDITIONS

- Turned on the power and connected of all equipment.
- EUT was operated according to the type used was description in manufacturer's specifications or the User's Manual.





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### 3.1.7 TEST RESULTS

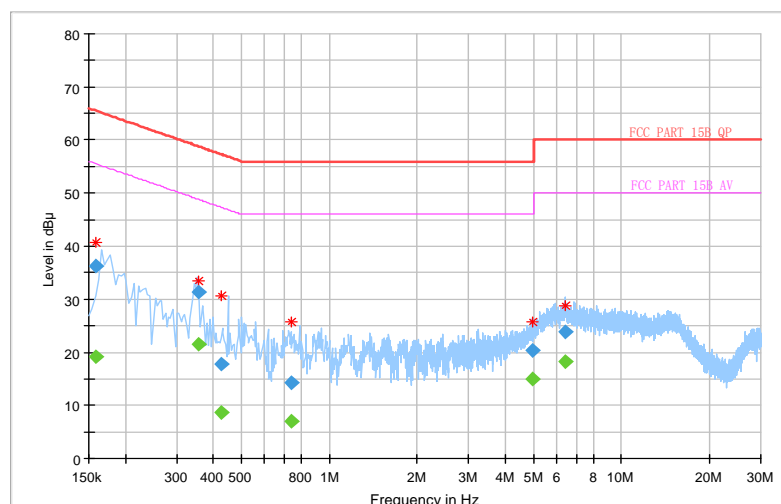
#### CONDUCTED WORST-CASE DATA:

TEST VOLTAGE	Input 120 Vac, 60 Hz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 43RH	TESTED BY	John Wen

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.158000	---	19.27	55.57	-36.30	L1	ON	9.6
0.158000	36.37	---	65.57	-29.20	L1	ON	9.6
0.356000	---	21.54	48.82	-27.28	L1	ON	9.7
<b>0.356000</b>	<b>31.36</b>	---	<b>58.82</b>	<b>-27.46</b>	<b>L1</b>	<b>ON</b>	<b>9.7</b>
0.428000	---	8.71	47.29	-38.58	L1	ON	9.7
0.428000	17.82	---	57.29	-39.47	L1	ON	9.7
0.740000	---	7.05	46.00	-38.95	L1	ON	9.7
0.740000	14.36	---	56.00	-41.64	L1	ON	9.7
4.952000	---	14.92	46.00	-31.08	L1	ON	9.7
4.952000	20.37	---	56.00	-35.63	L1	ON	9.7
6.412000	---	18.14	50.00	-31.86	L1	ON	9.8
6.412000	23.96	---	60.00	-36.04	L1	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



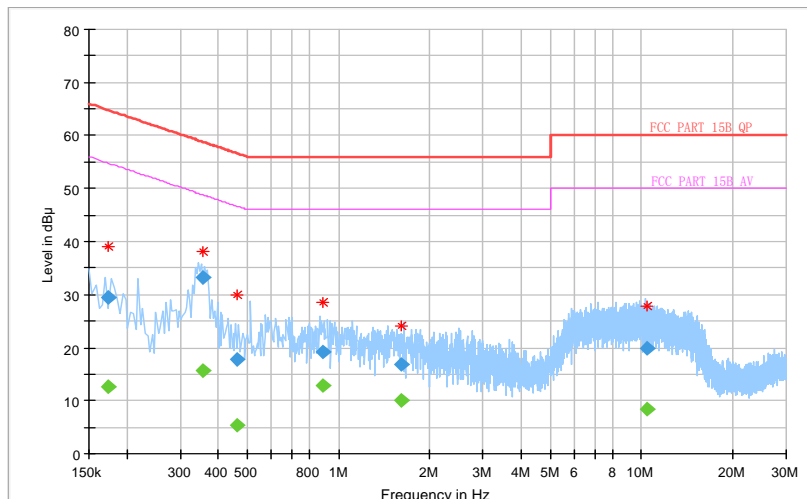


<b>TEST VOLTAGE</b>	Input 120 Vac, 60 Hz	<b>Detector Function &amp; Resolution Bandwidth</b>	Quasi-Peak (QP) / Average (AV), 9 kHz
<b>ENVIRONMENTAL CONDITIONS</b>	24deg. C, 43RH	<b>TESTED BY</b>	John Wen

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.174000	---	12.63	54.77	-42.14	N	ON	10.2
0.174000	29.39	---	64.77	-35.37	N	ON	10.2
0.356000	---	15.62	48.82	-33.20	N	ON	10.0
0.356000	33.23	---	58.82	-25.60	N	ON	10.0
0.464000	---	5.37	46.62	-41.25	N	ON	10.1
0.464000	17.82	---	56.62	-38.80	N	ON	10.1
0.888000	---	12.80	46.00	-33.20	N	ON	9.9
0.888000	19.13	---	56.00	-36.87	N	ON	9.9
1.604000	---	9.99	46.00	-36.01	N	ON	9.9
1.604000	16.96	---	56.00	-39.04	N	ON	9.9
10.384000	---	8.47	50.00	-41.53	N	ON	9.9
10.384000	19.83	---	60.00	-40.17	N	ON	9.9

- 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





## 3.2 RADIATED EMISSION MEASUREMENT

### 3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

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. As shown in 15.35(b), 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.



### 3.2.2 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 or 24 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.

### 3.2.3 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. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, For battery operated equipment, the equipment tests shall be performed using fresh batteries. The turntable was rotated to maximize the emission level.

#### **Note:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results were added to a correction factor ( $10 \log(1/\text{duty cycle})$ ).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

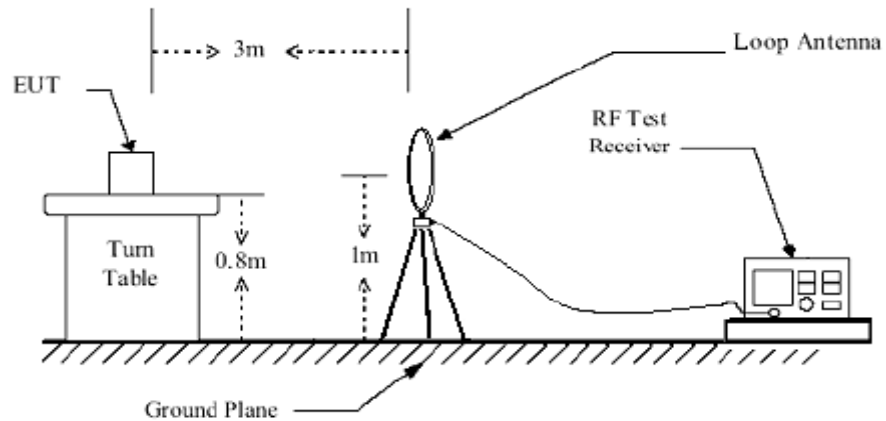
### 3.2.4 DEVIATION FROM TEST STANDARD

No deviation

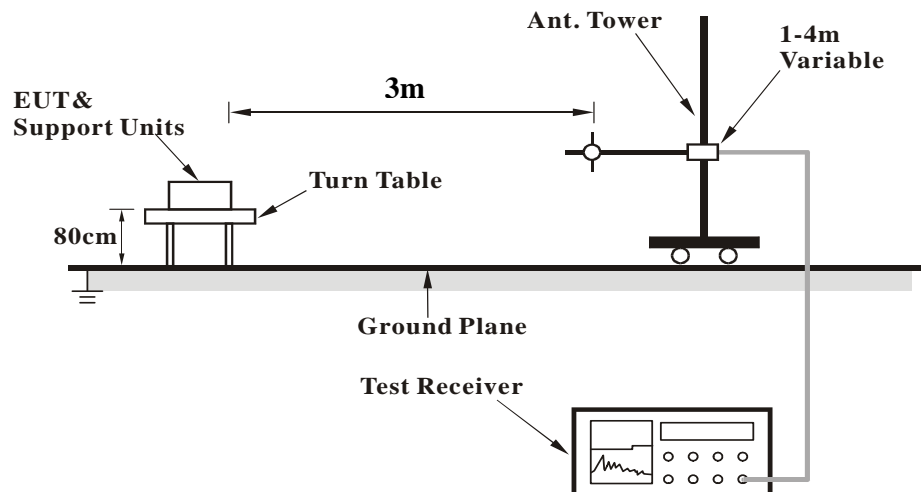


### 3.2.5 TEST SETUP

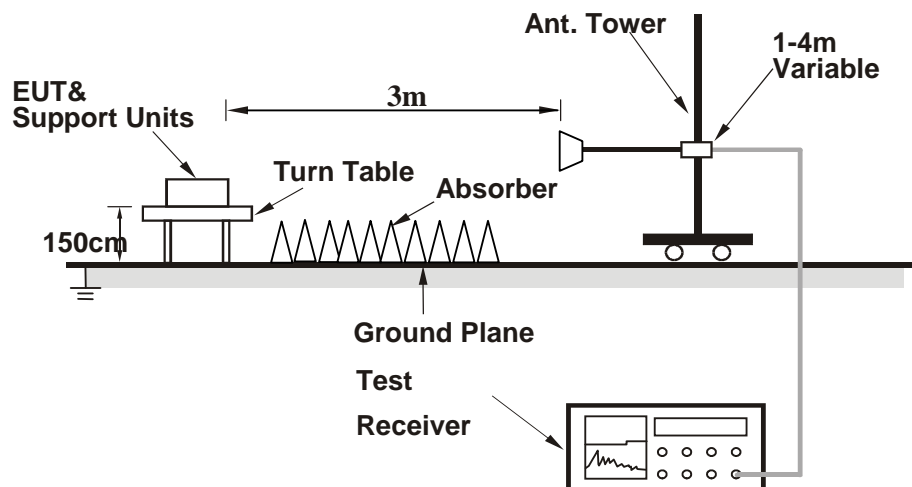
#### < Frequency Range below 30MHz >



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



<Frequency Range above 1GHz>



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

### 3.2.6 EUT OPERATING CONDITIONS

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



### 3.2.7 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:**

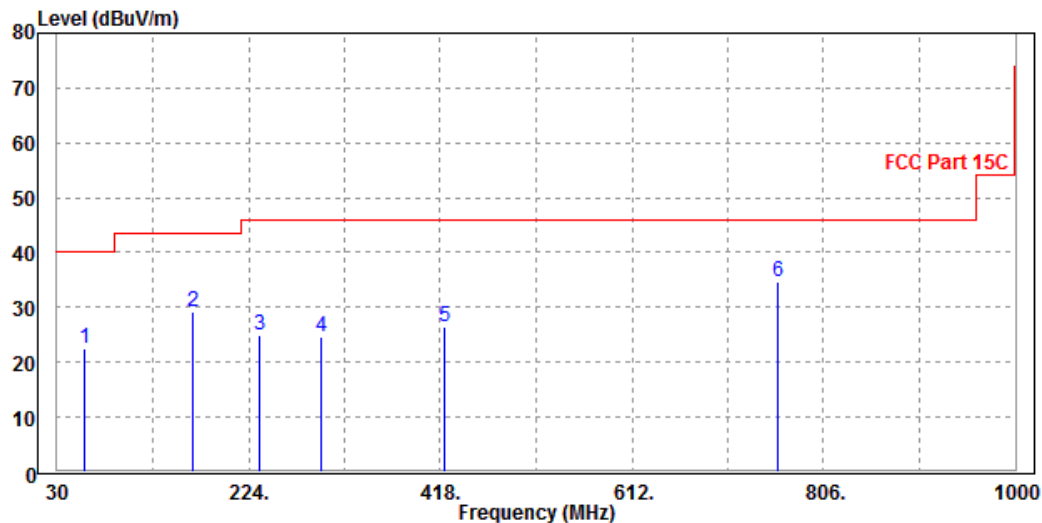
**802.11n (40MHz)**

<b>CHANNEL</b>	TX Channel 9	<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
57.16	22.39	51.88	40	-17.61	6.8	1.05	37.34	100	0	QP
167.74	29.28	53.91	43.5	-14.22	10.41	1.68	36.72	100	0	QP
235.64	24.93	47.39	46	-21.07	12.1	1.97	36.53	100	0	QP
297.72	24.66	45.21	46	-21.34	13.75	2.2	36.5	100	0	QP
422.85	26.45	43.21	46	-19.55	17.31	2.7	36.77	100	0	QP
759.44	34.61	45.5	46	-11.39	22.88	3.74	37.51	100	0	QP

#### REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.





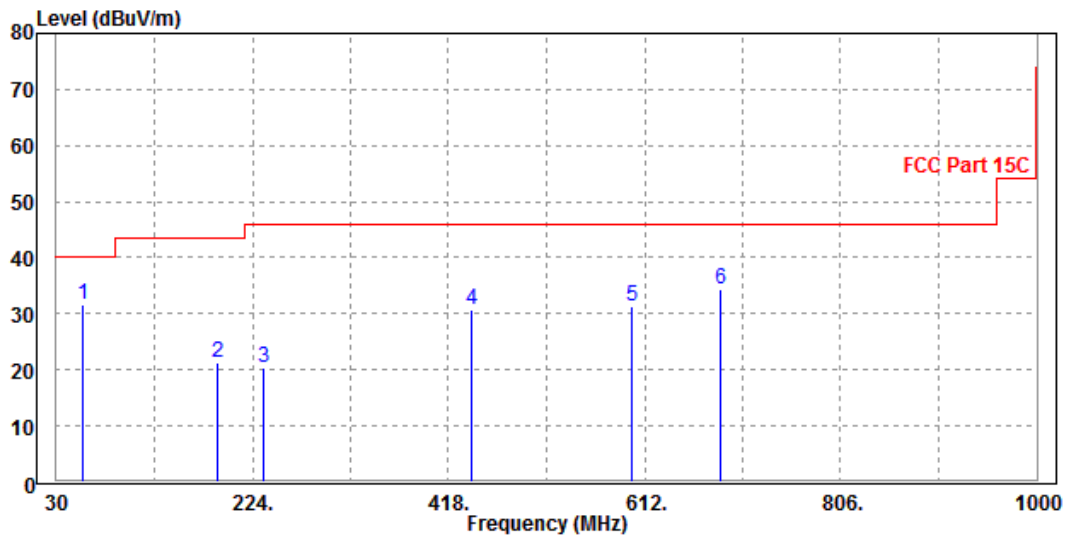


<b>CHANNEL</b>	TX Channel 9	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	30MHz ~ 1GHz		

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
56.19	31.74	61.24	40	-8.26	6.8	1.04	37.34	200	360	QP
190.05	21.38	45.89	43.5	-22.12	10.35	1.75	36.61	200	360	QP
235.64	20.38	42.84	46	-25.62	12.1	1.97	36.53	200	360	QP
440.31	30.8	47.39	46	-15.2	17.46	2.77	36.82	200	360	QP
599.39	31.46	45.56	46	-14.54	19.99	3.16	37.25	200	360	QP
687.66	34.35	45.85	46	-11.65	22.37	3.48	37.35	200	360	QP

**REMARKS:**

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.





## ABOVE 1GHz WORST-CASE DATA:

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

## 802.11n (20MHz)

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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
2390	42.17	50.34	54	-11.83	32.87	4.88	45.92	100	20	Average
2390	52.46	60.63	74	-21.54	32.87	4.88	45.92	100	20	Peak
2462	95.48	103.47			32.95	4.96	45.9	100	20	Average
2462	105.86	113.85			32.95	4.96	45.9	100	20	Peak
2483.5	45.6	53.53	54	-8.4	32.98	4.98	45.89	100	20	Average
2483.5	61.33	69.26	74	-12.67	32.98	4.98	45.89	100	20	Peak
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
2390	46.29	54.46	54	-7.71	32.87	4.88	45.92	100	295	Average
2390	55.07	63.24	74	-18.93	32.87	4.88	45.92	100	295	Peak
2462	90.15	98.14			32.95	4.96	45.9	100	295	Average
2462	100.79	108.78			32.95	4.96	45.9	100	295	Peak
2483.5	44.16	52.09	54	-9.84	32.98	4.98	45.89	100	295	Average
2483.5	64.79	72.72	74	-9.21	32.98	4.98	45.89	100	295	Peak

## REMARKS:

- Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
- 2462MHz: Fundamental frequency.



## 802.11n (40MHz)

CHANNEL	TX Channel 9	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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
2390	42.49	50.66	54	-11.51	32.87	4.88	45.92	100	15	Average
2390	53.39	61.56	74	-20.61	32.87	4.88	45.92	100	15	Peak
2452	91.75	99.76			32.94	4.95	45.9	100	15	Average
2452	103.3	111.31			32.94	4.95	45.9	100	15	Peak
<b>2483.5</b>	<b>48.95</b>	<b>56.88</b>	<b>54</b>	<b>-5.05</b>	<b>32.98</b>	<b>4.98</b>	<b>45.89</b>	<b>100</b>	<b>15</b>	<b>Average</b>
2483.5	66.95	74.88	74	-7.05	32.98	4.98	45.89	100	15	Peak
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
2390	42.24	50.41	54	-11.76	32.87	4.88	45.92	100	295	Average
2390	53.86	62.03	74	-20.14	32.87	4.88	45.92	100	295	Peak
2452	85.76	93.77			32.94	4.95	45.9	100	295	Average
2452	97.21	105.22			32.94	4.95	45.9	100	295	Peak
2483.5	44.21	52.14	54	-9.79	32.98	4.98	45.89	100	295	Average
2483.5	59	66.93	74	-15	32.98	4.98	45.89	100	295	Peak

## REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
2. 2452MHz: Fundamental frequency.



Test Report No.: RF181022W002-2

#### 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:**

**Lenovo TB-X605F**

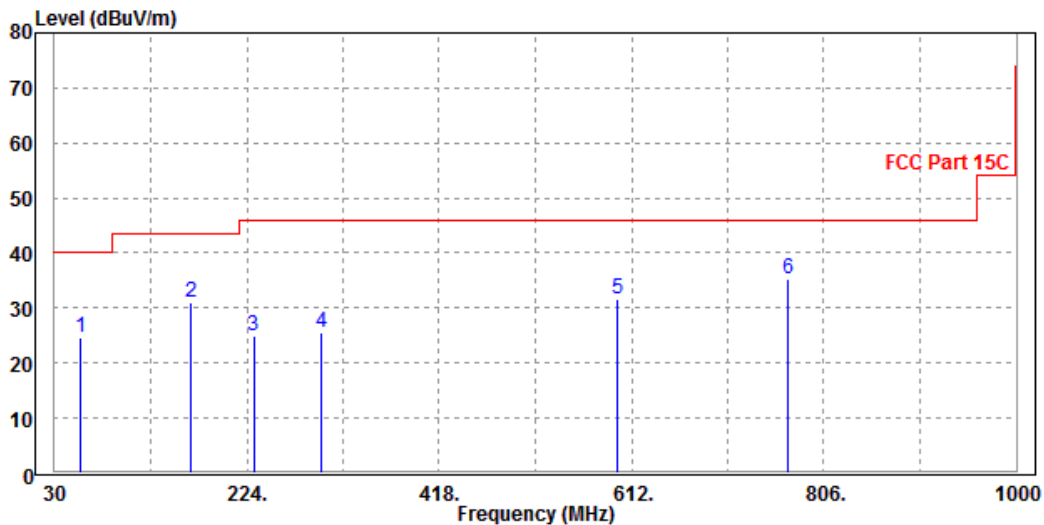
**BT-LE (GFSK)**

<b>CHANNEL</b>	TX Channel 0	<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
56.19	24.56	54.06	40	-15.44	6.8	1.04	37.34	100	360	QP
167.74	30.95	55.58	43.5	-12.55	10.41	1.68	36.72	100	360	QP
230.79	25.06	47.76	46	-20.94	11.89	1.94	36.53	100	360	QP
299.66	25.41	45.91	46	-20.59	13.79	2.21	36.5	100	360	QP
597.45	31.54	45.67	46	-14.46	19.95	3.16	37.24	100	360	QP
769.14	35.37	46.22	46	-10.63	22.91	3.78	37.54	100	360	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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



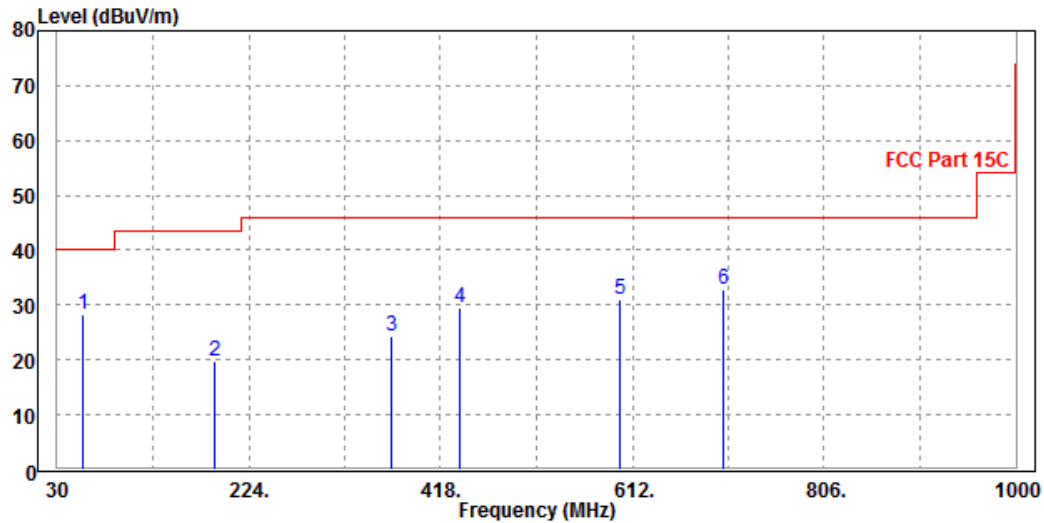


<b>CHANNEL</b>	TX Channel 0	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	30MHz ~ 1GHz		

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
56.19	28.34	57.84	40	-11.66	6.8	1.04	37.34	100	0	QP
190.05	19.66	44.17	43.5	-23.84	10.35	1.75	36.61	100	0	QP
368.53	24.41	42.51	46	-21.59	16.06	2.49	36.65	100	0	QP
437.4	29.53	46.14	46	-16.47	17.44	2.76	36.81	100	0	QP
599.39	31.05	45.15	46	-14.95	19.99	3.16	37.25	100	0	QP
703.18	32.75	43.87	46	-13.25	22.71	3.54	37.37	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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value





Lenovo HA-200

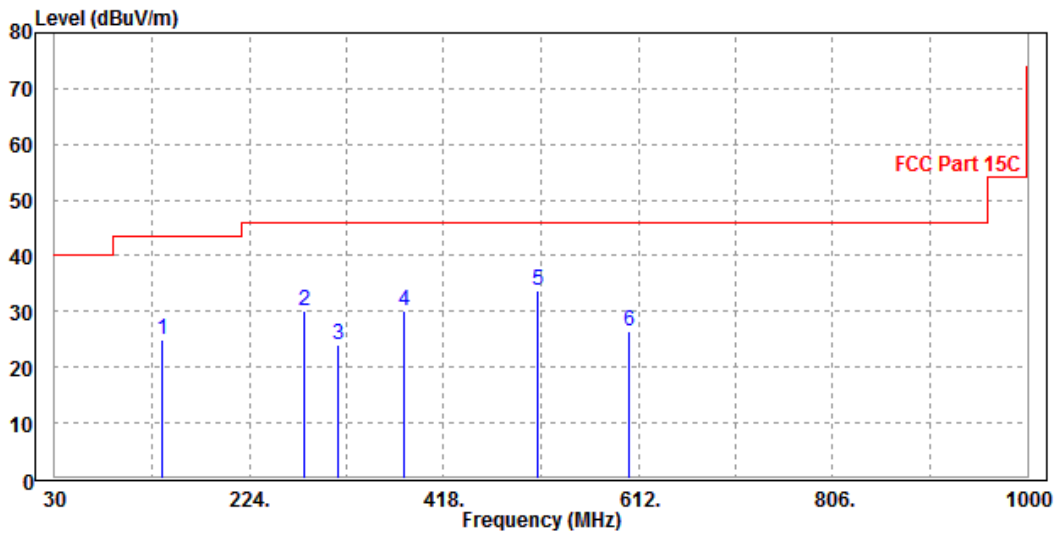
BT-LE (GFSK)

<b>CHANNEL</b>	TX Channel 0	<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
136.54	24.99	52.46	43.5	-18.51	7.86	1.53	36.86	100	360	QP
278.66	30.14	51.77	46	-15.86	12.74	2.14	36.51	100	360	QP
312.11	23.91	44.67	46	-22.09	13.51	2.26	36.53	100	360	QP
378.92	30.02	47.85	46	-15.98	16.31	2.53	36.67	100	360	QP
512.39	33.62	48.97	46	-12.38	18.64	3.01	37	100	360	QP
602.33	26.41	40.12	46	-19.59	20.37	3.17	37.25	100	360	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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



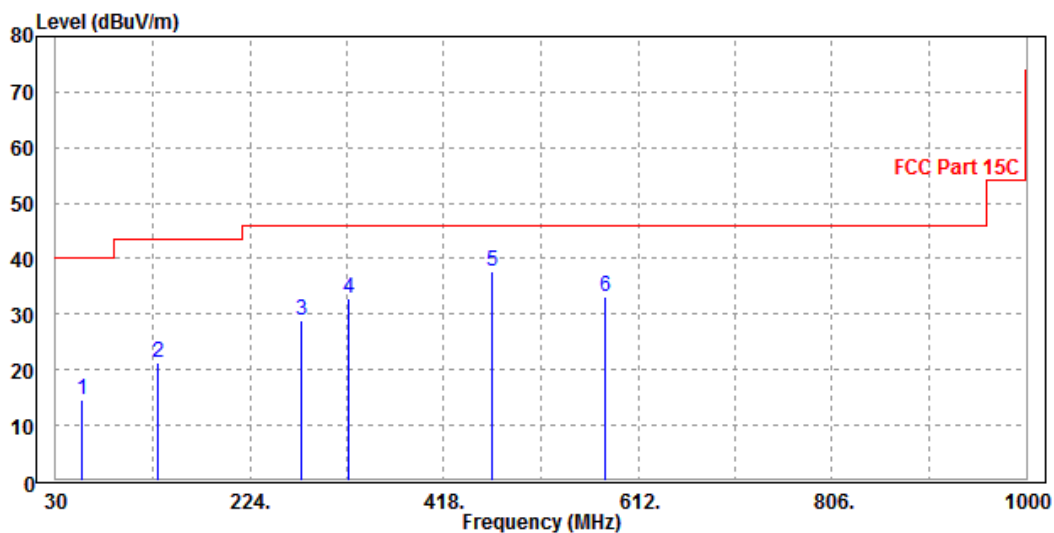


<b>CHANNEL</b>	TX Channel 0	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	30MHz ~ 1GHz		

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
56.87	14.56	44.32	40	-25.44	6.43	1.15	37.34	100	0	QP
132.58	21.35	48.76	43.5	-22.15	7.7	1.77	36.88	100	0	QP
275.64	28.95	50.16	46	-17.05	12.71	2.59	36.51	100	0	QP
322	32.82	52.64	46	-13.18	13.92	2.81	36.55	100	0	QP
465.88	37.73	53.27	46	-8.27	17.99	3.35	36.88	100	0	QP
578.95	33.17	46.57	46	-12.83	19.9	3.89	37.19	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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value





Test Report No.: RF181022W002-2

# ABOVE 1GHz TEST DATA:

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

Lenovo TB-X605F

BT-LE (GFSK)

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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
2390	45.16	53.78	54	-8.84	32.87	4.88	46.37	100	100	Average
2390	66.99	75.61	74	-7.01	32.87	4.88	46.37	100	100	Peak
2402	100.36	108.96			32.88	4.89	46.37	100	100	Average
2402	102.89	111.49			32.88	4.89	46.37	100	100	Peak
2483.5	44.86	53.27	54	-9.14	32.98	4.98	46.37	100	100	Average
2483.5	56.8	65.21	74	-17.2	32.98	4.98	46.37	100	100	Peak
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
2390	41.06	49.68	54	-12.94	32.87	4.88	46.37	100	291	Average
2390	59.92	68.54	74	-14.08	32.87	4.88	46.37	100	291	Peak
2402	94.3	102.9			32.88	4.89	46.37	100	291	Average
2402	98.08	106.68			32.88	4.89	46.37	100	291	Peak
2483.5	42.87	51.28	54	-11.13	32.98	4.98	46.37	100	291	Average
2483.5	54.18	62.59	74	-19.82	32.98	4.98	46.37	100	291	Peak

## REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
2. 2402MHz: Fundamental frequency.





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Lenovo HA-200

BT-LE (GFSK)

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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
2390	42.75	51.37	54	-11.25	32.87	4.88	46.37	100	270	Average
2390	61.62	70.24	74	-12.38	32.87	4.88	46.37	100	270	Peak
2402	96.27	104.87			32.88	4.89	46.37	100	270	Average
2402	105.76	114.36			32.88	4.89	46.37	100	270	Peak
2483.5	40.95	49.36	54	-13.05	32.98	4.98	46.37	100	270	Average
2483.5	51.92	60.33	74	-22.08	32.98	4.98	46.37	100	270	Peak
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
2390	42.9	51.52	54	-11.1	32.87	4.88	46.37	100	310	Average
2390	62.06	70.68	74	-11.94	32.87	4.88	46.37	100	310	Peak
2402	91.17	99.77			32.88	4.89	46.37	100	310	Average
2402	101.19	109.79			32.88	4.89	46.37	100	310	Peak
2483.5	39.72	48.13	54	-14.28	32.98	4.98	46.37	100	310	Average
2483.5	51.1	59.51	74	-22.9	32.98	4.98	46.37	100	310	Peak

#### REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
2. 2402MHz: Fundamental frequency.



### 3.3 6 dB BANDWIDTH MEASUREMENT

#### 3.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 3.3.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Power Meter	ANRITSU	ML2495A	1506002	Mar. 02,18	Mar. 01,19
EXA Signal Analyzer	KEYSIGHT	N9010A-526	MY54510322	Mar. 16,18	Mar. 15,19
EXA Signal Analyzer	KEYSIGHT	N9010A-544	MY54510355	Mar. 16,18	Mar. 15,19
Power Sensor	ANRITSU	MA2411B	1339352	Mar. 16,18	Mar. 15,19

**NOTE:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GREGT/CHINA and NIM/CHINA.
2. The test was performed in RF Oven room.

#### 3.3.3 TEST PROCEDURE

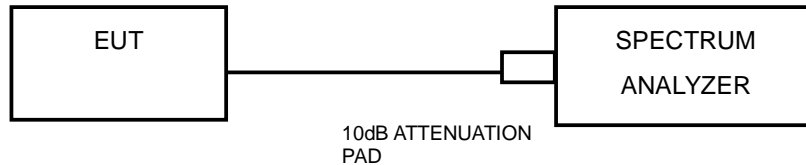
1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW)  $\geq 3$  RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



### 3.3.4 DEVIATION FROM TEST STANDARD

No deviation.

### 3.3.5 TEST SETUP



### 3.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

### 3.3.7 TEST RESULTS

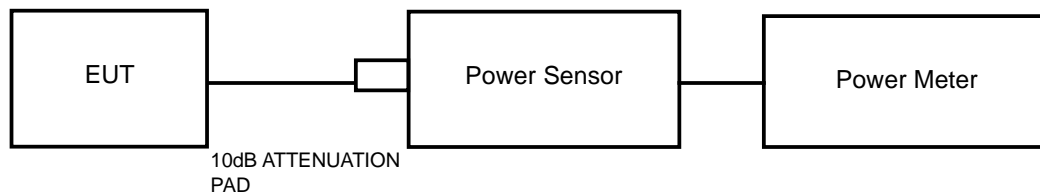
The test results were recorded in Reports No.: RF180724W011R1-1& RF180626C04 & RF180626C04-3.

### 3.4 CONDUCTED OUTPUT POWER

#### 3.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 2400–2483.5 MHz band: 1 Watt (30dBm)

#### 3.4.2 TEST SETUP



#### 3.4.3 TEST INSTRUMENTS

Refer to section 3.3.2 to get information of above instrument.

#### 3.4.4 TEST PROCEDURES

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

#### 3.4.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 3.4.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



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### 3.4.7 TEST RESULTS

#### 3.4.7.1 MAXIMUM PEAK OUTPUT POWER

The test results were recorded in Reports No.: RF180724W011R1-1& RF180626C04 & RF180626C04-3.

#### 3.4.7.2 AVERAGE OUTPUT POWER (FOR REFERENCE)

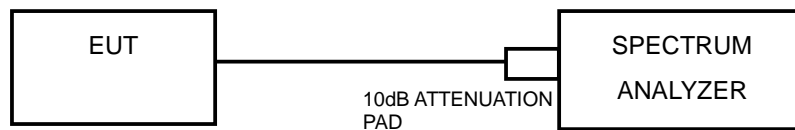
The test results were recorded in Reports No.: RF180724W011R1-1& RF180626C04 & RF180626C04-3.

### 3.5 POWER SPECTRAL DENSITY MEASUREMENT

#### 3.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm/3KHz.

#### 3.5.2 TEST SETUP



#### 3.5.3 TEST INSTRUMENTS

Refer to section 3.3.2 to get information of above instrument.

#### 3.5.4 TEST PROCEDURE

1. Set the span to 1.5 times the DTS bandwidth
2. Set the RBW = 3 kHz, VBW  $\geq 3 \times$  RBW, Detector = peak.
3. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
4. Use the peak marker function to determine the maximum amplitude level.

#### 3.5.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 3.5.6 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

#### 3.5.7 TEST RESULTS

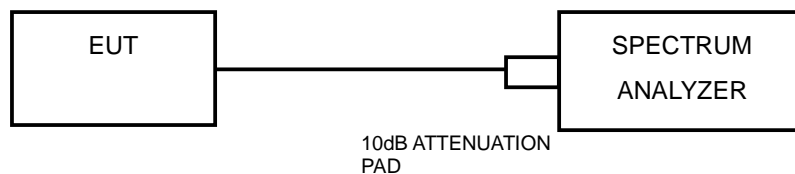
The test results were recorded in Reports No.: RF180724W011R1-1& RF180626C04 & RF180626C04-3.

### 3.6 OUT OF BAND EMISSION MEASUREMENT

#### 3.6.1 LIMITS OF OUT OF BAND EMISSION MEASUREMENT

Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

#### 3.6.2 TEST SETUP



#### 3.6.3 TEST INSTRUMENTS

Refer to section 3.3.2 to get information of above instrument.

#### 3.6.4 TEST PROCEDURE

##### MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW  $\geq$  300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.



## **MEASUREMENT PROCEDURE OOB**

1. Set RBW = 100 kHz.
2. Set VBW  $\geq$  300 kHz.
3. Set span to encompass the spectrum to be examined
4. Detector = peak.
5. Trace Mode = max hold.
6. Sweep = auto couple.

### **3.6.5 DEVIATION FROM TEST STANDARD**

No deviation.

### **3.6.6 EUT OPERATING CONDITION**

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

### **3.6.7 TEST RESULTS**

The spectrum plots are attached on the following images. D1 line indicates the highest level. D2 line indicates the 20dB offset below D1. It shows compliance to the requirement.

The test results were recorded in Reports No.: RF180724W011R1-1& RF180626C04 & RF180626C04-3.





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## 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 any modifications are made to the EUT by the lab during the test.

---END---