ACCREDITED
Certificate # 3939.01

FCC TEST REPORT

(Part 15, Subpart C)

Applicant:	LINGDONG TECHNOLOGY (BEIJING) CO. LTD
Address:	1601-29, Floor 16, Linghang Building, No.68 Zhichun Road, Haidian District, Beijing

Manufacturer or Supplier:	LINGDONG TECHNOLOGY (BEIJING) CO. LTD
Address:	1601-29, Floor 16, Linghang Building, No.68 Zhichun Road, Haidian District, Beijing
Product:	OVIS
Brand Name:	FORWARDX
Model Name:	OVIS-01
FCC ID:	2AR7B-OVIS-01
Date of tests:	Feb. 29, 2019 ~ Jun. 22, 2019

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

Issued by Alex Chen Engineer / Mobile Department	Approved by Luke Lu Manager / Mobile Department
Alex	Luke Lu
Date: Jul 03, 2019	Date: Jul 03, 2019

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF190228W007-2	Original release	Jul. 03, 2019

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 -19.78dB at 0.740000MHz.
15.205 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -3.1dB at 2390MHz.
15.247(d)	Out of band Emission Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted Output power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used

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	UNCERTAINTY
AC Power Conducted emissions	±2.70dB
All Radiated emissions	±4.48dB
Conducted emissions	±2 dB
Occupied Channel Bandwidth	±21.7KHz
Conducted Output power	±1.03 dB
Power Spectral Density	±0.95 dB

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

PRODUCT	OVIS
BRAND NAME	FORWARDX
MODEL NAME	OVIS-01
NOMINAL VOLTAGE	21Vdc (adapter or host equipment) 18Vdc (Li-ion, battery)
MODULATION TECHNOLOGY	DSSS, OFDM, GFSK
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM BT-LE(GFSK) for GFSK
TRANSMISSION RATE	802.11b: 11/ 5.5/ 2.0 / 1.0 Mbps 802.11g: 54/ 48/ 36 / 24 / 18 / 9/ 6 Mbps 802.11n: up to 65 Mbps BT_LE: 1 Mbps
OPERATING FREQUENCY	2412-2462MHz for 11b/g/n(HT20) 2402-2480MHz for BT-LE(GFSK)
MAX. OUTPUT POWER	WLAN: 185.353mW (Maximum) BT-LE: 1.574mW (Maximum)
ANTENNA TYPE	PIFA Antenna with 1.08dBi gain for WLAN PIFA Antenna with 1.08dBi gain for BT_LE
HW VERSION	1.0
SW VERSION	L130_v00
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	N/A

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
BT_LE	1TX /1RX

3. The EUT was powered by the following adapter:

ADAPTER	
BRAND:	XINSPOWER
MODEL:	A481
INPUT:	AC 100-240V, 1500mA
OUTPUT:	DC 21V, 2000mA

UWB WRIST STRAP BATTERY	
BRAND:	PATL
MODEL:	441422
POWER RATING:	DC 3.7V, 120mAh

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

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		

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)
BT-LE	0 to 39	39	GFSK	GFSK	1
802.11g	1 to 11	1	OFDM	BPSK	6.0

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
BT-LE	0 to 39	0,19, 39	GFSK	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)
802.11g	1 to 11	1	OFDM	BPSK	6.0

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
BT-LE	0 to 39	0, 39	GFSK	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
BT-LE	0 to 39	0, 19, 39	GFSK	GFSK	1

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE	TESTED BY
RE<1G	22deg. C, 54%RH	DC 21V from adaptor	Star Le
RE≥1G	22deg. C, 54%RH	DC 21V from adaptor	Star Le
PLC	24deg. C, 55%RH	DC 21V from adaptor	John Wen
APCM	25deg. C, 60%RH	DC 18V from battery	Rain Wang

2.3 Duty Cycle of Test Signal

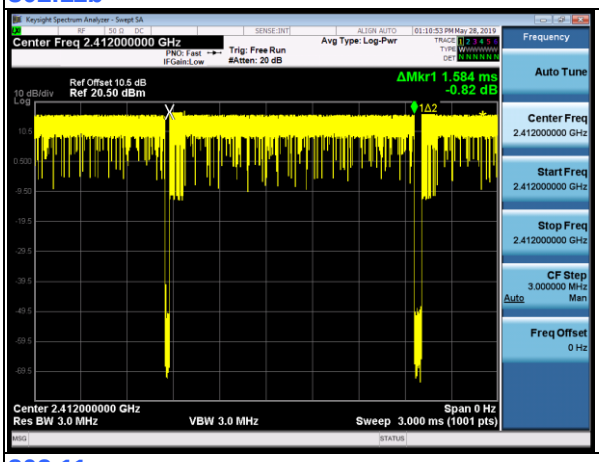
WIFI 2.4GHz

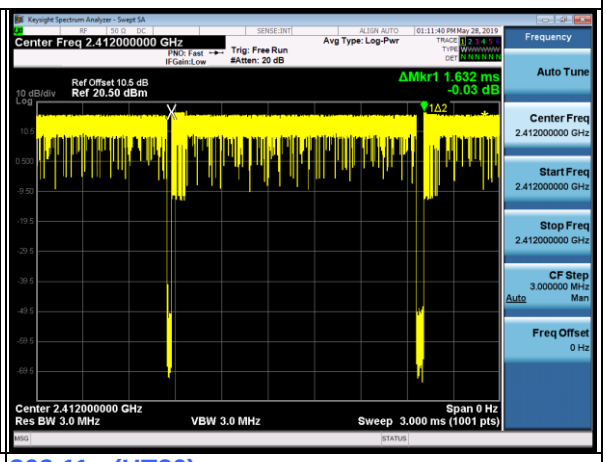
802.11b: Duty cycle = 1.584/1.632 = 0.971 < 98%, Duty factor = 10 * log(1/0.971) = 0.130

802.11g: Duty cycle = 1.355/1.405 = 0.964 < 98%, Duty factor = 10 * log(1/0.964) = 0.157

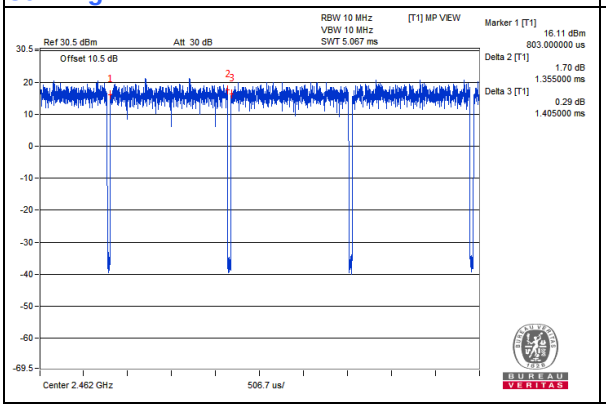
802.11n (HT20): Duty cycle = 1.268/1.321 = 0.960 < 98%, Duty factor = 10 * log(1/0.960) = 0.178

802.11b

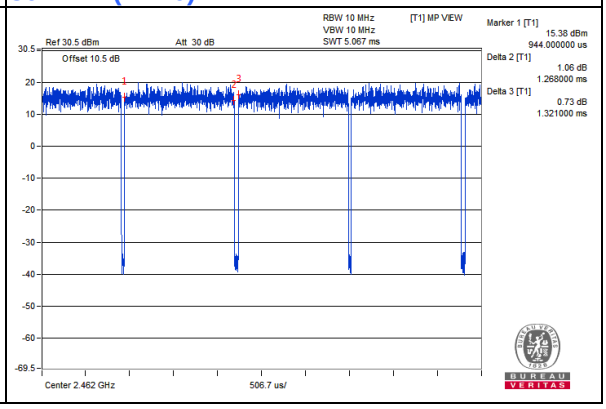




802.11g



802.11n (HT20)



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

558074 D01 15.247 Meas Guidance v05r02

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 (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.

3.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESR3	101900	Feb. 26,19	Feb. 25,20
EMC32 test software	Rohde&Schwarz	EMC32	NA	NA	NA
LISN network	Rohde&Schwarz	ENV216	101922	Feb. 26,19	Feb. 25,20

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.

3.1.3 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.

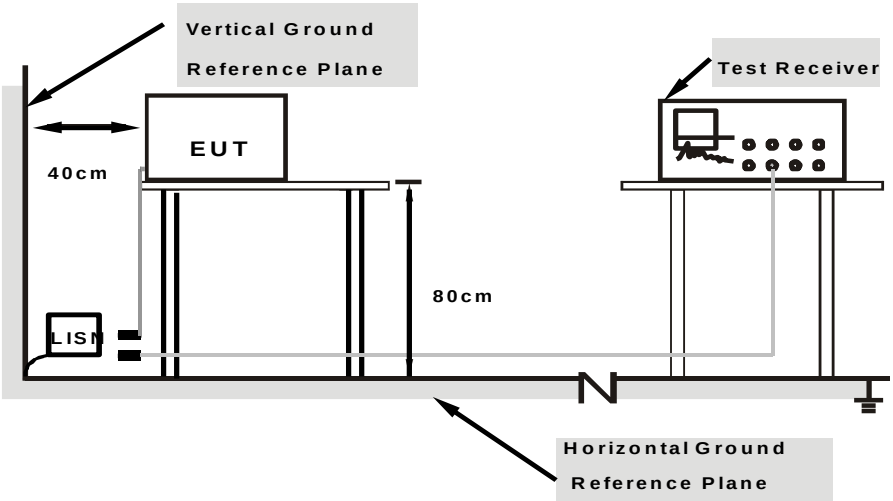
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

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

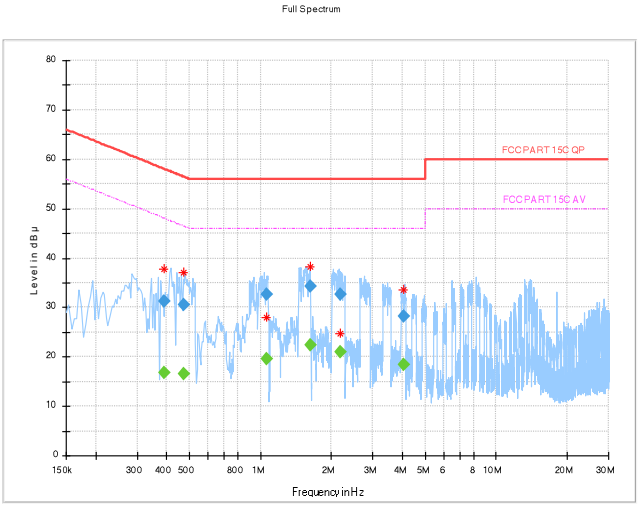
3.1.7 TEST RESULTS

CONDUCTED WORST-CASE DATA:

Frequency Range	150KHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120Vac, 60Hz	**Environmental Conditions**	25deg. C, 52RH
Tested By	John Wen	**TEST DATE**	2019/06/11
Test Voltage	DC 21V From Adapter		

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.392000	---	16.90	48.02	-31.12	L	ON	9.7
0.392000	31.32	---	58.02	-26.70	L	ON	9.7
0.472000	---	16.44	46.48	-30.04	L	ON	9.7
0.472000	30.67	---	56.48	-25.81	L	ON	9.7
1.064000	---	19.57	46.00	-26.43	L	ON	9.7
1.064000	32.63	---	56.00	-23.37	L	ON	9.7
1.624000	---	22.32	46.00	-23.68	L	ON	9.7
1.624000	34.17	---	56.00	-21.83	L	ON	9.7
2.188000	---	20.97	46.00	-25.03	L	ON	9.7
2.188000	32.67	---	56.00	-23.33	L	ON	9.7
4.028000	---	18.38	46.00	-27.62	L	ON	9.7
4.028000	28.25	---	56.00	-27.75	L	ON	9.7

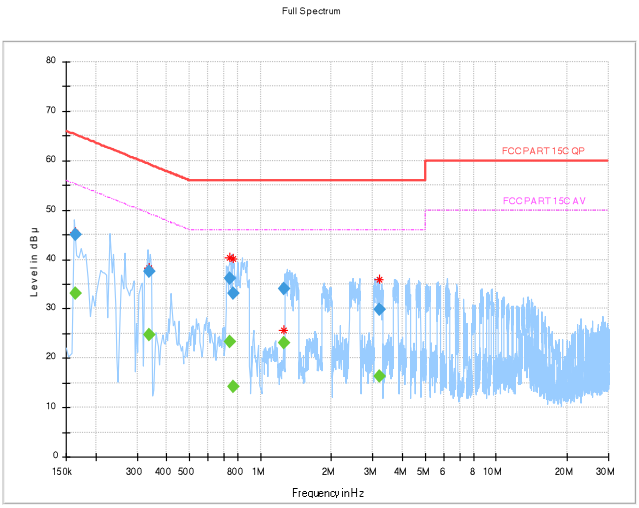
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



Frequency Range	150KHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120Vac, 60Hz	**Environmental Conditions**	25deg. C, 52RH
Tested By	John Wen	**TEST DATE**	2019/06/11
Test Voltage	DC 21V From Adapter		

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.164000	---	33.05	55.26	−22.21	N	ON	10.2
0.164000	44.99	---	65.26	−20.27	N	ON	10.2
0.336000	---	24.81	49.30	−24.50	N	ON	10.0
0.336000	37.67	---	59.30	−21.63	N	ON	10.0
0.740000	---	23.33	46.00	−22.67	N	ON	10.0
0.740000	**36.22**	**---**	**56.00**	**−19.78**	**N**	**ON**	**10.0**
0.770000	---	14.20	46.00	−31.80	N	ON	10.0
0.770000	33.16	---	56.00	−22.84	N	ON	10.0
1.256000	---	23.14	46.00	−22.86	N	ON	9.9
1.256000	34.16	---	56.00	−21.84	N	ON	9.9
3.212000	---	16.31	46.00	−29.69	N	ON	9.8
3.212000	29.79	---	56.00	−26.21	N	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.



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	Feb. 26,19	Feb. 25,20
Bilog Antenna	ETS-LINDGREN	3143B	00161965	Feb. 26,19	Feb. 25,20
Horn Antenna	ETS-LINDGREN	3117	00168728	Feb. 26,19	Feb. 25,20
Loop antenna	Daze	ZN30900A	0708	Oct. 23,18	Oct. 22, 19
Horn Antenna (18GHz-40GHz)	N/A	QWH-SL-18-40-K-SG/QMS-00361	15433	Nov. 21, 18	Nov. 20, 19
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	Feb. 26,19	Feb. 25,20
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; The Designation No. is CN1171.

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 perform using fresh batteries. The turntable was rotated to maximize the emission level.

Note:

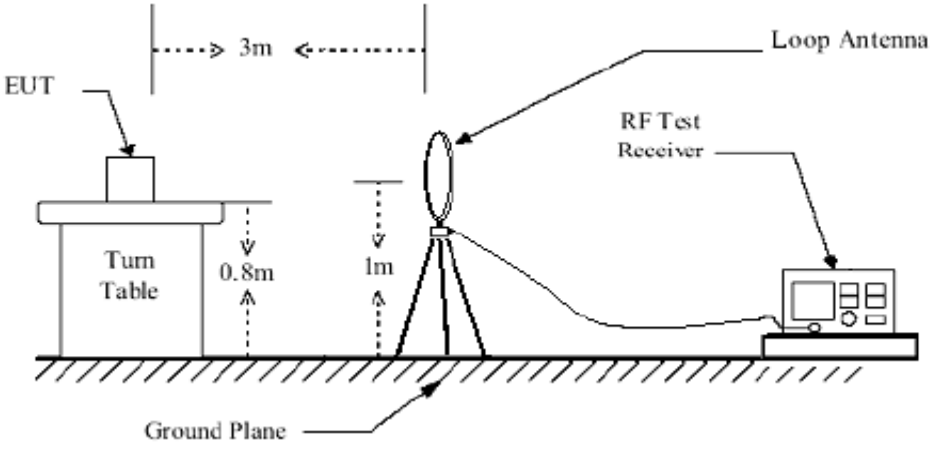
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

3.2.4 DEVIATION FROM TEST STANDARD

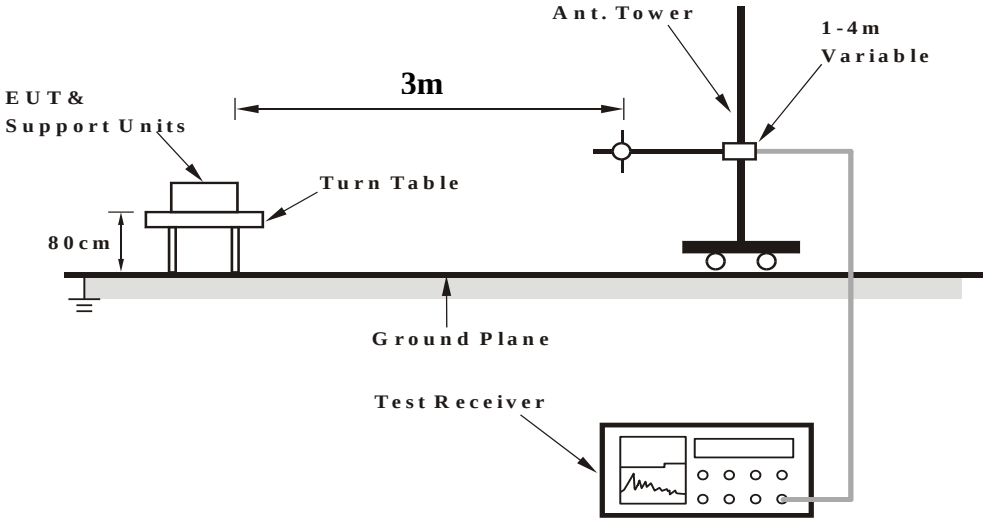
No deviation

3.2.5 TEST SETUP

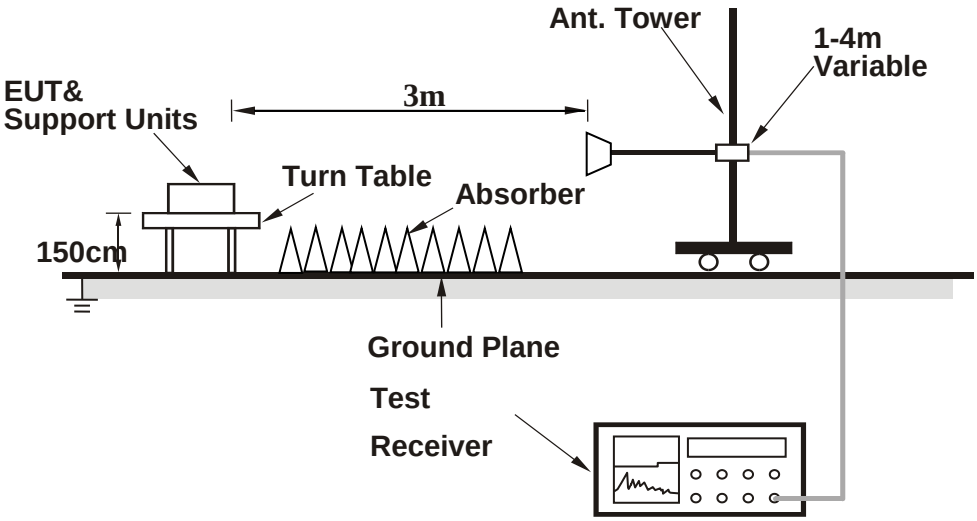
< Frequency Range below 30MHz >



< 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

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.

3.2.7 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:

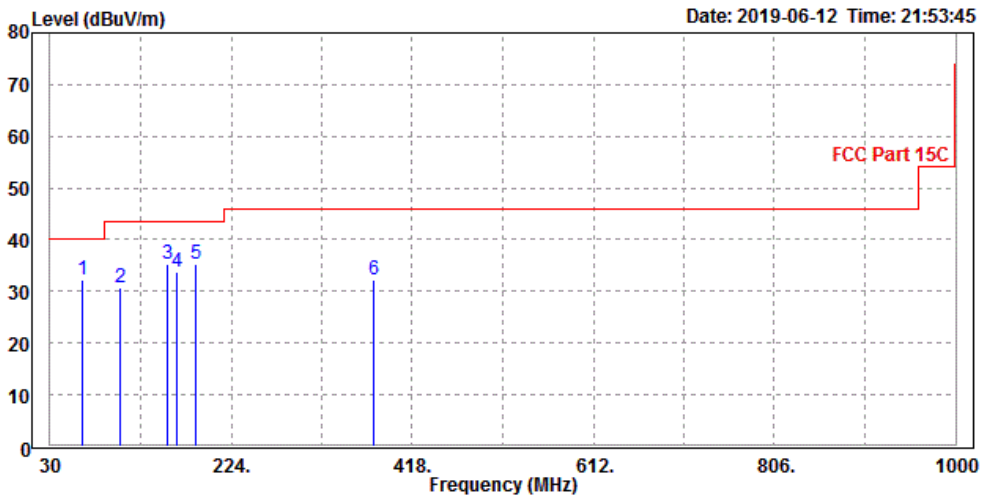
802.11g

CHANNEL	TX Channel 1	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	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
65.31	32.28	61.25	40	-7.72	7.22	1.14	37.33	200	360	QP
105.24	30.85	57.25	43.5	-12.65	9.39	1.35	37.14	200	360	QP
155.23	35.19	60.23	43.5	-8.31	10.12	1.61	36.77	200	360	QP
165.28	33.87	58.46	43.5	-9.63	10.45	1.67	36.71	200	360	QP
185.42	35.29	59.75	43.5	-8.21	10.44	1.72	36.62	200	360	QP
376.52	32.3	50.12	46	-13.7	16.47	2.52	36.81	200	360	QP

REMARKS:

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

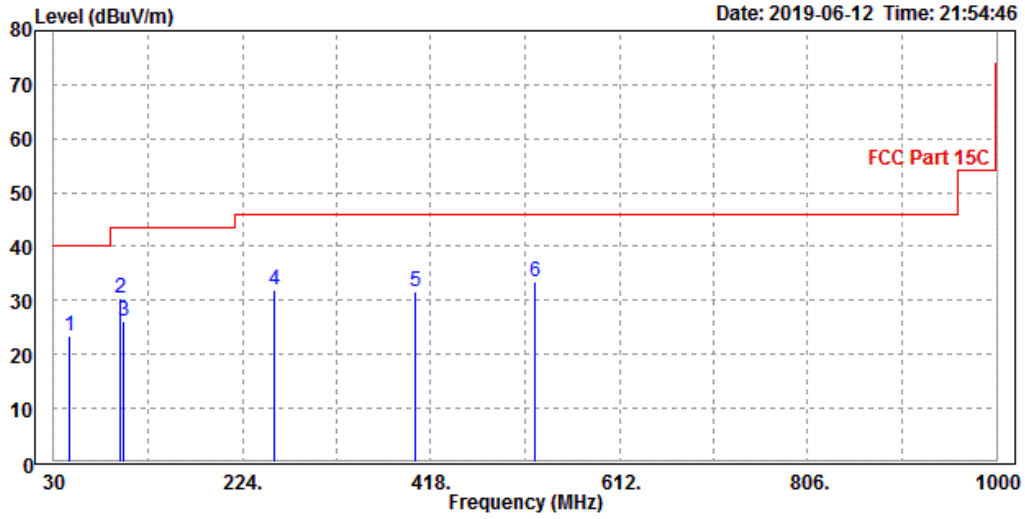


CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

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
45.61	23.52	52.3	40	-16.48	7.58	1.04	37.4	100	0	QP
98.54	30.41	56.65	43.5	-13.09	9.62	1.31	37.17	100	0	QP
101.15	26.24	52.34	43.5	-17.26	9.74	1.32	37.16	100	0	QP
256.34	31.99	53.26	46	-14.01	13.33	2.06	36.66	100	0	QP
401.25	31.75	48.64	46	-14.25	17.32	2.62	36.83	100	0	QP
524.36	33.49	48.51	46	-12.51	19.04	3.03	37.09	100	0	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.

802.11b

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

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	48.45	51.91	74	-25.55	33.1	4.88	41.44	177	305	Peak
2390	43.15	46.61	54	-10.85	33.1	4.88	41.44	177	305	Average
2412	99.73	103.14			33.14	4.9	41.45	177	305	Peak
2412	97.57	100.98			33.14	4.9	41.45	177	305	Average
2483.5	50.29	53.5	74	-23.71	33.27	4.98	41.46	177	305	Peak
2483.5	41.68	44.89	54	-12.32	33.27	4.98	41.46	177	305	Average
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	48.36	52.71	74	-25.64	32.21	4.88	41.44	100	26	Peak
2390	41.52	45.87	54	-12.48	32.21	4.88	41.44	100	26	Average
2412	97.87	102.15			32.27	4.9	41.45	100	26	Peak
2412	93.96	98.24			32.27	4.9	41.45	100	26	Average
2483.5	47.94	51.96	74	-26.06	32.46	4.98	41.46	100	26	Peak
2483.5	39.49	43.51	54	-14.51	32.46	4.98	41.46	100	26	Average

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
2. 2412MHz: Fundamental frequency.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	49.41	52.87	74	-24.59	33.1	4.88	41.44	105	338	Peak
2390	40.15	43.61	54	-13.85	33.1	4.88	41.44	105	338	Average
2437	101.35	104.68			33.19	4.93	41.45	105	338	Peak
2437	98.63	101.96			33.19	4.93	41.45	105	338	Average
2483.5	50.65	53.86	74	-23.35	33.27	4.98	41.46	105	338	Peak
2483.5	40.13	43.34	54	-13.87	33.27	4.98	41.46	105	338	Average
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	47.37	51.72	74	-26.63	32.21	4.88	41.44	115	21	Peak
2390	39.2	43.55	54	-14.8	32.21	4.88	41.44	115	21	Average
2437	99.08	103.26			32.34	4.93	41.45	115	21	Peak
2437	96.03	100.21			32.34	4.93	41.45	115	21	Average
2483.5	49.7	53.72	74	-24.3	32.46	4.98	41.46	115	21	Peak
2483.5	39.49	43.51	54	-14.51	32.46	4.98	41.46	115	21	Average

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
   2. 2437MHz: Fundamental frequency.

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

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	48.65	52.11	74	-25.35	33.1	4.88	41.44	149	337	Peak
2390	39.8	43.26	54	-14.2	33.1	4.88	41.44	149	337	Average
2462	101.95	105.21			33.23	4.96	41.45	149	337	Peak
2462	99.5	102.76			33.23	4.96	41.45	149	337	Average
2483.5	50.68	53.89	74	-23.32	33.27	4.98	41.46	149	337	Peak
2483.5	42.73	45.94	54	-11.27	33.27	4.98	41.46	149	337	Average
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	48.26	52.61	74	-25.74	32.21	4.88	41.44	115	71	Peak
2390	38.14	42.49	54	-15.86	32.21	4.88	41.44	115	71	Average
2462	98.85	102.94			32.4	4.96	41.45	115	71	Peak
2462	96.43	100.52			32.4	4.96	41.45	115	71	Average
2483.5	51.94	55.96	74	-22.06	32.46	4.98	41.46	115	71	Peak
2483.5	42.13	46.15	54	-11.87	32.46	4.98	41.46	115	71	Average

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
2. 2462MHz: Fundamental frequency.

802.11g

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

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	62.26	65.72	74	-11.74	33.1	4.88	41.44	135	305	Peak
2390	**50.9**	**54.36**	**54**	**-3.1**	**33.1**	**4.88**	**41.44**	**135**	**305**	**Average**
2412	101.42	104.83			33.14	4.9	41.45	135	305	Peak
2412	93.74	97.15			33.14	4.9	41.45	135	305	Average
2483.5	48.49	51.7	74	-25.51	33.27	4.98	41.46	135	305	Peak
2483.5	42.55	45.76	54	-11.45	33.27	4.98	41.46	135	305	Average
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	60.03	64.38	74	-13.97	32.21	4.88	41.44	100	23	Peak
2390	50.37	54.72	54	-3.63	32.21	4.88	41.44	100	23	Average
2412	99.5	103.78			32.27	4.9	41.45	100	23	Peak
2412	91.66	95.94			32.27	4.9	41.45	100	23	Average
2483.5	47.66	51.68	74	-26.34	32.46	4.98	41.46	100	23	Peak
2483.5	39.65	43.67	54	-14.35	32.46	4.98	41.46	100	23	Average

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
2. 2412MHz: Fundamental frequency.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	50.25	53.71	74	-23.75	33.1	4.88	41.44	100	336	Peak
2390	41.28	44.74	54	-12.72	33.1	4.88	41.44	100	336	Average
2437	104.39	107.72			33.19	4.93	41.45	100	336	Peak
2437	95.28	98.61			33.19	4.93	41.45	100	336	Average
2483.5	49.24	52.45	74	-24.76	33.27	4.98	41.46	100	336	Peak
2483.5	41.28	44.49	54	-12.72	33.27	4.98	41.46	100	336	Average
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	48.51	52.86	74	-25.49	32.21	4.88	41.44	112	22	Peak
2390	39.93	44.28	54	-14.07	32.21	4.88	41.44	112	22	Average
2437	102.93	107.11			32.34	4.93	41.45	112	22	Peak
2437	92.85	97.03			32.34	4.93	41.45	112	22	Average
2483.5	50.07	54.09	74	-23.93	32.46	4.98	41.46	112	22	Peak
2483.5	39.56	43.58	54	-14.44	32.46	4.98	41.46	112	22	Average

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
2. 2437MHz: Fundamental frequency.

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

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	48.06	51.52	74	-25.94	33.1	4.88	41.44	100	338	Peak
2390	40.06	43.52	54	-13.94	33.1	4.88	41.44	100	338	Average
2462	104.31	107.57			33.23	4.96	41.45	100	338	Peak
2462	96.52	99.78			33.23	4.96	41.45	100	338	Average
2483.5	63.97	67.18	74	-10.03	33.27	4.98	41.46	100	338	Peak
2483.5	49.91	53.12	54	-4.09	33.27	4.98	41.46	100	338	Average
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	47.85	52.2	74	-26.15	32.21	4.88	41.44	125	72	Peak
2390	39.19	43.54	54	-14.81	32.21	4.88	41.44	125	72	Average
2462	100.94	105.03			32.4	4.96	41.45	125	72	Peak
2462	92.37	96.46			32.4	4.96	41.45	125	72	Average
2483.5	60.65	64.67	74	-13.35	32.46	4.98	41.46	125	72	Peak
2483.5	46.46	50.48	54	-7.54	32.46	4.98	41.46	125	72	Average

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
2. 2462MHz: Fundamental frequency.

802.11n (20MHz)

CHANNEL	TX Channel 1	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	59.52	62.98	74	-14.48	33.1	4.88	41.44	100	360	Peak
2390	48.69	52.15	54	-5.31	33.1	4.88	41.44	100	360	Average
2412	95.08	98.49			33.14	4.9	41.45	100	360	Peak
2412	86.76	90.17			33.14	4.9	41.45	100	360	Average
2483.5	50.11	53.32	74	-23.89	33.27	4.98	41.46	100	360	Peak
2483.5	40.67	43.88	54	-13.33	33.27	4.98	41.46	100	360	Average
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	62.6	66.95	74	-11.4	32.21	4.88	41.44	126	22	Peak
2390	50.31	54.66	54	-3.69	32.21	4.88	41.44	126	22	Average
2412	98.43	102.71			32.27	4.9	41.45	126	22	Peak
2412	90.8	95.08			32.27	4.9	41.45	126	22	Average
2483.5	49.5	53.52	74	-24.5	32.46	4.98	41.46	126	22	Peak
2483.5	39.61	43.63	54	-14.39	32.46	4.98	41.46	126	22	Average

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
2. 2412MHz: Fundamental frequency.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	48.11	51.57	74	-25.89	33.1	4.88	41.44	100	0	Peak
2390	40.24	43.7	54	-13.76	33.1	4.88	41.44	100	0	Average
2437	93.88	97.21			33.19	4.93	41.45	100	0	Peak
2437	86.1	89.43			33.19	4.93	41.45	100	0	Average
2483.5	49.37	52.58	74	-24.63	33.27	4.98	41.46	100	0	Peak
2483.5	40.65	43.86	54	-13.35	33.27	4.98	41.46	100	0	Average
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	46.96	51.31	74	-27.04	32.21	4.88	41.44	100	220	Peak
2390	39.66	44.01	54	-14.34	32.21	4.88	41.44	100	220	Average
2437	100.26	104.44			32.34	4.93	41.45	100	220	Peak
2437	90.86	95.04			32.34	4.93	41.45	100	220	Average
2483.5	50.38	54.4	74	-23.62	32.46	4.98	41.46	100	220	Peak
2483.5	39.72	43.74	54	-14.28	32.46	4.98	41.46	100	220	Average

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
   2. 2437MHz: Fundamental frequency.

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

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	52.24	55.7	74	-21.76	33.1	4.88	41.44	100	360	Peak
2390	39.87	43.33	54	-14.13	33.1	4.88	41.44	100	360	Average
2462	88.96	92.22			33.23	4.96	41.45	100	360	Peak
2462	78.52	81.78			33.23	4.96	41.45	100	360	Average
2483.5	54.53	57.74	74	-19.47	33.27	4.98	41.46	100	360	Peak
2483.5	43.63	46.84	54	-10.37	33.27	4.98	41.46	100	360	Average
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	47.82	52.17	74	-26.18	32.21	4.88	41.44	100	70	Peak
2390	39.29	43.64	54	-14.71	32.21	4.88	41.44	100	70	Average
2462	100	104.09			32.4	4.96	41.45	100	70	Peak
2462	91.82	95.91			32.4	4.96	41.45	100	70	Average
2483.5	62.38	66.4	74	-11.62	32.46	4.98	41.46	100	70	Peak
2483.5	46.18	50.2	54	-7.82	32.46	4.98	41.46	100	70	Average

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
2. 2462MHz: Fundamental frequency.

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:

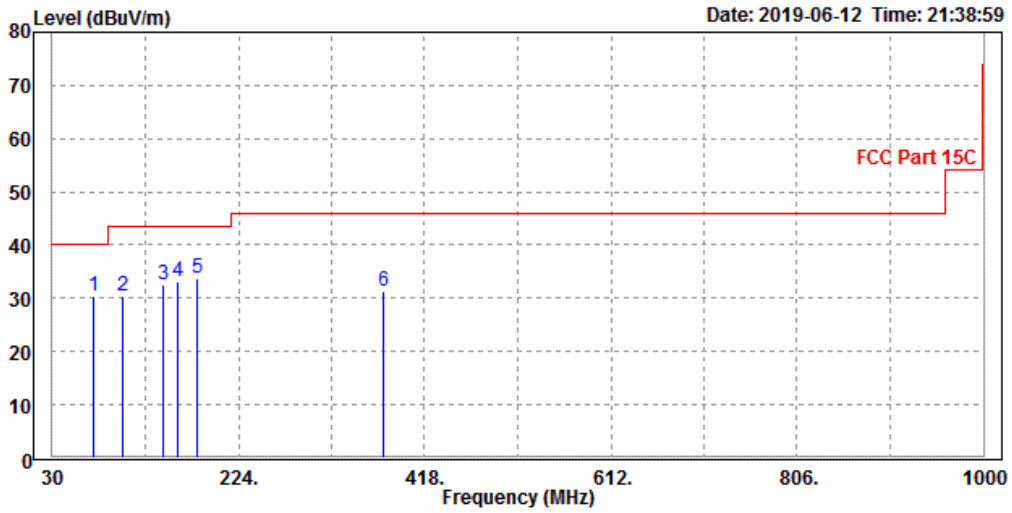
BT-LE (GFSK)

CHANNEL	TX Channel 39	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	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
73.65	30.29	58.7	40	-9.71	7.72	1.2	37.33	200	360	QP
102.75	30.27	56.56	43.5	-13.23	9.53	1.33	37.15	200	360	QP
146.4	32.69	58.6	43.5	-10.81	9.38	1.56	36.85	200	360	QP
160.95	33.05	57.63	43.5	-10.45	10.49	1.66	36.73	200	360	QP
180.35	33.69	58.32	43.5	-9.81	10.31	1.7	36.64	200	360	QP
375.32	31.35	49.21	46	-14.65	16.43	2.52	36.81	200	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

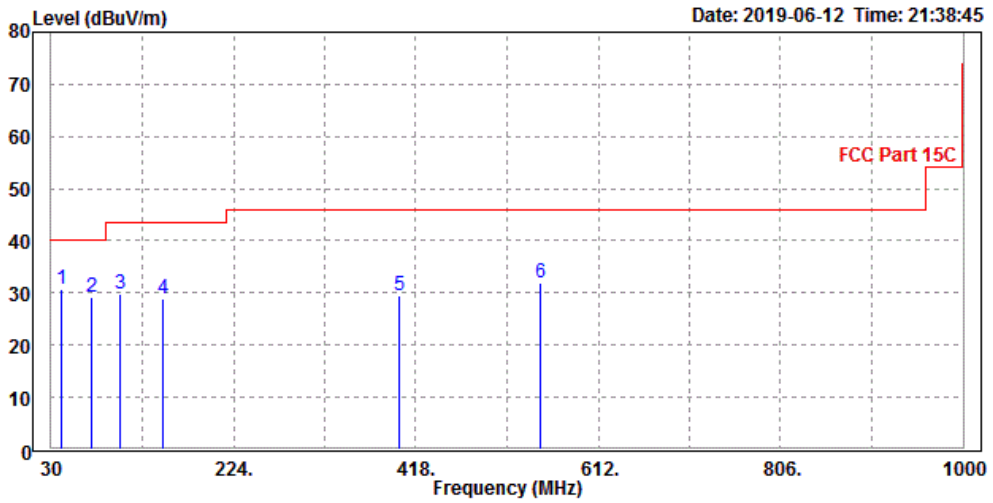


CHANNEL	TX Channel 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

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
41.64	**30.76**	**55.59**	**40**	**-9.24**	**11.7**	**0.95**	**37.48**	**100**	**0**	**QP**
73.65	29.25	57.52	40	-10.75	7.86	1.2	37.33	100	0	QP
102.75	29.8	55.97	43.5	-13.7	9.65	1.33	37.15	100	0	QP
149.31	28.83	54.46	43.5	-14.67	9.64	1.56	36.83	100	0	QP
399.57	29.62	46.54	46	-16.38	17.29	2.62	36.83	100	0	QP
549.92	31.81	46.52	46	-14.19	19.4	3.07	37.18	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



ABOVE 1GHz TEST DATA:

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

BT-LE (GFSK)

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

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	49.18	52.64	74	-24.82	33.1	4.88	41.44	100	78	Peak
2390	37.82	41.28	54	-16.18	33.1	4.88	41.44	100	69	Average
2402	100.83	104.26			33.12	4.89	41.44	100	78	Peak
2402	81.8	85.23			33.12	4.89	41.44	100	78	Average
2483.5	50.01	53.22	74	-23.99	33.27	4.98	41.46	100	78	Peak
2483.5	39.16	42.37	54	-14.84	33.27	4.98	41.46	100	78	Average
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	47.96	52.31	74	-26.04	32.21	4.88	41.44	100	25	Peak
2390	37.21	41.56	54	-16.79	32.21	4.88	41.44	100	25	Average
2402	100.94	105.24			32.25	4.89	41.44	100	25	Peak
2402	86.28	90.58			32.25	4.89	41.44	100	25	Average
2483.5	47.67	51.69	74	-26.33	32.46	4.98	41.46	100	25	Peak
2483.5	38.13	42.15	54	-15.87	32.46	4.98	41.46	100	25	Average

REMARKS:

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

CHANNEL	TX Channel 19	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	48.88	52.34	74	-25.12	33.1	4.88	41.44	100	123	Peak
2390	38.29	41.75	54	-15.71	33.1	4.88	41.44	100	123	Average
2440	100.33	103.65			33.19	4.94	41.45	100	123	Peak
2440	84.19	87.51			33.19	4.94	41.45	100	123	Average
2483.5	50.25	53.46	74	-23.75	33.27	4.98	41.46	100	123	Peak
2483.5	39.37	42.58	54	-14.63	33.27	4.98	41.46	100	123	Average
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	48.03	52.38	74	-25.97	32.21	4.88	41.44	100	98	Peak
2390	37.22	41.57	54	-16.78	32.21	4.88	41.44	100	98	Average
2440	101.25	105.42			32.34	4.94	41.45	100	98	Peak
2440	85.08	89.25			32.34	4.94	41.45	100	98	Average
2483.5	48.12	52.14	74	-25.88	32.46	4.98	41.46	100	98	Peak
2483.5	38.29	42.31	54	-15.71	32.46	4.98	41.46	100	98	Average

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
2. 2440MHz: Fundamental frequency.

CHANNEL	TX Channel 39	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	50.17	53.63	74	-23.83	33.1	4.88	41.44	100	125	Peak
2390	38.77	42.23	54	-15.23	33.1	4.88	41.44	100	125	Average
2480	100.8	104.02			33.26	4.98	41.46	100	125	Peak
2480	80	83.22			33.26	4.98	41.46	100	125	Average
2483.5	49.76	52.97	74	-24.24	33.27	4.98	41.46	100	125	Peak
2483.5	40.15	43.36	54	-13.85	33.27	4.98	41.46	100	125	Average
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	48.04	52.39	74	-25.96	32.21	4.88	41.44	100	65	Peak
2390	36.92	41.27	54	-17.08	32.21	4.88	41.44	100	65	Average
2480	100.25	104.28			32.45	4.98	41.46	100	65	Peak
2480	83.58	87.61			32.45	4.98	41.46	100	65	Average
2483.5	47.76	51.78	74	-26.24	32.46	4.98	41.46	100	65	Peak
2483.5	38.3	42.32	54	-15.7	32.46	4.98	41.46	100	65	Average

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
2. 2480MHz: 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	Feb. 26,19	Feb. 25,20
EXA Signal Analyzer	KEYSIGHT	N9010A-526	MY54510322	Feb. 26,19	Feb. 25,20
EXA Signal Analyzer	KEYSIGHT	N9010A-544	MY54510355	Feb. 26,19	Feb. 25,20
Power Sensor	ANRITSU	MA2411B	1339352	Feb. 26,19	Feb. 25,20

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 RF Oven room.

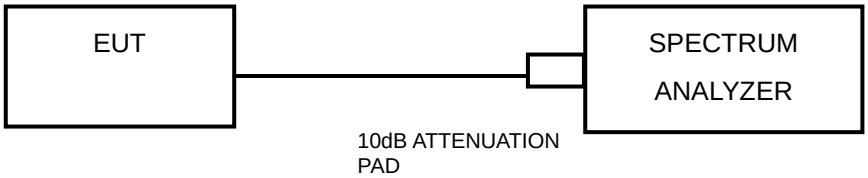
3.3.3 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 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



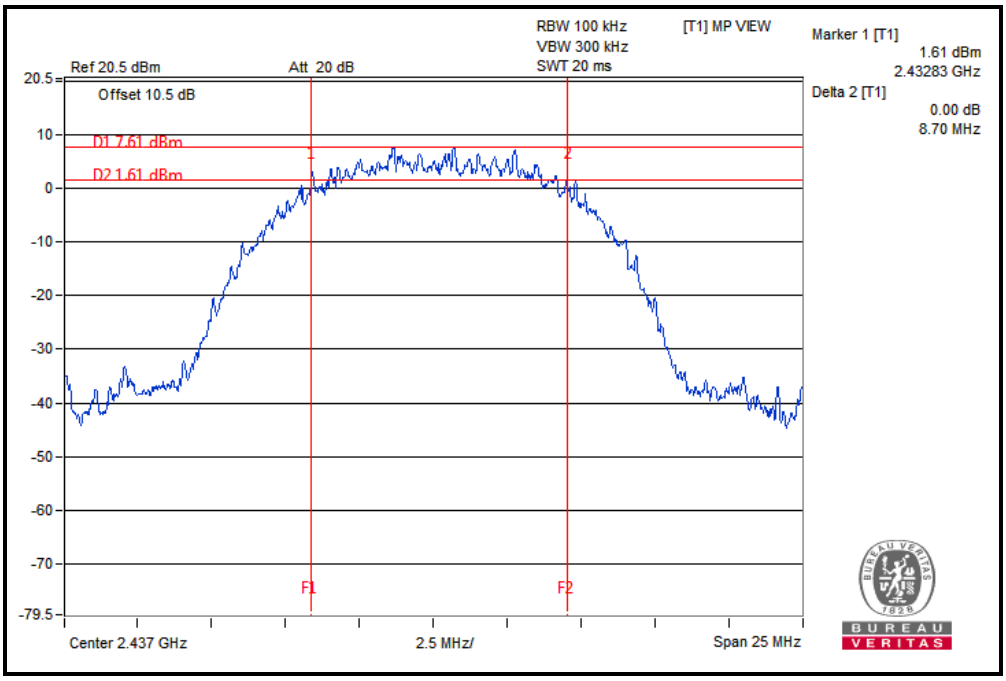
3.3.6 EUT OPERATING CONDITIONS

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

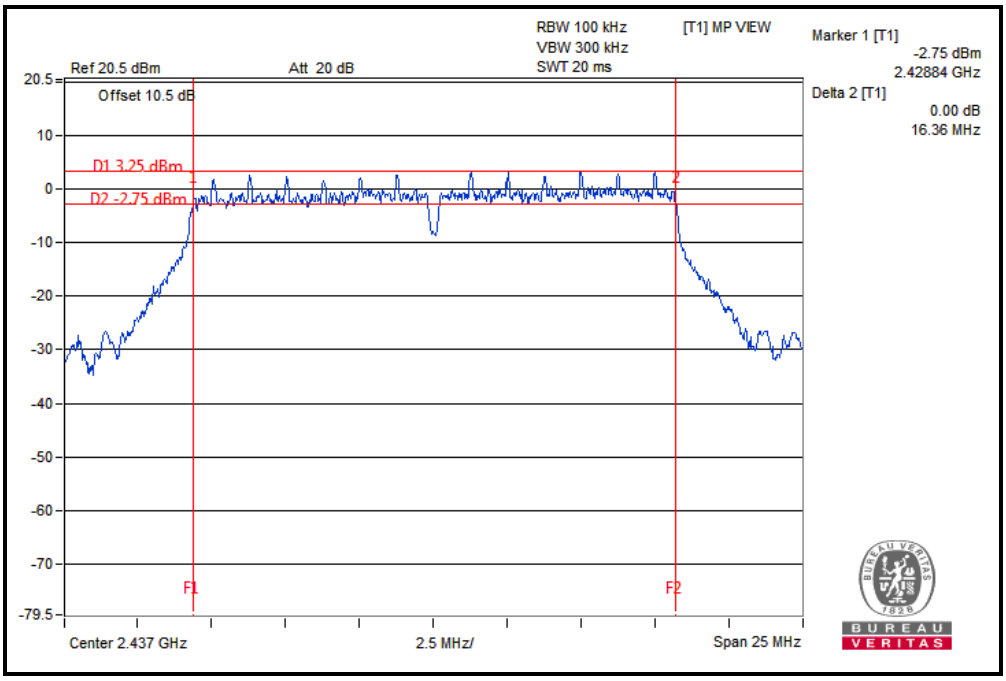
802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	8.35	0.5	PASS
6	2437	8.70	0.5	PASS
11	2462	8.68	0.5	PASS



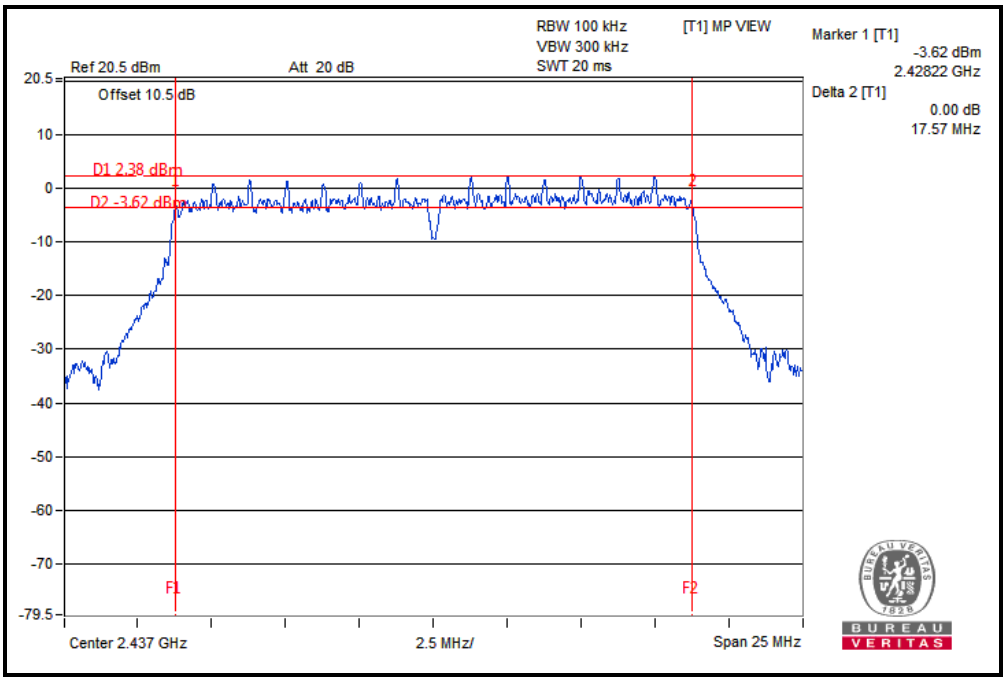
802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.34	0.5	PASS
6	2437	16.36	0.5	PASS
11	2462	16.36	0.5	PASS



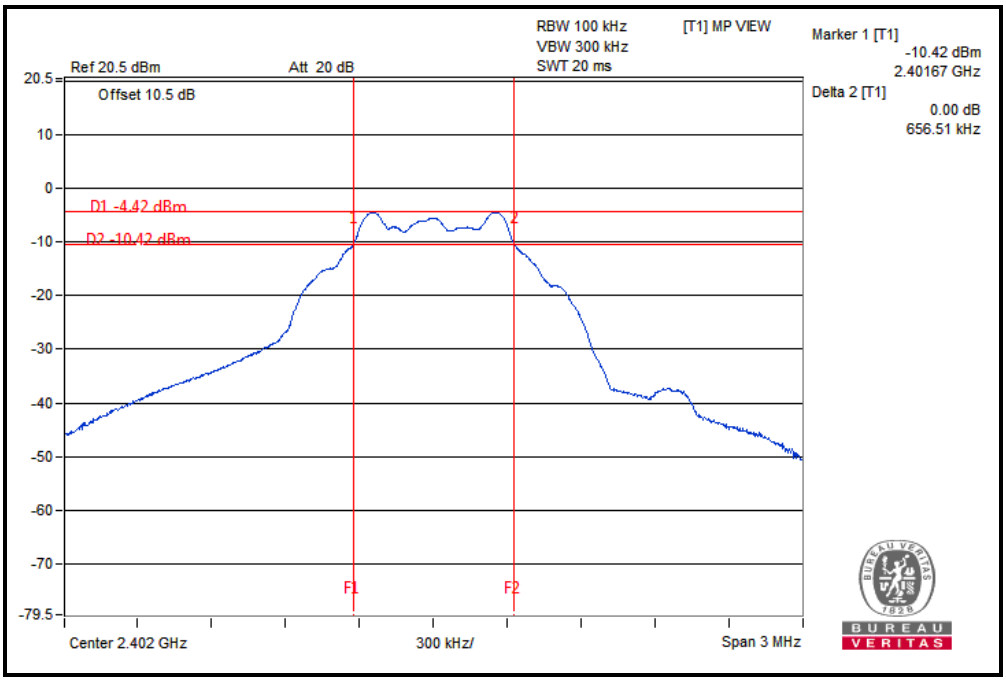
802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	17.32	0.5	PASS
6	2437	17.57	0.5	PASS
11	2462	17.56	0.5	PASS



BT-LE (GFSK)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	0.66	0.5	PASS
19	2440	0.66	0.5	PASS
39	2480	0.66	0.5	PASS

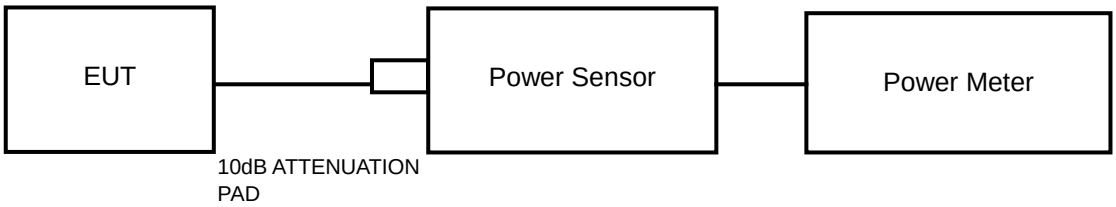


3.4 CONDUCTED OUTPUT POWER

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.

3.4.7 TEST RESULTS

3.4.7.1 MAXIMUM PEAK OUTPUT POWER

802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT(W)	PASS/FAIL
1	2412	19.11	81.470	1	PASS
6	2437	18.57	71.945	1	PASS
11	2462	18.88	77.268	1	PASS

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT(W)	PASS/FAIL
1	2412	22.68	**185.353**	1	PASS
6	2437	22.12	162.930	1	PASS
11	2462	21.81	151.705	1	PASS

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT(W)	PASS/FAIL
1	2412	21.84	152.757	1	PASS
6	2437	21.71	148.252	1	PASS
11	2462	21.57	143.549	1	PASS

BT-LE (GFSK)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT(W)	PASS/FAIL
0	2402	1.97	**1.574**	1	PASS
19	2440	-0.19	0.957	1	PASS
39	2480	-0.18	0.959	1	PASS

3.4.7.2 AVERAGE OUTPUT POWER (FOR REFERENCE)

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

802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	PASS/FAIL
1	2412	16.13	N/A
6	2437	15.47	N/A
11	2462	15.81	N/A

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	PASS/FAIL
1	2412	14.65	N/A
6	2437	14.26	N/A
11	2462	13.99	N/A

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	PASS/FAIL
1	2412	13.79	N/A
6	2437	13.38	N/A
11	2462	13.27	N/A

BT-LE (GFSK)

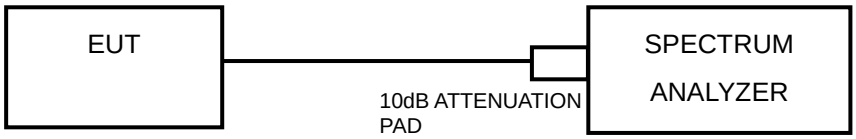
CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	PASS/FAIL
0	2402	1.69	N/A
19	2440	-0.44	N/A
39	2480	-0.42	N/A

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 ≥ 3 x 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.

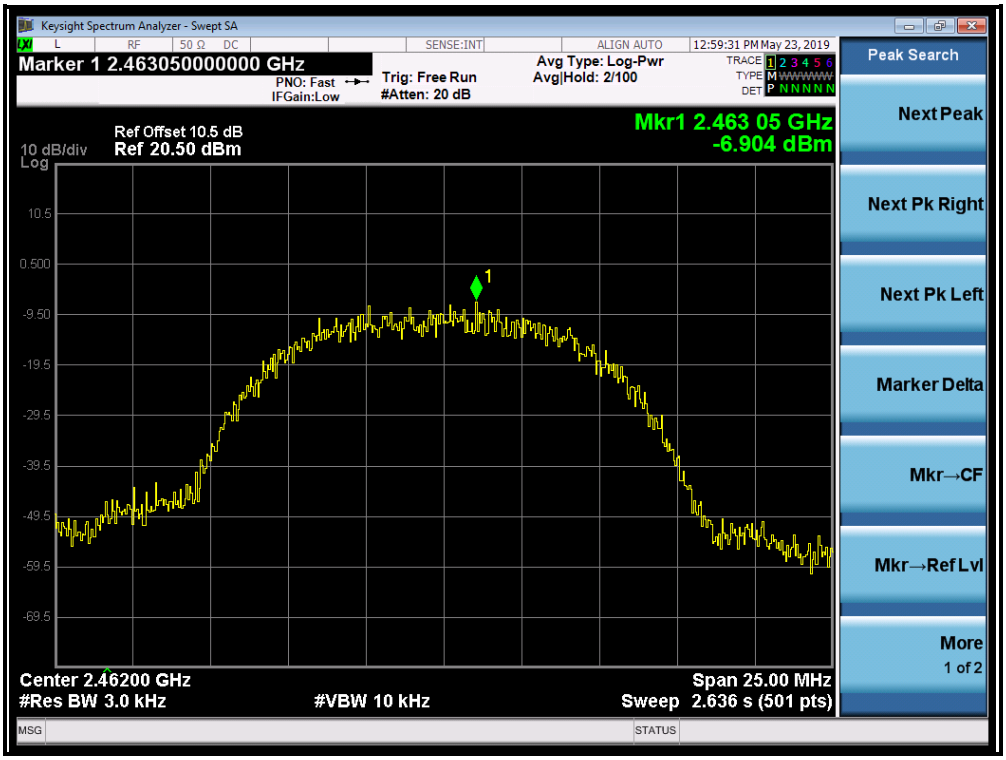
3.5.6 EUT OPERATING CONDITION

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

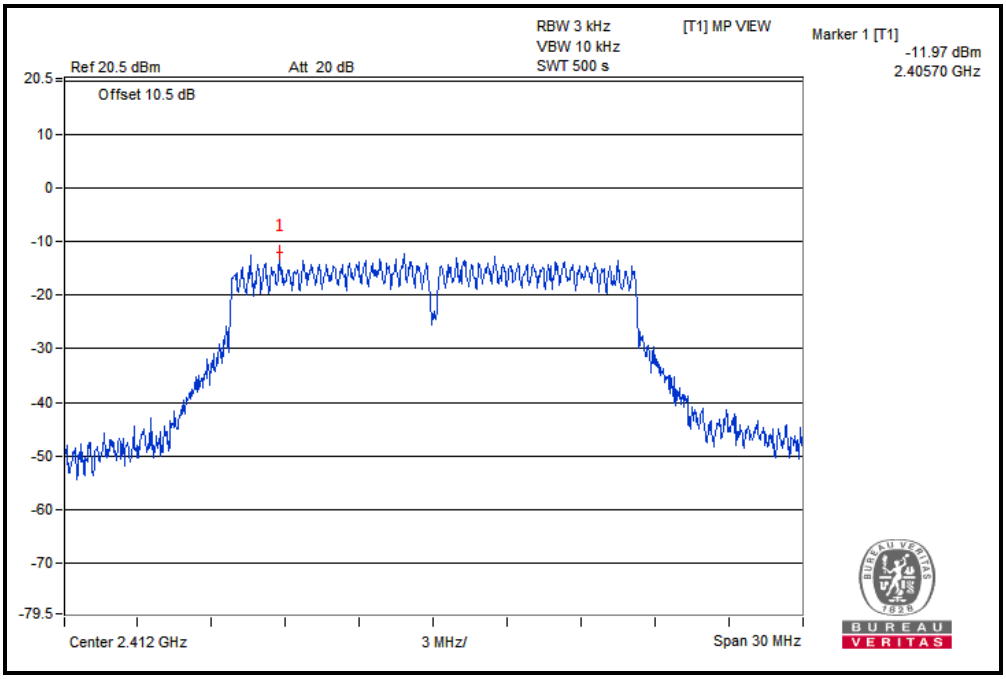
802.11b

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-7.54	8	PASS
6	2437	-7.17	8	PASS
11	2462	-6.90	8	PASS



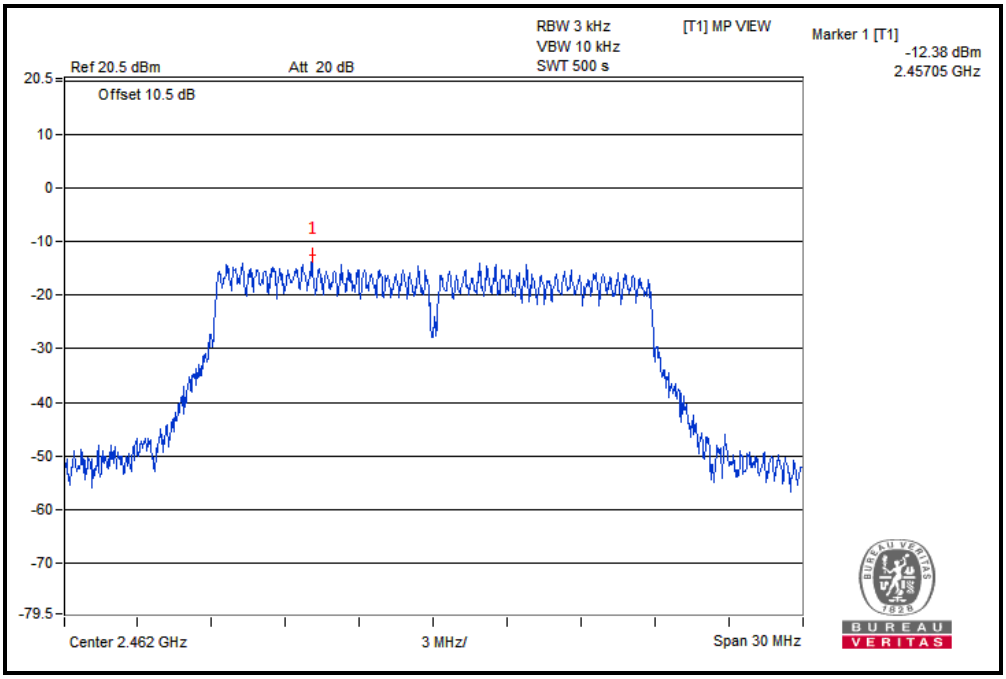
802.11g

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-11.97	8	PASS
6	2437	-12.24	8	PASS
11	2462	-12.02	8	PASS



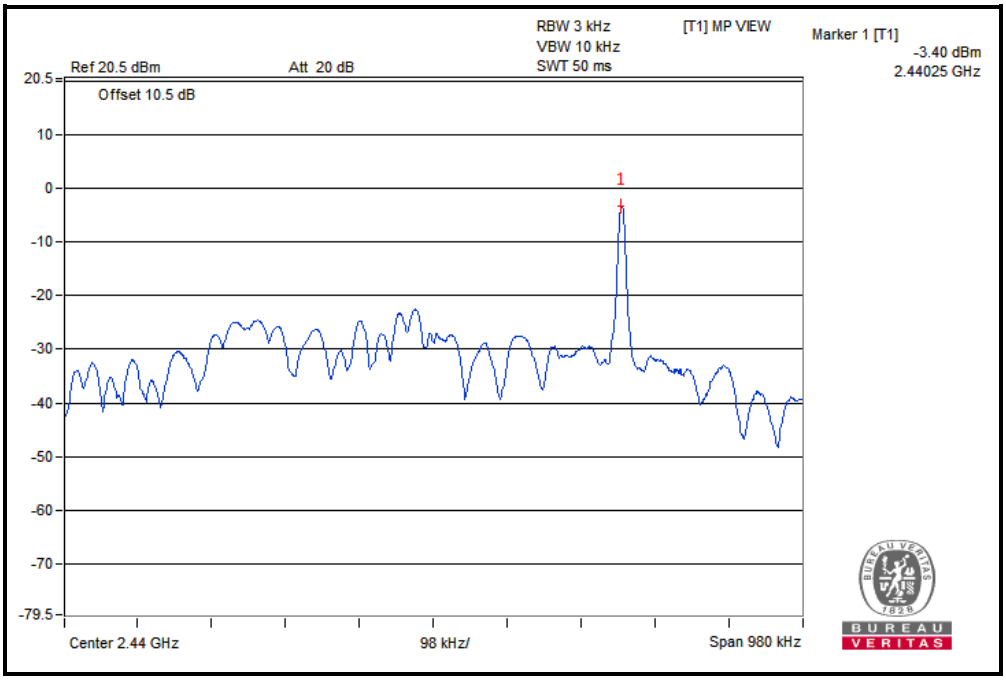
802.11n (20MHz)

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-12.83	8	PASS
6	2437	-12.74	8	PASS
11	2462	-12.38	8	PASS



BT-LE (GFSK)

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	2402	-4.43	8	PASS
19	2440	-3.40	8	PASS
39	2480	-4.59	8	PASS

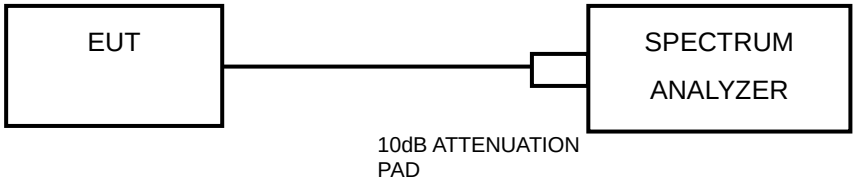


3.6 OUT OF BAND EMISSION MEASUREMENT

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 ≥ 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 OOBE

1. Set RBW = 100 kHz.
2. Set VBW ≥ 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

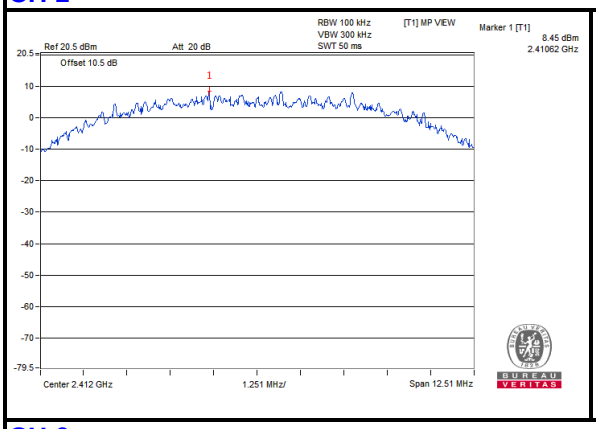
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

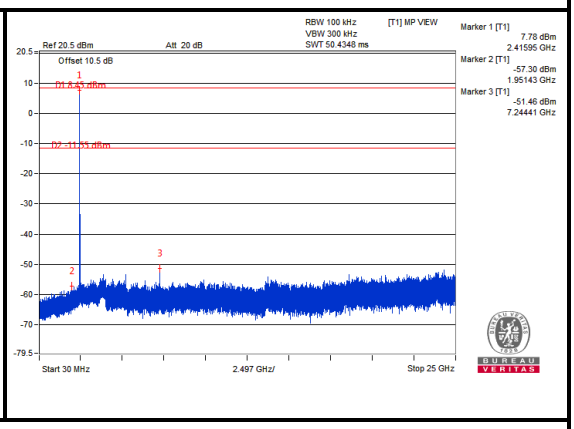
3.6.7 TEST RESULTS

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.

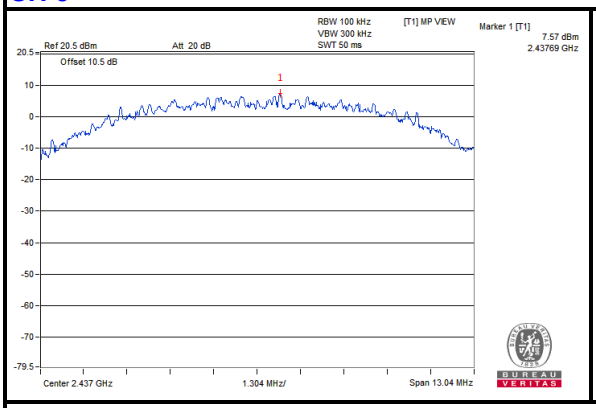
802.11b

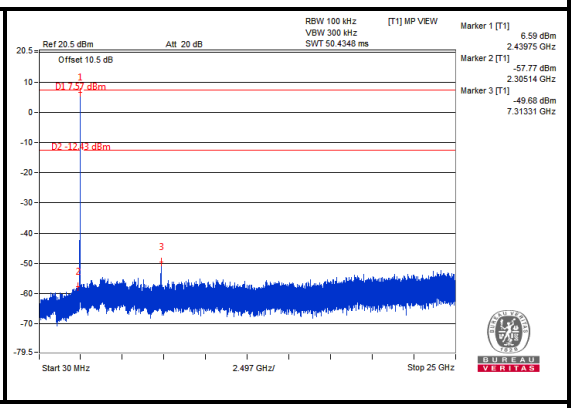
CH 1



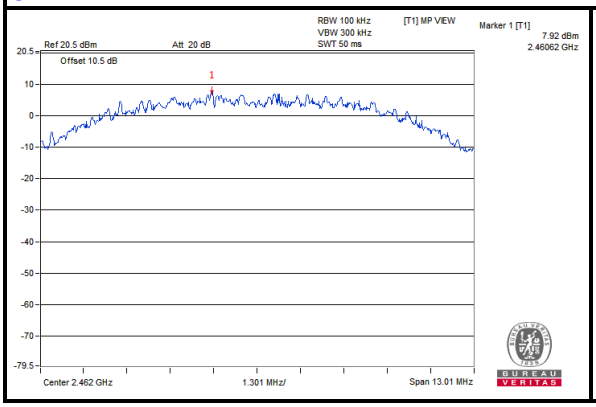


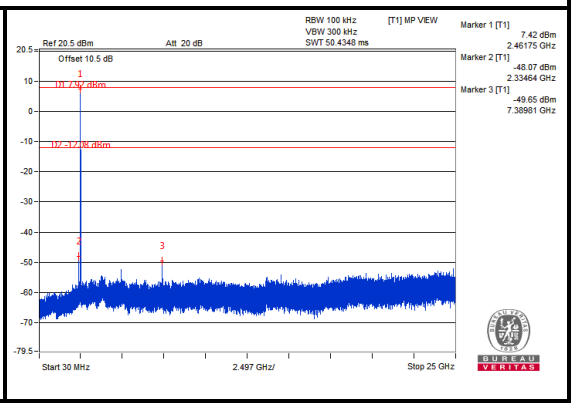
CH 6

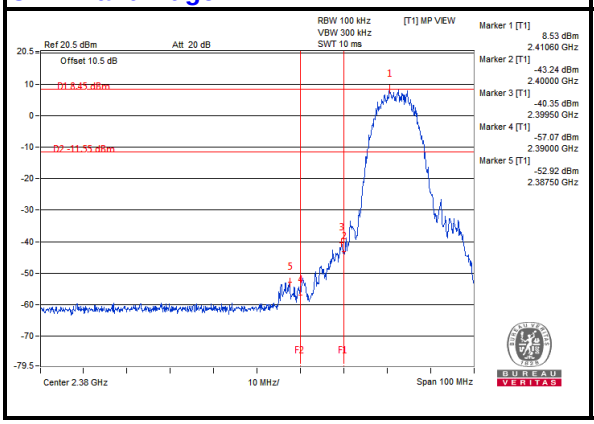
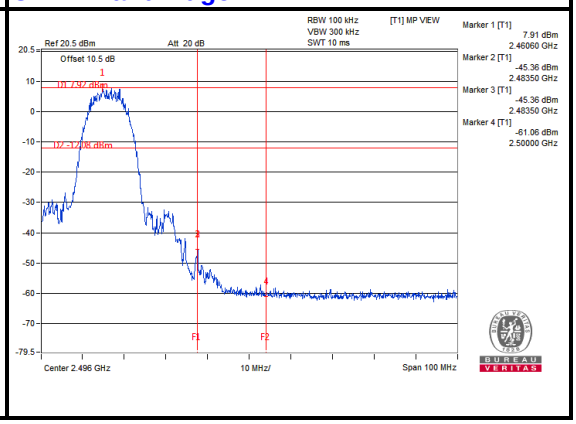




CH 11

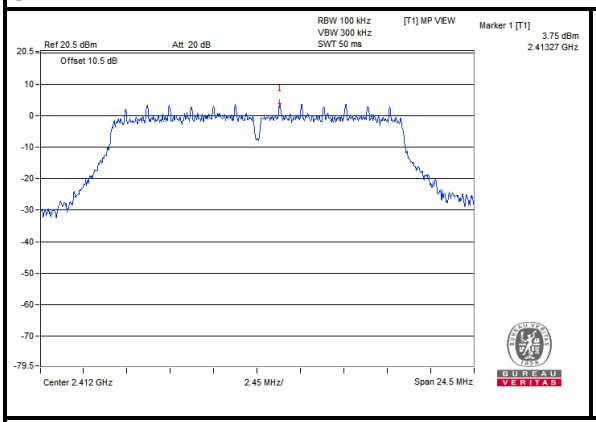


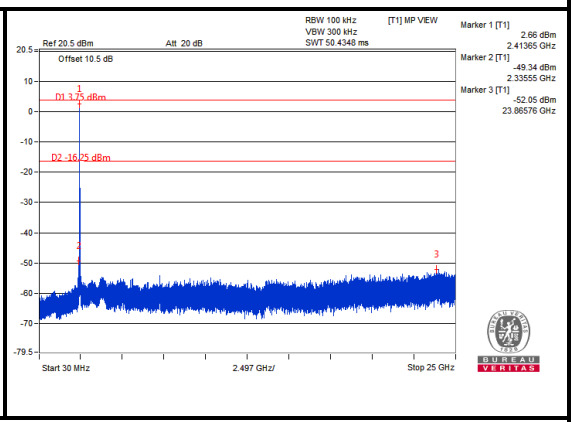


CH 1 Band Edge	CH 11 Band Edge
	

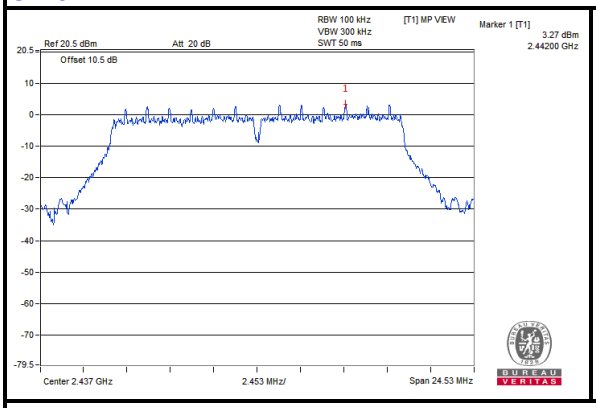
802.11g

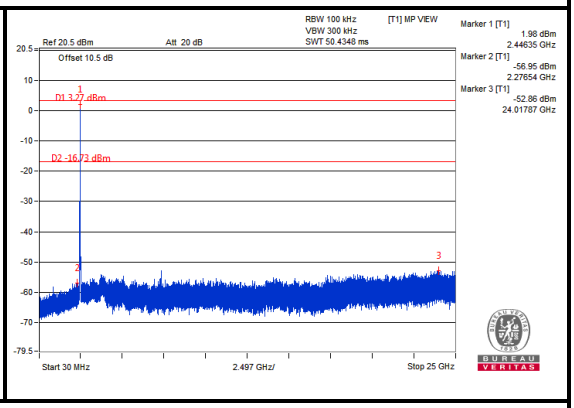
CH 1



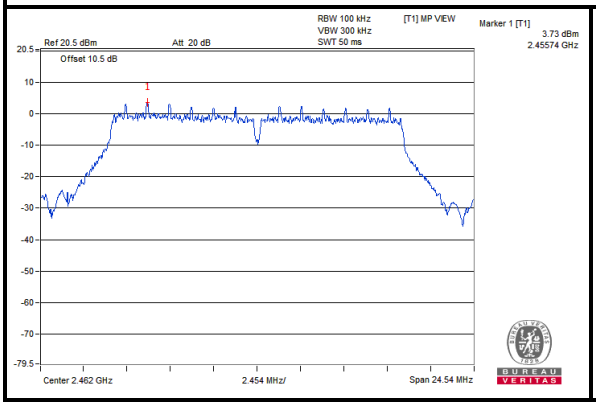


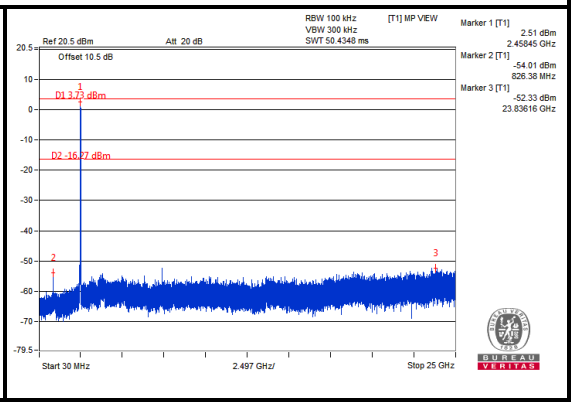
CH 6

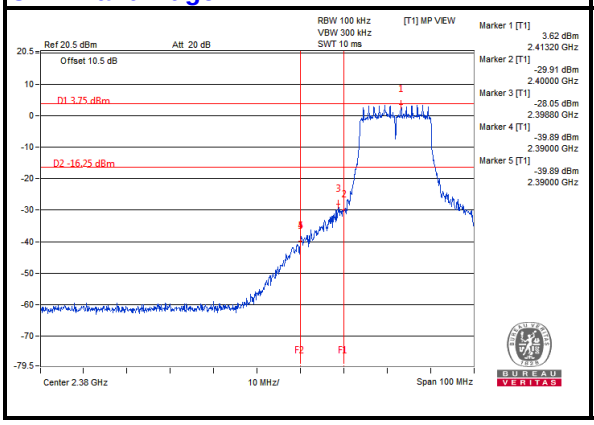
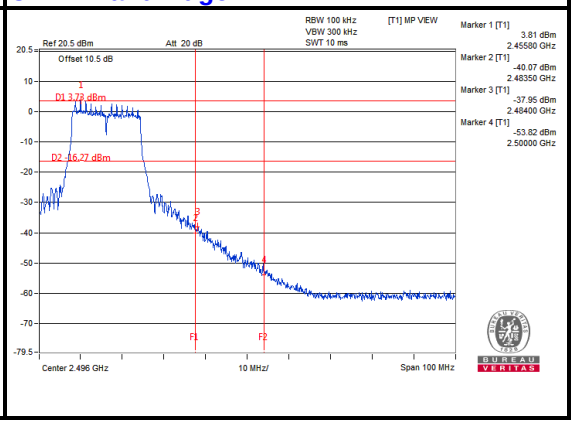




CH 11

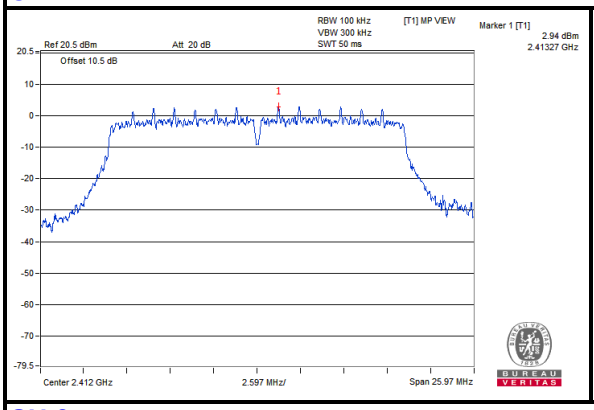


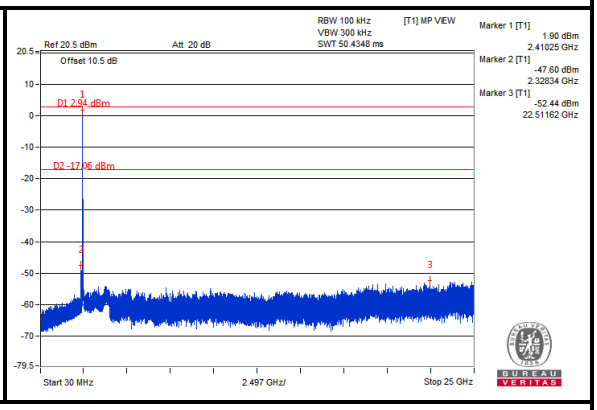


CH 1 Band Edge	CH 11 Band Edge
	

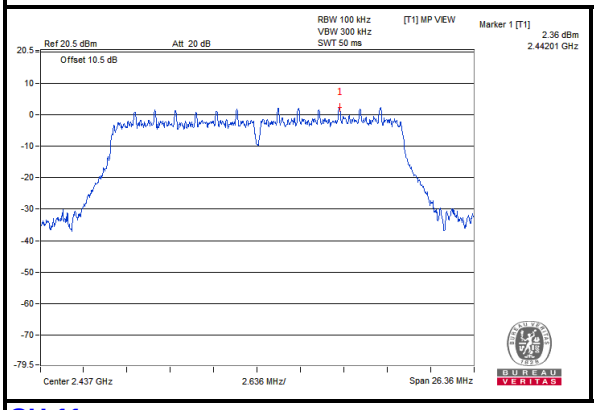
802.11n (20MHz)

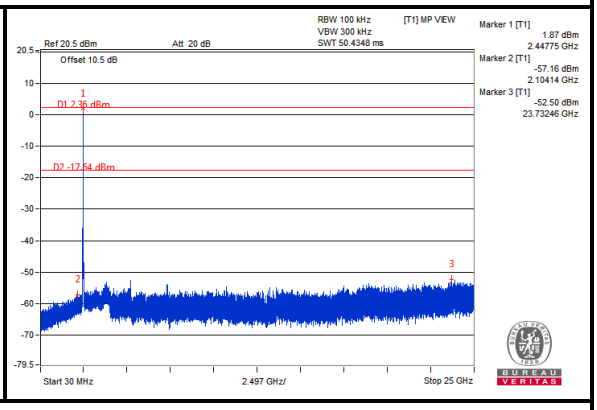
CH 1



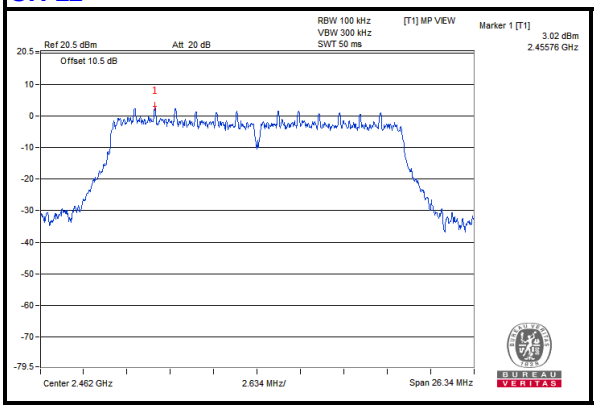


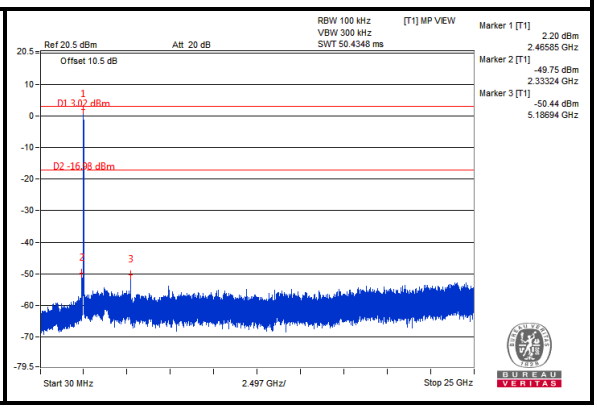
CH 6

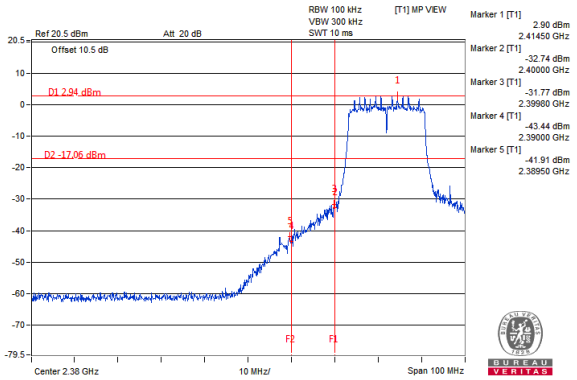
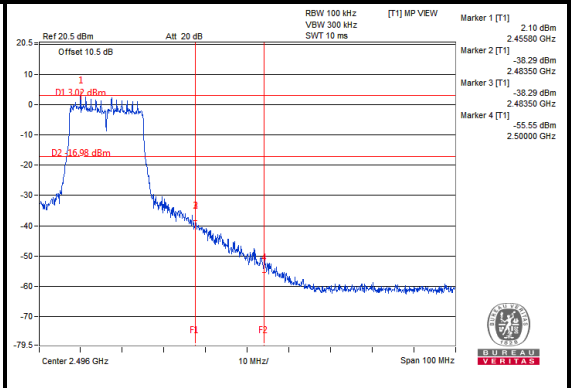




CH 11

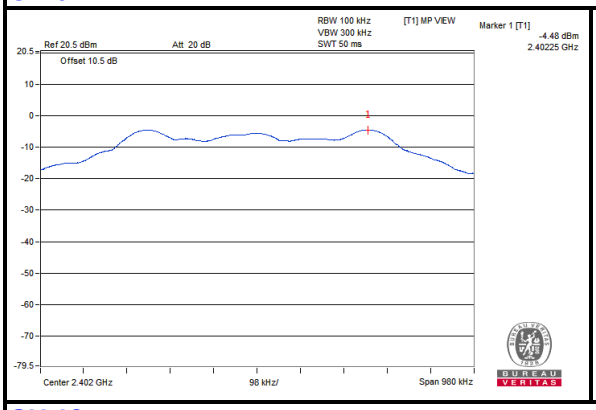


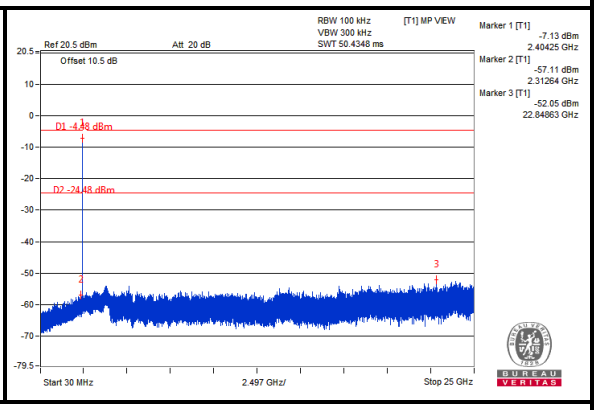


CH 1 Band Edge	CH 11 Band Edge
	

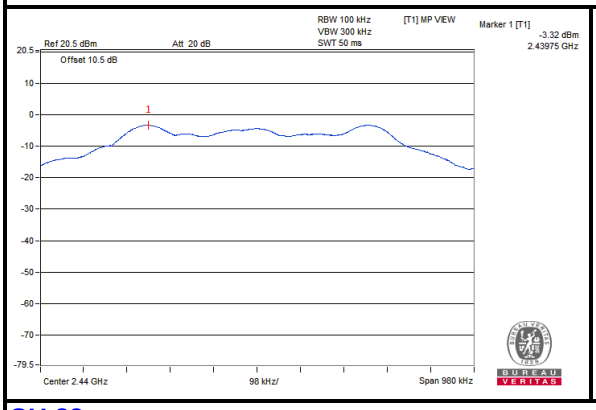
BT-LE (GFSK)

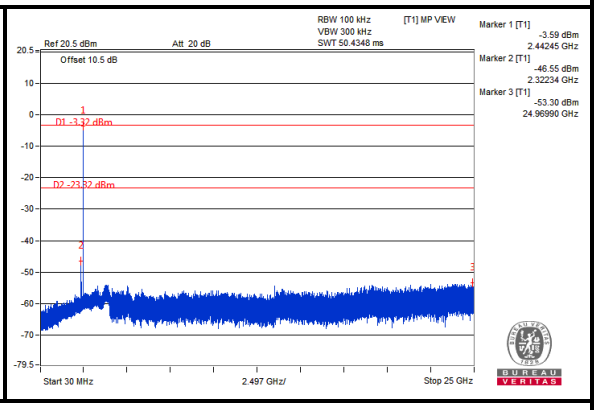
CH 0



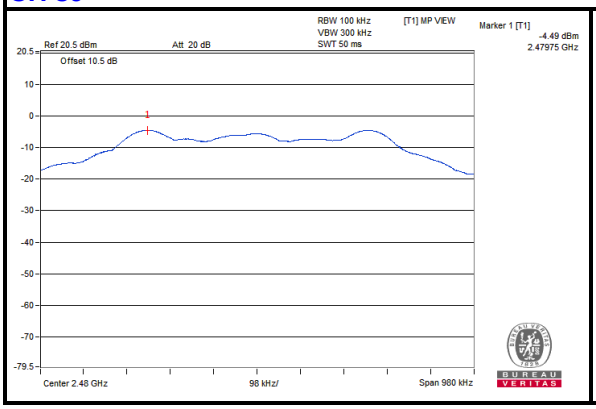


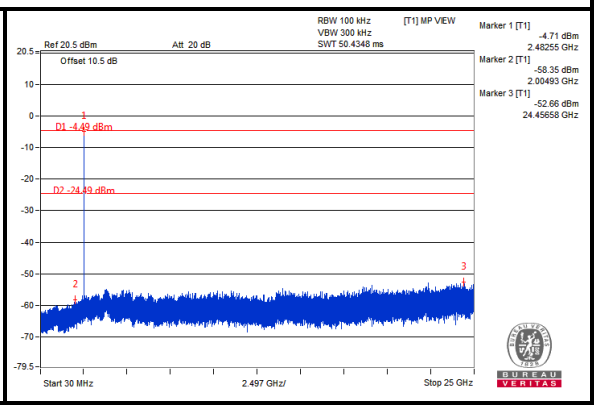
CH 19

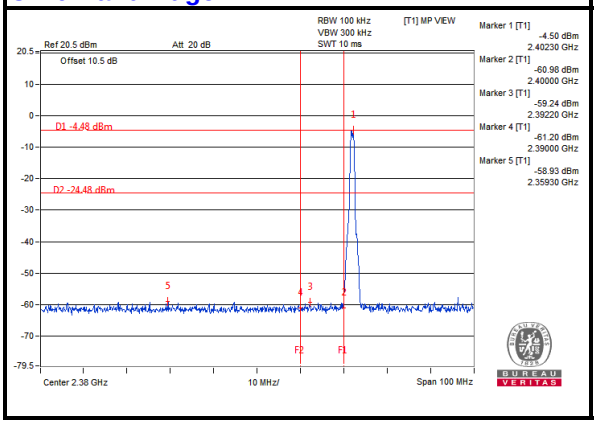
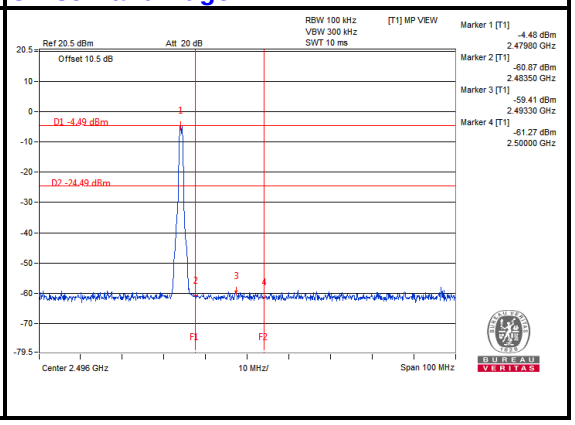




CH 39





CH 0 Band Edge	CH 39 Band Edge
	

4 PHOTOGRAPHS OF THE TEST CONFIGURATION

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

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---