

## FCC Test Report

**Report No.:** RF171110W004-2

**FCC ID:** 2AJOTTA-1016

**Test Model:** TA-1016

**Received Date:** Nov. 13, 2017

**Test Date:** Nov. 14, 2017 ~ Dec. 26, 2017

**Issued Date:** Jan. 02, 2018

**Applicant:** HMD Global Oy

**Address:** Karaportti 2, 02610 Espoo, Finland

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

**Lab Address:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan ( R.O.C )

**Test Location (1):** NO. B102, Dazhu Chuangxin Mansion, North of Beihuan Avenue, North Area, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong 518057, China

**Test Location (2):** No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

**FCC Registration /  
Designation Number:** 788550 / TW0003



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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF171110W004-2	Original release	Jan. 02, 2018

# 1 CERTIFICATION

**Product:** Smart Phone

**Brand:** Nokia

**Test Model:** TA-1016

**Sample Status:** Identical Prototype

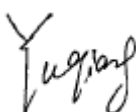
**Applicant:** HMD Global Oy

**Test Date:** Nov. 14, 2017 ~ Dec. 26, 2017

**Standards:** 47 CFR FCC Part 15, Subpart C (Section 15.247)

ANSI C63.10:2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**Prepared by :**  **Date:** Jan. 02, 2018  
Yuqiang Yin / Engineer

**Approved by :**  **Date:** Jan. 02, 2018  
Dylan Chiou / Project Engineer

## 2 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 -12.63dB at 10.504000MHz.
15.205 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -7.95dB at 2483.5MHz.
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

### 2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	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  $k = 2$ .

### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	Smart Phone
<b>BRAND NAME</b>	Nokia
<b>MODEL NAME</b>	TA-1016
<b>NOMINAL VOLTAGE</b>	5/9Vdc (adapter or host equipment) 3.85Vdc (Li-ion, battery)
<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: 2 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: 211.35mW (Maximum) BT-LE: 0.97mW (Maximum)
<b>ANTENNA TYPE</b>	PIFA Antenna with -1.7dBi gain
<b>HW VERSION</b>	5
<b>SW VERSION</b>	00WW_1_300
<b>I/O PORTS</b>	Refer to user's manual
<b>CABLE SUPPLIED</b>	USB cable: non-shielded, detachable, 1.0meter Earphone cable: non-shielded, detachable, 1.4meter

#### NOTE:

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

- 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	MANUFACTURER	SPECIFICATION
Adapter 1	Nokia	FC0302	Salcomp	I/P: 100-240Vac, 0.5A O/P: 5Vdc, 2.5A/ 9Vdc, 2.0A / 12Vdc, 1.5A
Adapter 2	Nokia	AD-18WU	DVE	I/P: 100-240Vac, 0.5A O/P: 5Vdc, 2.5A/ 9Vdc, 2.0A / 12Vdc, 1.5A
Adapter 3	Nokia	AD-18WU	Salcomp	I/P: 100-240Vac, 0.5A O/P: 5Vdc, 3.0A/ 9Vdc, 2.0A / 12Vdc, 1.5A
Battery	SCUD	HE345	SCUD	Rating: 3.85Vdc, 3000mAh
Earphone 1	Foxconn	WH-108	Foxconn	1.4m non-shielded cable w/o core
Earphone 2	Foxconn	WH-108	OBO PRO.2 INC.	1.4m non-shielded cable w/o core
USB Cable 1	FIT	CUDU01B-FA203-DH	Foxconn	1.0m non-shielded cable w/o core
USB Cable 2	Shenglan	JCT024-F001	Shenglan	1.0m non-shielded cable w/o core
USB Cable 3	Yinrun	YR680004-A	Yinrun	1.0m non-shielded cable w/o core



### 3.2 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

### 3.2.1 CONFIGURATION OF SYSTEM UNDER TEST

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

### 3.2.2 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(1MHz)	0 to 39	39	DTS	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(1MHz)	0 to 39	0,19, 39	DTS	GFSK	1
BT-LE(2MHz)	0 to 39	0,19, 39	DTS	GFSK	2

#### **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(1MHz)	0 to 39	0, 39	DTS	GFSK	1
BT-LE(2MHz)	0 to 39	0, 39	DTS	GFSK	2

#### **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(1MHz)	0 to 39	0, 19, 39	DTS	GFSK	1
BT-LE(2MHz)	0 to 39	0, 19, 39	DTS	GFSK	2

#### **TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE	TESTED BY
RE<1G	22deg. C, 54%RH	DC 5/9V from adaptor	Simon Yang
RE≥1G	22deg. C, 54%RH	DC 5/9V from adaptor	Simon Yang
PLC	24deg. C, 55%RH	DC 5/9V from adaptor	Felix Chen
APCM	25deg. C, 60%RH	3.85Vdc from battery	Wenliang Wu

### 3.3 Duty Cycle of Test Signal

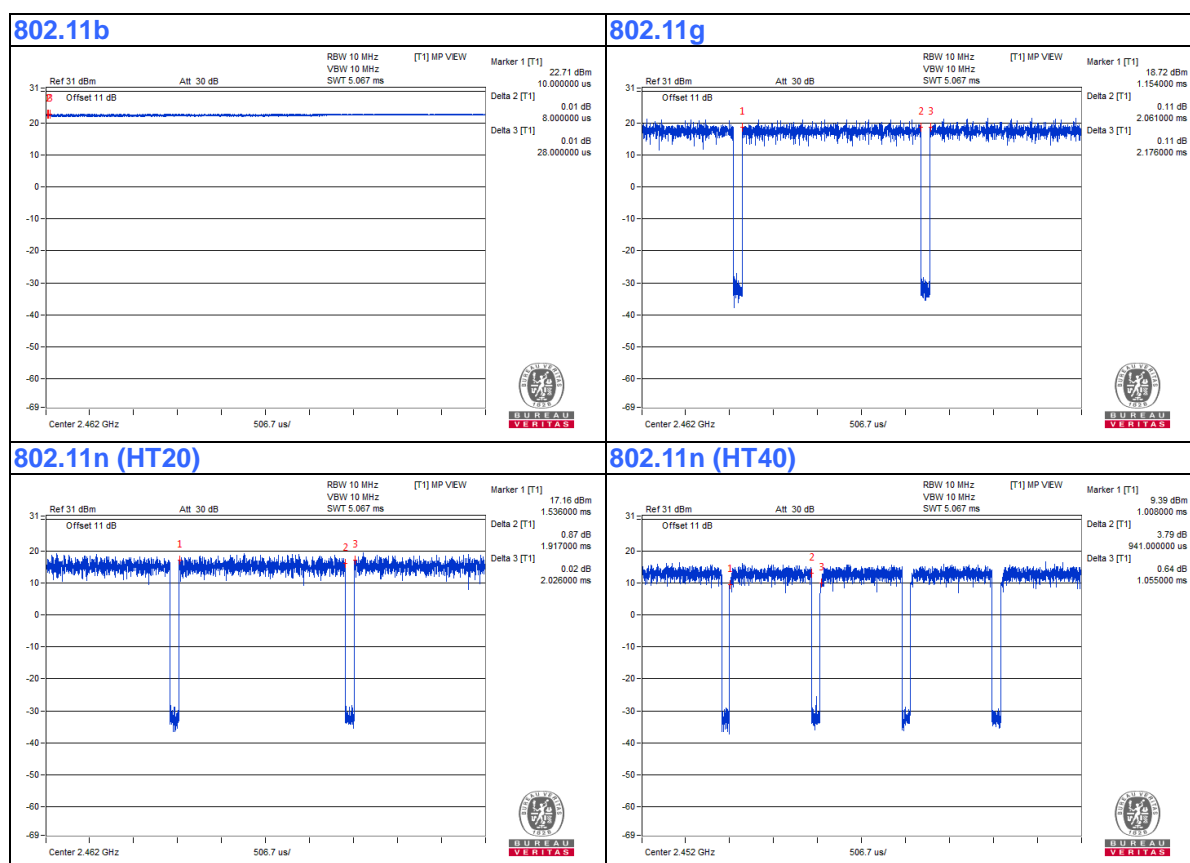
#### WIFI 2.4GHz

**802.11b:** Duty cycle = 100%

**802.11g:** Duty cycle =  $2.061/2.176 = 0.947 < 98\%$ , Duty factor =  $10 * \log(1/0.947) = 0.236$

**802.11n (HT20):** Duty cycle =  $1.917/2.026 = 0.946 < 98\%$ , Duty factor =  $10 * \log(1/0.946) = 0.240$

**802.11n (HT40):** Duty cycle =  $0.941/1.055 = 0.892 < 98\%$ , Duty factor =  $10 * \log(1/0.892) = 0.497$



### 3.4 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 (Doc). The test report has been issued separately.

### 3.5 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

## 4 TEST TYPES AND RESULTS

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 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.

#### 4.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESR3	101900	Jun. 28,17	Jun. 27,18
EMC32 test software	Rohde&Schwarz	EMC32	NA	NA	NA
LISN network	Rohde&Schwarz	ENV216	101922	Sep. 18,17	Sep. 17,18

**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.

#### 4.1.3 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.

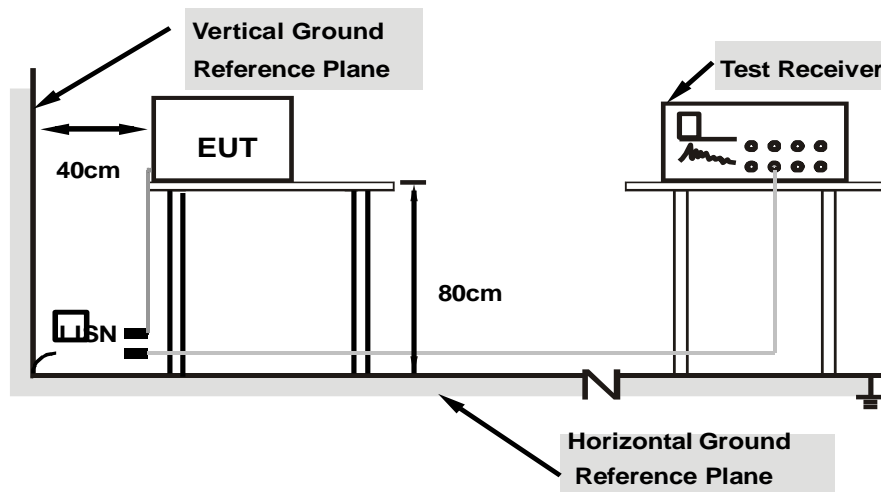
**NOTE:** All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation.



#### 4.1.5 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).

#### 4.1.6 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.

#### 4.1.7 TEST RESULTS

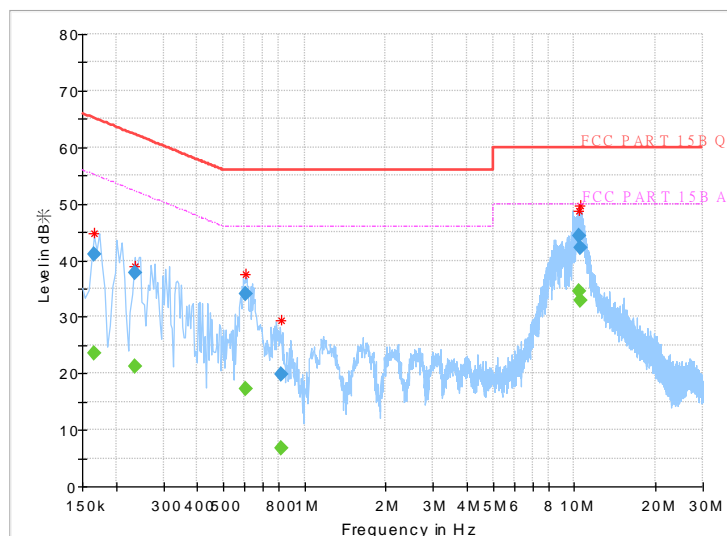
##### CONDUCTED WORST-CASE DATA:

Frequency Range	150KHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120Vac, 60Hz	Environmental Conditions	24deg. C, 55RH
Tested By	Felix Chen	TEST DATE	2017/11/14

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Line	Filter	Corr. (dB)
0.166000	---	23.60	55.16	-31.56	L	ON	9.7
0.166000	41.13	---	65.16	-24.03	L	ON	9.7
0.236000	---	21.18	52.24	-31.06	L	ON	9.7
0.236000	37.71	---	62.24	-24.53	L	ON	9.7
0.604000	---	17.29	46.00	-28.71	L	ON	9.7
0.604000	33.95	---	56.00	-22.05	L	ON	9.7
0.820000	---	6.67	46.00	-39.33	L	ON	9.7
0.820000	19.76	---	56.00	-36.24	L	ON	9.7
10.432000	---	34.54	50.00	-15.46	L	ON	9.9
10.432000	44.29	---	60.00	-15.71	L	ON	9.9
10.536000	---	32.91	50.00	-17.09	L	ON	9.9
10.536000	42.30	---	60.00	-17.70	L	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

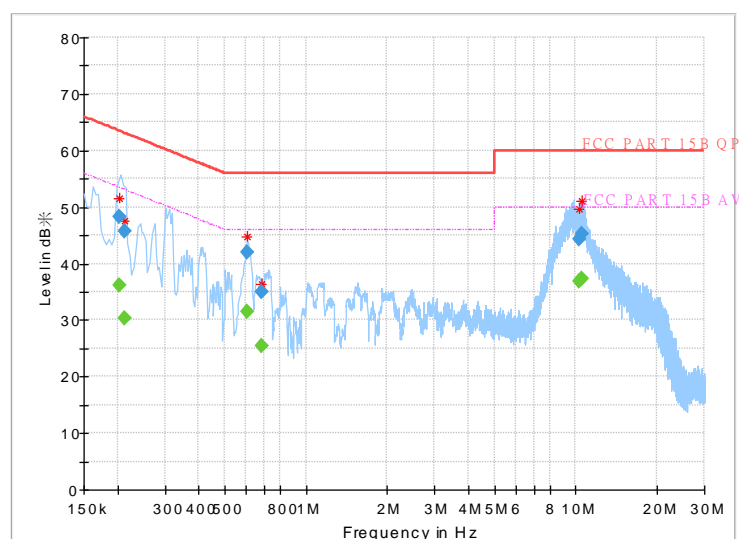


Frequency Range	150KHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120Vac, 60Hz	Environmental Conditions	24deg. C, 55RH
Tested By	Felix Chen	TEST DATE	2017/11/14

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Line	Filter	Corr. (dB)
0.204000	---	36.10	53.45	-17.35	N	ON	9.9
0.204000	48.36	---	63.45	-15.09	N	ON	9.9
0.212000	---	30.41	53.13	-22.72	N	ON	9.9
0.212000	45.82	---	63.13	-17.31	N	ON	9.9
0.604000	---	31.45	46.00	-14.55	N	ON	10.1
0.604000	41.88	---	56.00	-14.12	N	ON	10.1
0.684000	---	25.49	46.00	-20.51	N	ON	10.0
0.684000	34.92	---	56.00	-21.08	N	ON	10.0
10.248000	---	36.81	50.00	-13.19	N	ON	9.9
10.248000	44.39	---	60.00	-15.61	N	ON	9.9
<b>10.504000</b>	---	<b>37.37</b>	<b>50.00</b>	<b>-12.63</b>	<b>N</b>	<b>ON</b>	<b>9.9</b>
10.504000	45.36	---	60.00	-14.64	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



Note: Conducted Emission was performed by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch.**

## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 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.

#### 4.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	Euroshieldpn-CT0001143-1216	May 06,17	May 05,18
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. 24,17	Jul. 23,18
MXE EMI Receiver	KEYSIGHT	N9038A-544	MY54450026	Mar. 10,17	Mar. 09,18
Signal Pre-Amplifier	EMSI	EMC 9135	980249	Jul. 24,17	Jul. 23,18
Signal Pre-Amplifier	EMSI	EMC 012645B	980257	Jul. 24,17	Jul. 23,18
Signal Pre-Amplifier	EMSI	EMC 184045B	980259	Jul. 24,17	Jul. 23,18

- 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.

#### 4.2.3 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:**

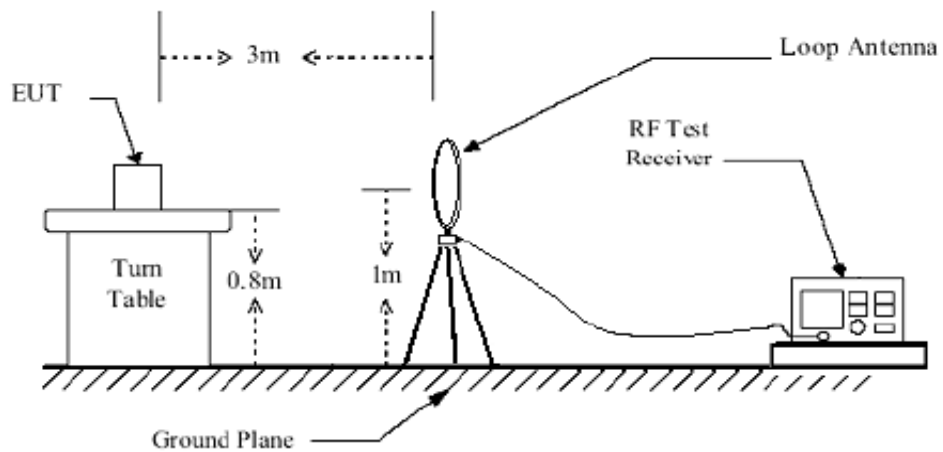
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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 was 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.

#### 4.2.4 DEVIATION FROM TEST STANDARD

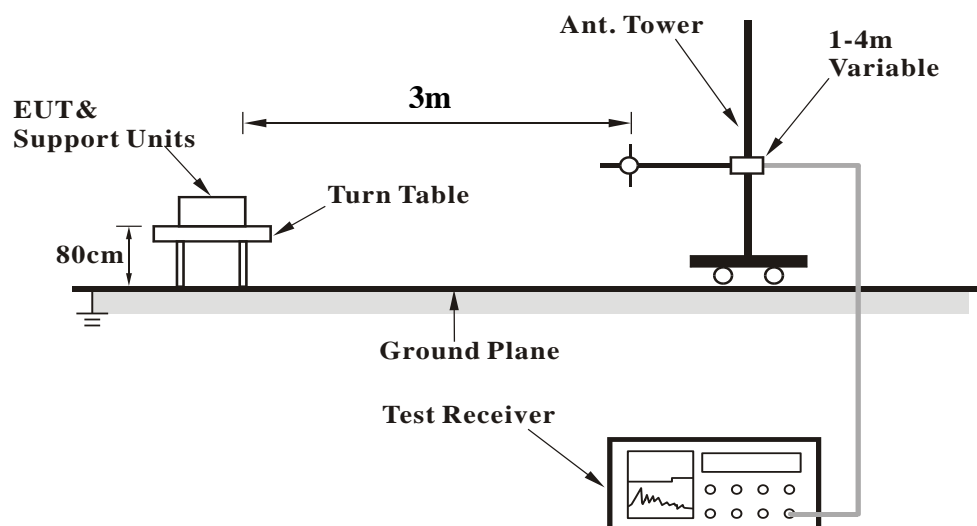
No deviation

## 4.2.5 TEST SETUP

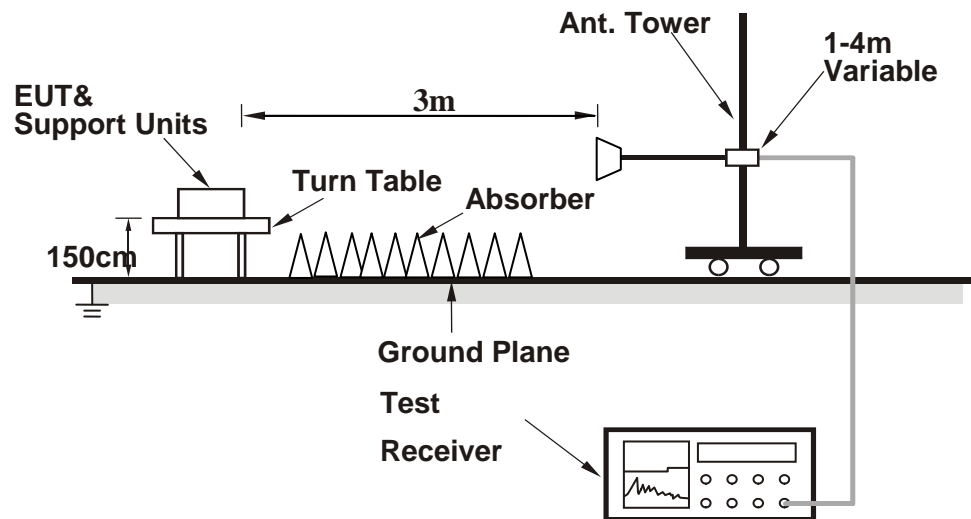
### < Frequency Range below 30MHz >



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



### <Frequency Range above 1GHz>



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

#### 4.2.6 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.



## 4.2.7 TEST RESULTS

### BELOW 1GHz WORST-CASE DATA:

**9 KHz – 30 KHz 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:**

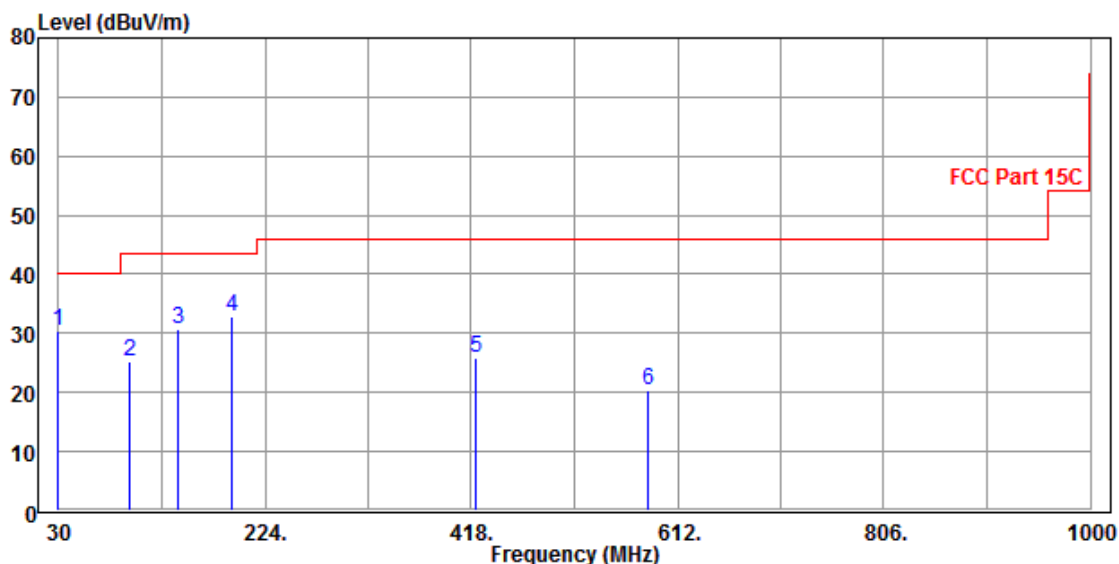
**802.11n (40MHz)**

<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
30	30.47	50.15	40	-9.53	17.1	0.78	37.56	100	23	QP
96.93	25.27	53.1	43.5	-18.23	7.66	1.52	37.01	100	172	QP
141.55	30.57	57.38	43.5	-12.93	8.19	1.83	36.83	100	69	QP
192.96	32.84	57.27	43.5	-10.66	10.03	2.13	36.59	100	332	QP
422.85	25.88	41.96	46	-20.12	17.47	3.22	36.77	100	278	QP
583.87	20.24	33.53	46	-25.76	19.99	3.92	37.2	100	54	QP

### REMARKS:

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

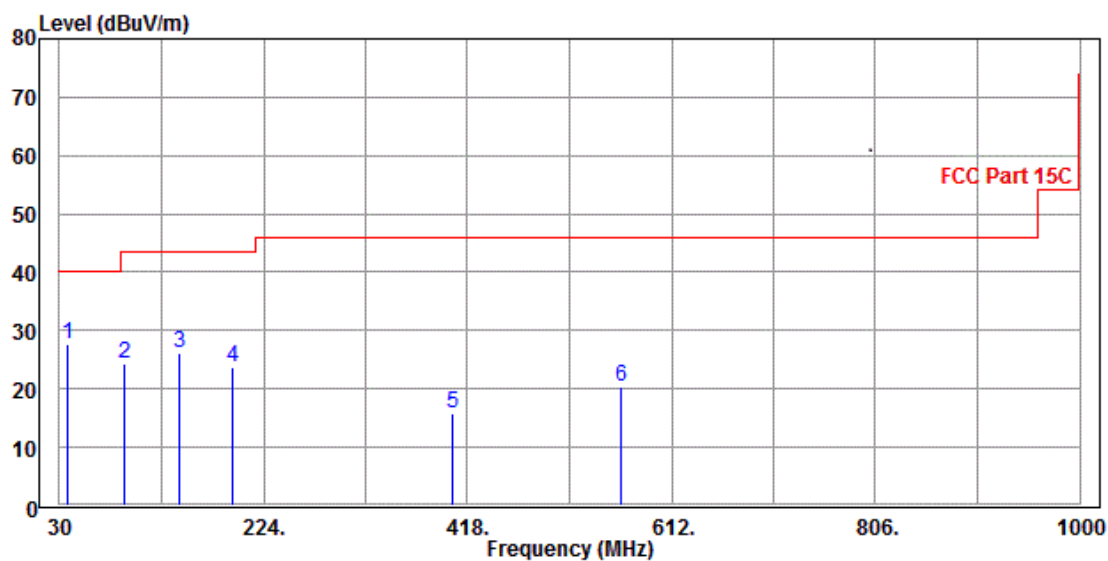


CHANNEL	TX Channel 9	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

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
37.76	27.69	52.53	40	-12.31	11.75	0.91	37.5	100	47	QP
92.08	24.22	52.64	43.5	-19.28	7.13	1.48	37.03	100	36	QP
143.49	26.11	52.67	43.5	-17.39	8.42	1.84	36.82	100	351	QP
194.9	23.68	48.07	43.5	-19.82	10.05	2.14	36.58	100	152	QP
403.45	15.7	32.03	46	-30.3	17.24	3.16	36.73	100	222	QP
564.47	20.31	34.03	46	-25.69	19.62	3.81	37.15	100	69	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

<b>CHANNEL</b>	TX Channel 1	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	44.88	50.36	54	-9.12	32.29	8.15	45.92	100	210	Average
2390	55.8	61.28	74	-18.2	32.29	8.15	45.92	100	210	Peak
2412	98.64	104.05			32.31	8.19	45.91	100	210	Average
2412	102.76	108.17			32.31	8.19	45.91	100	210	Peak
2483.5	45.55	50.74	54	-8.45	32.38	8.32	45.89	100	210	Average
2483.5	55.53	60.72	74	-18.47	32.38	8.32	45.89	100	210	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	44.61	50.09	54	-9.39	32.29	8.15	45.92	100	262	Average
2390	55.48	60.96	74	-18.52	32.29	8.15	45.92	100	262	Peak
2412	101.88	107.29			32.31	8.19	45.91	100	262	Average
2412	105.11	110.52			32.31	8.19	45.91	100	262	Peak
2483.5	44.96	50.15	54	-9.04	32.38	8.32	45.89	100	262	Average
2483.5	55.63	60.82	74	-18.37	32.38	8.32	45.89	100	262	Peak

### 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)
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	44.86	50.34	54	-9.14	32.29	8.15	45.92	210	218	Average
2390	55.44	60.92	74	-18.56	32.29	8.15	45.92	210	218	Peak
2437	96.59	101.92			32.34	8.24	45.91	210	218	Average
2437	101.62	106.95			32.34	8.24	45.91	210	218	Peak
2483.5	44.83	50.02	54	-9.17	32.38	8.32	45.89	210	218	Average
2483.5	55.23	60.42	74	-18.77	32.38	8.32	45.89	210	218	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	44.93	50.41	54	-9.07	32.29	8.15	45.92	100	300	Average
2390	54.89	60.37	74	-19.11	32.29	8.15	45.92	100	300	Peak
2437	91.85	97.18			32.34	8.24	45.91	100	300	Average
2437	103.56	108.89			32.34	8.24	45.91	100	300	Peak
2483.5	44.72	49.91	54	-9.28	32.38	8.32	45.89	100	300	Average
2483.5	55.96	61.15	74	-18.04	32.38	8.32	45.89	100	300	Peak

**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)
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	44.25	49.73	54	-9.75	32.29	8.15	45.92	100	225	Average
2390	55.18	60.66	74	-18.82	32.29	8.15	45.92	100	225	Peak
2462	100.66	105.92			32.36	8.28	45.9	100	225	Average
2462	102.3	107.56			32.36	8.28	45.9	100	225	Peak
2483.5	44.79	49.98	54	-9.21	32.38	8.32	45.89	100	225	Average
2483.5	56.27	61.46	74	-17.73	32.38	8.32	45.89	100	225	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	44.64	50.12	54	-9.36	32.29	8.15	45.92	100	305	Average
2390	55.11	60.59	74	-18.89	32.29	8.15	45.92	100	305	Peak
2462	97.31	102.57			32.36	8.28	45.9	100	305	Average
2462	103.61	108.87			32.36	8.28	45.9	100	305	Peak
2483.5	44.6	49.79	54	-9.4	32.38	8.32	45.89	100	305	Average
2483.5	55.49	60.68	74	-18.51	32.38	8.32	45.89	100	305	Peak

**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)
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	44.88	50.36	54	-9.12	32.29	8.15	45.92	100	222	Average
2390	55.23	60.71	74	-18.77	32.29	8.15	45.92	100	222	Peak
2412	98.75	104.16			32.31	8.19	45.91	100	222	Average
2412	103.62	109.03			32.31	8.19	45.91	100	222	Peak
2483.5	45.3	50.49	54	-8.7	32.38	8.32	45.89	100	222	Average
2483.5	55.19	60.38	74	-18.81	32.38	8.32	45.89	100	222	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	44.31	49.79	54	-9.69	32.29	8.15	45.92	100	56	Average
2390	55.7	61.18	74	-18.3	32.29	8.15	45.92	100	56	Peak
2412	98.82	104.23			32.31	8.19	45.91	100	56	Average
2412	101.81	107.22			32.31	8.19	45.91	100	56	Peak
2483.5	44.7	49.89	54	-9.3	32.38	8.32	45.89	100	56	Average
2483.5	55.93	61.12	74	-18.07	32.38	8.32	45.89	100	56	Peak

## REMARKS:

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

CHANNEL	TX Channel 6	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	44.93	50.41	54	-9.07	32.29	8.15	45.92	100	0	Average
2390	56.13	61.61	74	-17.87	32.29	8.15	45.92	100	0	Peak
2437	100.3	105.63			32.34	8.24	45.91	100	0	Average
2437	103.56	108.89			32.34	8.24	45.91	100	0	Peak
2483.5	44.75	49.94	54	-9.25	32.38	8.32	45.89	100	0	Average
2483.5	55.66	60.85	74	-18.34	32.38	8.32	45.89	100	0	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	45.04	50.52	54	-8.96	32.29	8.15	45.92	100	60	Average
2390	54.87	60.35	74	-19.13	32.29	8.15	45.92	100	60	Peak
2437	101.1	106.43			32.34	8.24	45.91	100	60	Average
2437	102.58	107.91			32.34	8.24	45.91	100	60	Peak
2483.5	44.86	50.05	54	-9.14	32.38	8.32	45.89	100	60	Average
2483.5	55.42	60.61	74	-18.58	32.38	8.32	45.89	100	60	Peak

**REMARKS:**

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

<b>CHANNEL</b>	TX Channel 11	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	44.75	50.23	54	-9.25	32.29	8.15	45.92	100	218	Average
2390	54.61	60.09	74	-19.39	32.29	8.15	45.92	100	218	Peak
2462	101.85	107.11			32.36	8.28	45.9	100	218	Average
2462	103.56	108.82			32.36	8.28	45.9	100	218	Peak
2483.5	44.88	50.07	54	-9.12	32.38	8.32	45.89	100	218	Average
2483.5	55.45	60.64	74	-18.55	32.38	8.32	45.89	100	218	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	44.28	49.76	54	-9.72	32.29	8.15	45.92	100	55	Average
2390	55.03	60.51	74	-18.97	32.29	8.15	45.92	100	55	Peak
2462	100.41	105.67			32.36	8.28	45.9	100	55	Average
2462	102.56	107.82			32.36	8.28	45.9	100	55	Peak
2483.5	45.02	50.21	54	-8.98	32.38	8.32	45.89	100	55	Average
2483.5	55.64	60.83	74	-18.36	32.38	8.32	45.89	100	55	Peak

**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	44.54	50.02	54	-9.46	32.29	8.15	45.92	100	220	Average
2390	55.63	61.11	74	-18.37	32.29	8.15	45.92	100	220	Peak
2412	94.27	99.68			32.31	8.19	45.91	100	220	Average
2412	101.86	107.27			32.31	8.19	45.91	100	220	Peak
2483.5	44.69	49.88	54	-9.31	32.38	8.32	45.89	100	220	Average
2483.5	54.87	60.06	74	-19.13	32.38	8.32	45.89	100	220	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	44.67	50.15	54	-9.33	32.29	8.15	45.92	100	60	Average
2390	56.69	62.17	74	-17.31	32.29	8.15	45.92	100	60	Peak
2412	92.63	98.04			32.31	8.19	45.91	100	60	Average
2412	99.67	105.08			32.31	8.19	45.91	100	60	Peak
2483.5	44.47	49.66	54	-9.53	32.38	8.32	45.89	100	60	Average
2483.5	55.26	60.45	74	-18.74	32.38	8.32	45.89	100	60	Peak

## REMARKS:

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

<b>CHANNEL</b>	TX Channel 6	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	44.38	49.86	54	-9.62	32.29	8.15	45.92	105	225	Average
2390	54.28	59.76	74	-19.72	32.29	8.15	45.92	105	225	Peak
2437	94.38	99.71			32.34	8.24	45.91	105	225	Average
2437	103.18	108.51			32.34	8.24	45.91	105	225	Peak
2483.5	44.98	50.17	54	-9.02	32.38	8.32	45.89	105	225	Average
2483.5	54.94	60.13	74	-19.06	32.38	8.32	45.89	105	225	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	44.42	49.9	54	-9.58	32.29	8.15	45.92	100	58	Average
2390	54.71	60.19	74	-19.29	32.29	8.15	45.92	100	58	Peak
2437	93.43	98.76			32.34	8.24	45.91	100	58	Average
2437	101.38	106.71			32.34	8.24	45.91	100	58	Peak
2483.5	44.8	49.99	54	-9.2	32.38	8.32	45.89	100	58	Average
2483.5	55	60.19	74	-19	32.38	8.32	45.89	100	58	Peak

**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)
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	44.44	49.92	54	-9.56	32.29	8.15	45.92	100	250	Average
2390	54.97	60.45	74	-19.03	32.29	8.15	45.92	100	250	Peak
2462	92.06	97.32			32.36	8.28	45.9	100	250	Average
2462	102.85	108.11			32.36	8.28	45.9	100	250	Peak
2483.5	45.15	50.34	54	-8.85	32.38	8.32	45.89	100	250	Average
2483.5	56.42	61.61	74	-17.58	32.38	8.32	45.89	100	250	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	44.39	49.87	54	-9.61	32.29	8.15	45.92	105	60	Average
2390	54.64	60.12	74	-19.36	32.29	8.15	45.92	105	60	Peak
2462	90.45	95.71			32.36	8.28	45.9	105	60	Average
2462	101.35	106.61			32.36	8.28	45.9	105	60	Peak
2483.5	44.95	50.14	54	-9.05	32.38	8.32	45.89	105	60	Average
2483.5	55.25	60.44	74	-18.75	32.38	8.32	45.89	105	60	Peak

**REMARKS:**

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

# 802.11n (40MHz)

CHANNEL	TX Channel 3	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	44.96	50.44	54	-9.04	32.29	8.15	45.92	100	245	Average
2390	55.83	61.31	74	-18.17	32.29	8.15	45.92	100	245	Peak
2422	88.66	94.04			32.32	8.21	45.91	100	245	Average
2422	100.09	105.47			32.32	8.21	45.91	100	245	Peak
2483.5	44.84	50.03	54	-9.16	32.38	8.32	45.89	100	245	Average
2483.5	55.32	60.51	74	-18.68	32.38	8.32	45.89	100	245	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	44.91	50.39	54	-9.09	32.29	8.15	45.92	105	55	Average
2390	55.85	61.33	74	-18.15	32.29	8.15	45.92	105	55	Peak
2422	87.6	92.98			32.32	8.21	45.91	105	55	Average
2422	99.48	104.86			32.32	8.21	45.91	105	55	Peak
2483.5	44.74	49.93	54	-9.26	32.38	8.32	45.89	105	55	Average
2483.5	54.93	60.12	74	-19.07	32.38	8.32	45.89	105	55	Peak

## REMARKS:

- Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
- 2422MHz: Fundamental frequency.

<b>CHANNEL</b>	TX Channel 6	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	44.37	49.85	54	-9.63	32.29	8.15	45.92	105	225	Average
2390	55.72	61.2	74	-18.28	32.29	8.15	45.92	105	225	Peak
2437	88.46	93.79			32.34	8.24	45.91	105	225	Average
2437	100.78	106.11			32.34	8.24	45.91	105	225	Peak
2483.5	44.67	49.86	54	-9.33	32.38	8.32	45.89	105	225	Average
2483.5	55.55	60.74	74	-18.45	32.38	8.32	45.89	105	225	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	44.51	49.99	54	-9.49	32.29	8.15	45.92	100	58	Average
2390	54.62	60.1	74	-19.38	32.29	8.15	45.92	100	58	Peak
2437	87.5	92.83			32.34	8.24	45.91	100	58	Average
2437	98.56	103.89			32.34	8.24	45.91	100	58	Peak
2483.5	44.82	50.01	54	-9.18	32.38	8.32	45.89	100	58	Average
2483.5	54.99	60.18	74	-19.01	32.38	8.32	45.89	100	58	Peak

**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 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	44.25	49.73	54	-9.75	32.29	8.15	45.92	100	220	Average
2390	54.68	60.16	74	-19.32	32.29	8.15	45.92	100	220	Peak
2452	85.49	90.78			32.35	8.26	45.9	100	220	Average
2452	101.08	106.37			32.35	8.26	45.9	100	220	Peak
2483.5	45.64	50.83	54	-8.36	32.38	8.32	45.89	100	220	Average
2483.5	56.83	62.02	74	-17.17	32.38	8.32	45.89	100	220	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	44.1	49.58	54	-9.9	32.29	8.15	45.92	100	52	Average
2390	54.5	59.98	74	-19.5	32.29	8.15	45.92	100	52	Peak
2452	87.56	92.85			32.35	8.26	45.9	100	52	Average
2452	98.65	103.94			32.35	8.26	45.9	100	52	Peak
<b>2483.5</b>	<b>46.05</b>	<b>51.24</b>	<b>54</b>	<b>-7.95</b>	<b>32.38</b>	<b>8.32</b>	<b>45.89</b>	<b>100</b>	<b>52</b>	<b>Average</b>
2483.5	57.32	62.51	74	-16.68	32.38	8.32	45.89	100	52	Peak

**REMARKS:**

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

## BELOW 1GHz WORST-CASE DATA:

**9 KHz – 30 KHz 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:**

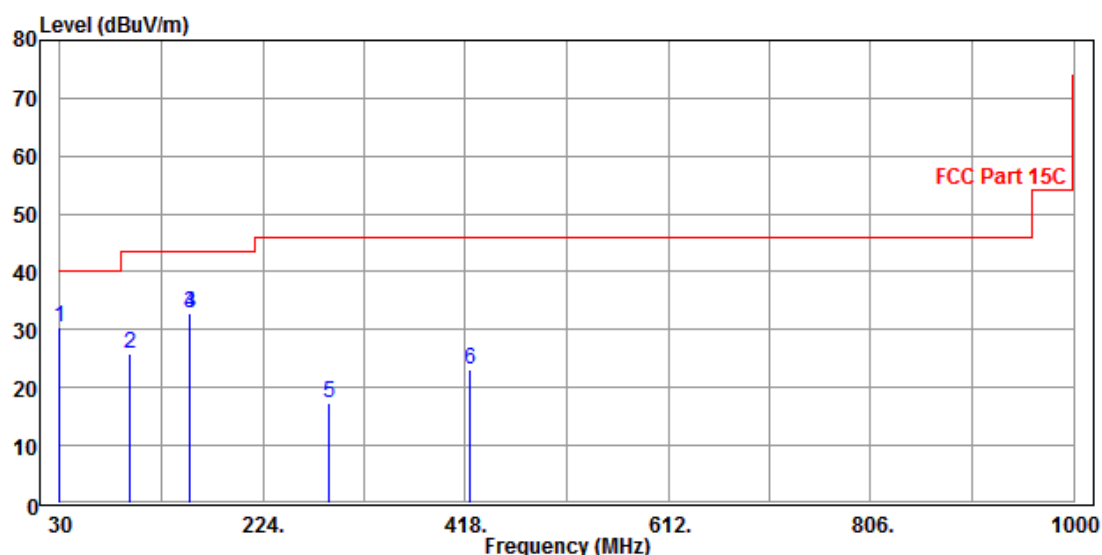
**BT-LE (GFSK) (1MHz)**

<b>CHANNEL</b>	TX Channel 39	<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
30	30.38	50.06	40	-9.62	17.1	0.78	37.56	100	180	QP
96.93	25.89	53.72	43.5	-17.61	7.66	1.52	37.01	100	258	QP
154.16	32.83	58.08	43.5	-10.67	9.62	1.9	36.77	100	317	QP
154.16	32.83	58.08	43.5	-10.67	9.62	1.9	36.77	100	72	QP
287.05	17.37	38.39	46	-28.63	12.84	2.65	36.51	100	54	QP
422.85	23.22	39.3	46	-22.78	17.47	3.22	36.77	100	296	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

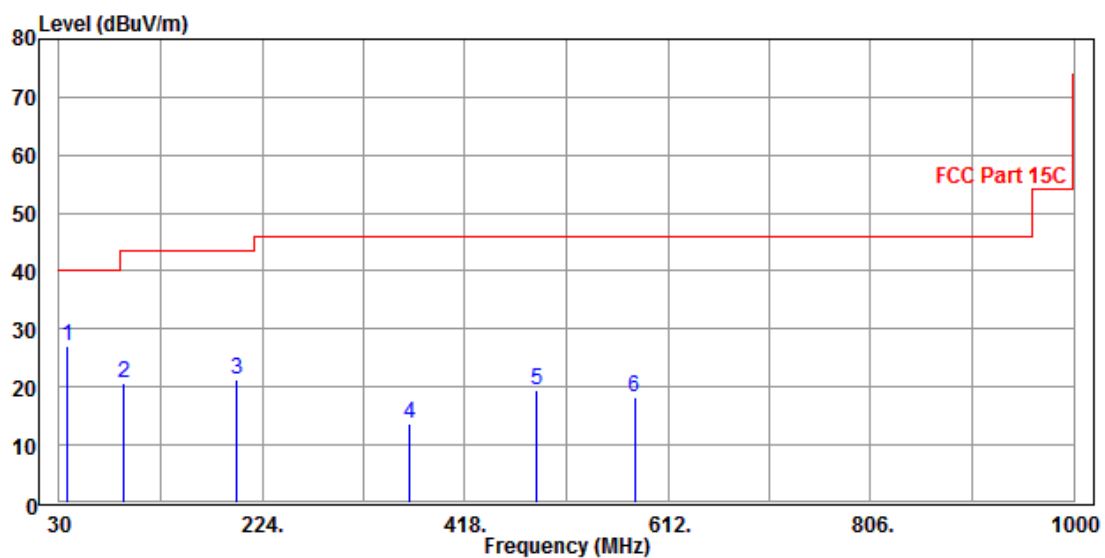


CHANNEL	TX Channel 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

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
37.76	27.1	51.94	40	-12.9	11.75	0.91	37.5	100	115	QP
92.08	20.64	49.06	43.5	-22.86	7.13	1.48	37.03	100	22	QP
198.78	21.37	45.67	43.5	-22.13	10.09	2.16	36.55	100	239	QP
364.65	13.73	31.65	46	-32.27	15.72	3	36.64	100	332	QP
486.87	19.38	34.65	46	-26.62	18.24	3.42	36.93	100	158	QP
579.99	18.32	31.69	46	-27.68	19.92	3.9	37.19	100	74	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) (1MHz)

<b>CHANNEL</b>	TX Channel 0	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	44.4	49.88	54	-9.6	32.29	8.15	45.92	100	220	Average
2390	54.37	59.85	74	-19.63	32.29	8.15	45.92	100	220	Peak
2402	83.92	89.37			32.3	8.17	45.92	100	220	Average
2402	85.03	90.48			32.3	8.17	45.92	100	220	Peak
2483.5	44.24	49.43	54	-9.76	32.38	8.32	45.89	100	220	Average
2483.5	55.07	60.26	74	-18.93	32.38	8.32	45.89	100	220	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	44.27	49.75	54	-9.73	32.29	8.15	45.92	100	265	Average
2390	54.83	60.31	74	-19.17	32.29	8.15	45.92	100	265	Peak
2402	84.47	89.92			32.3	8.17	45.92	100	265	Average
2402	92.47	97.92			32.3	8.17	45.92	100	265	Peak
2483.5	44.35	49.54	54	-9.65	32.38	8.32	45.89	100	265	Average
2483.5	55.59	60.78	74	-18.41	32.38	8.32	45.89	100	265	Peak

## REMARKS:

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

<b>CHANNEL</b>	TX Channel 19	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	44.03	49.51	54	-9.97	32.29	8.15	45.92	105	222	Average
2390	54.75	60.23	74	-19.25	32.29	8.15	45.92	105	222	Peak
2440	80.9	86.23			32.34	8.24	45.91	105	222	Average
2440	84.79	90.12			32.34	8.24	45.91	105	222	Peak
2483.5	44.28	49.47	54	-9.72	32.38	8.32	45.89	105	222	Average
2483.5	54.99	60.18	74	-19.01	32.38	8.32	45.89	105	222	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	44.24	49.72	54	-9.76	32.29	8.15	45.92	100	252	Average
2390	54.43	59.91	74	-19.57	32.29	8.15	45.92	100	252	Peak
2440	84.76	90.09			32.34	8.24	45.91	100	252	Average
2440	90.09	95.42			32.34	8.24	45.91	100	252	Peak
2483.5	44.34	49.53	54	-9.66	32.38	8.32	45.89	100	252	Average
2483.5	55.09	60.28	74	-18.91	32.38	8.32	45.89	100	252	Peak

**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)
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	44.39	49.87	54	-9.61	32.29	8.15	45.92	100	325	Average
2390	54.1	59.58	74	-19.9	32.29	8.15	45.92	100	325	Peak
2480	84.55	89.76			32.38	8.31	45.9	100	325	Average
2480	90.49	95.7			32.38	8.31	45.9	100	325	Peak
<b>2483.5</b>	<b>45.2</b>	<b>50.39</b>	<b>54</b>	<b>-8.8</b>	<b>32.38</b>	<b>8.32</b>	<b>45.89</b>	<b>100</b>	<b>325</b>	<b>Average</b>
2483.5	54.89	60.08	74	-19.11	32.38	8.32	45.89	100	325	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	44.33	49.81	54	-9.67	32.29	8.15	45.92	100	255	Average
2390	54.8	60.28	74	-19.2	32.29	8.15	45.92	100	255	Peak
2480	83.22	88.43			32.38	8.31	45.9	100	255	Average
2480	88.48	93.69			32.38	8.31	45.9	100	255	Peak
2483.5	44.32	49.51	54	-9.68	32.38	8.32	45.89	100	255	Average
2483.5	54.95	60.14	74	-19.05	32.38	8.32	45.89	100	255	Peak

**REMARKS:**

- Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
- 2480MHz: Fundamental frequency.

# BT-LE (GFSK) (2MHz)

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	44.44	49.92	54	-9.56	32.29	8.15	45.92	100	315	Average
2390	55.25	60.73	74	-18.75	32.29	8.15	45.92	100	315	Peak
2402	74.58	80.03			32.3	8.17	45.92	100	315	Average
2402	88.95	94.4			32.3	8.17	45.92	100	315	Peak
2483.5	44.33	49.52	54	-9.67	32.38	8.32	45.89	100	315	Average
2483.5	55.08	60.27	74	-18.92	32.38	8.32	45.89	100	315	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	44.39	49.87	54	-9.61	32.29	8.15	45.92	100	250	Average
2390	55.4	60.88	74	-18.6	32.29	8.15	45.92	100	250	Peak
2402	77.24	82.69			32.3	8.17	45.92	100	250	Average
2402	89.97	95.42			32.3	8.17	45.92	100	250	Peak
2483.5	44.5	49.69	54	-9.5	32.38	8.32	45.89	100	250	Average
2483.5	55	60.19	74	-19	32.38	8.32	45.89	100	250	Peak

## REMARKS:

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

<b>CHANNEL</b>	TX Channel 19	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	44.05	49.53	54	-9.95	32.29	8.15	45.92	105	320	Average
2390	55.14	60.62	74	-18.86	32.29	8.15	45.92	105	320	Peak
2440	76.39	81.72			32.34	8.24	45.91	105	320	Average
2440	88.05	93.38			32.34	8.24	45.91	105	320	Peak
2483.5	44.54	49.73	54	-9.46	32.38	8.32	45.89	105	320	Average
2483.5	55.67	60.86	74	-18.33	32.38	8.32	45.89	105	320	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	44.28	49.76	54	-9.72	32.29	8.15	45.92	100	255	Average
2390	55.31	60.79	74	-18.69	32.29	8.15	45.92	100	255	Peak
2440	78.34	83.67			32.34	8.24	45.91	100	255	Average
2440	90.51	95.84			32.34	8.24	45.91	100	255	Peak
2483.5	44.42	49.61	54	-9.58	32.38	8.32	45.89	100	255	Average
2483.5	54.95	60.14	74	-19.05	32.38	8.32	45.89	100	255	Peak

**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)
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	44.09	49.57	54	-9.91	32.29	8.15	45.92	100	315	Average
2390	54.39	59.87	74	-19.61	32.29	8.15	45.92	100	315	Peak
2480	79.09	84.3			32.38	8.31	45.9	100	315	Average
2480	92.62	97.83			32.38	8.31	45.9	100	315	Peak
2483.5	44.73	49.92	54	-9.27	32.38	8.32	45.89	100	315	Average
2483.5	54.64	59.83	74	-19.36	32.38	8.32	45.89	100	315	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	44.26	49.74	54	-9.74	32.29	8.15	45.92	100	272	Average
2390	54.25	59.73	74	-19.75	32.29	8.15	45.92	100	272	Peak
2480	73.55	78.76			32.38	8.31	45.9	100	272	Average
2480	88.58	93.79			32.38	8.31	45.9	100	272	Peak
2483.5	44.83	50.02	54	-9.17	32.38	8.32	45.89	100	272	Average
2483.5	55.36	60.55	74	-18.64	32.38	8.32	45.89	100	272	Peak

**REMARKS:**

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
2. 2480MHz: Fundamental frequency.

Note: The test, calibration and test results are compliance with the A2LA (Certificate # 3939.01).

### 4.3 6 dB BANDWIDTH MEASUREMENT

#### 4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 4.3.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Power Meter	ANRITSU	ML2495A	1506002	Mar. 01,17	Feb. 28,18
EXA Signal Analyzer	KEYSIGHT	N9010A-526	MY54510523	Mar. 01,17	Feb. 28,18
EXA Signal Analyzer	KEYSIGHT	N9010A-544	MY54510332	Mar. 01,17	Feb. 28,18
Power Sensor	ANRITSU	MA2411B	1339352	Mar. 01,17	Feb. 28,18

**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.

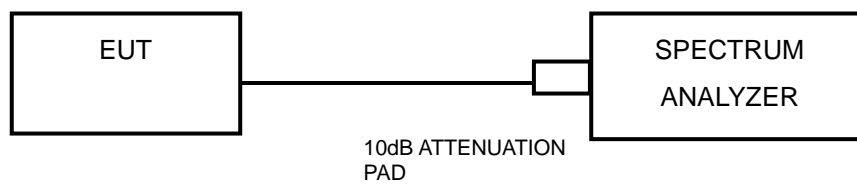
#### 4.3.3 TEST PROCEDURE

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.

#### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.3.5 TEST SETUP



#### 4.3.6 EUT OPERATING CONDITIONS

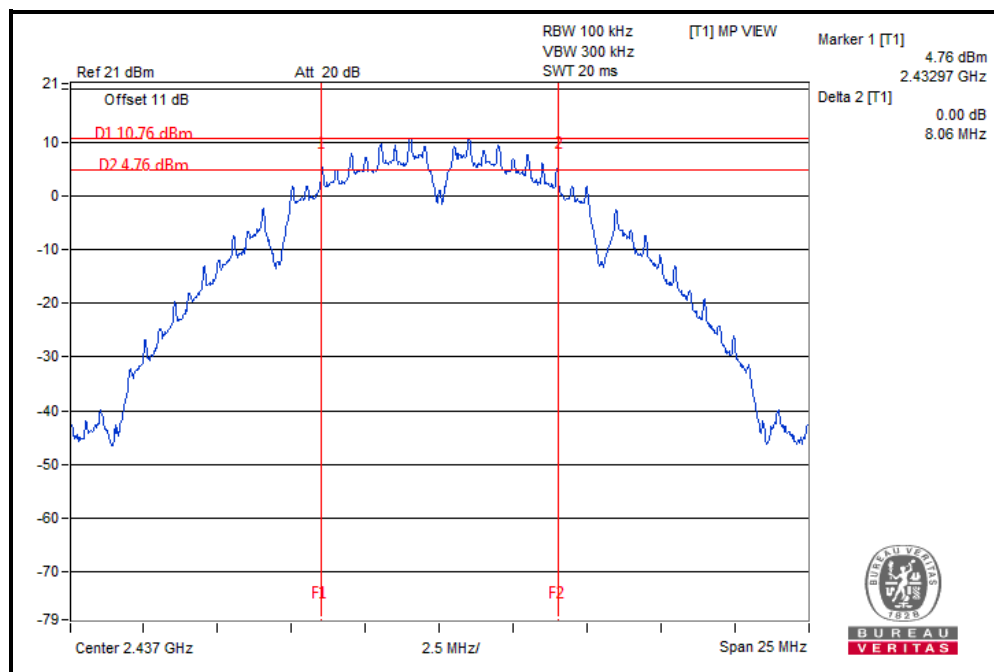
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



#### 4.3.7 TEST RESULTS

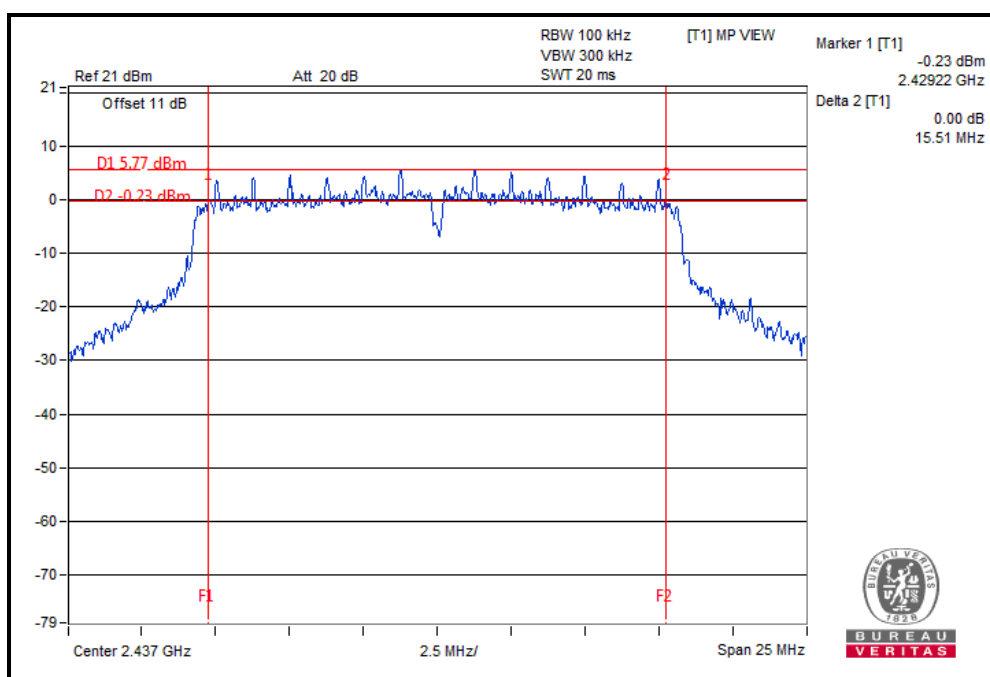
##### 802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	7.56	0.5	PASS
6	2437	8.06	0.5	PASS
11	2462	8.03	0.5	PASS



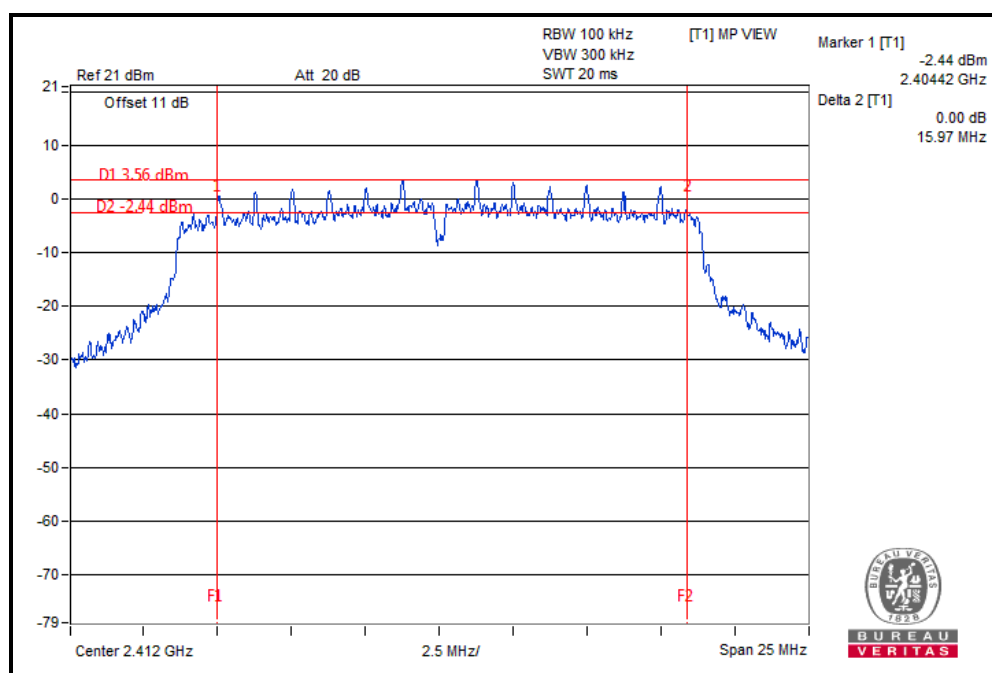
# 802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	15.43	0.5	PASS
6	2437	15.51	0.5	PASS
11	2462	15.15	0.5	PASS



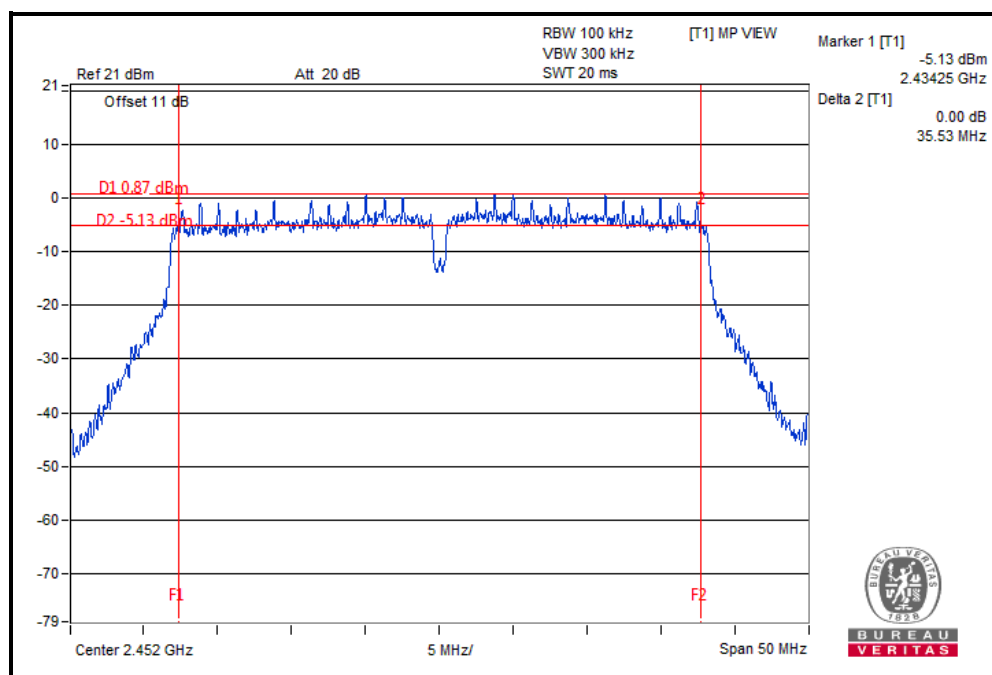
### 802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	15.97	0.5	PASS
6	2437	15.97	0.5	PASS
11	2462	15.71	0.5	PASS



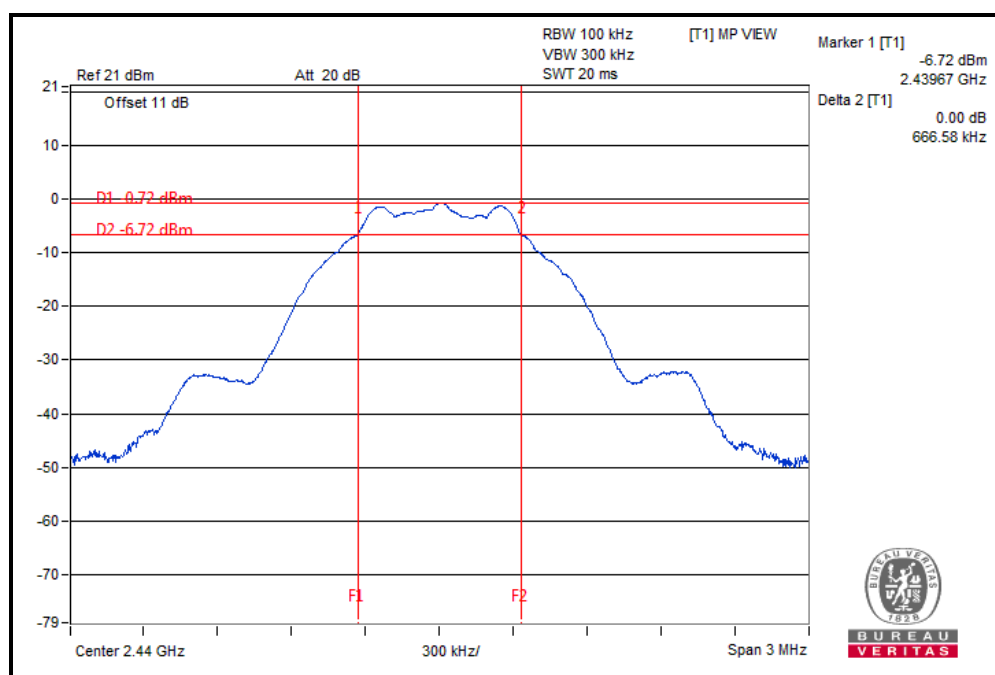
### 802.11n (40MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
3	2422	35.14	0.5	PASS
6	2437	35.32	0.5	PASS
9	2452	35.53	0.5	PASS



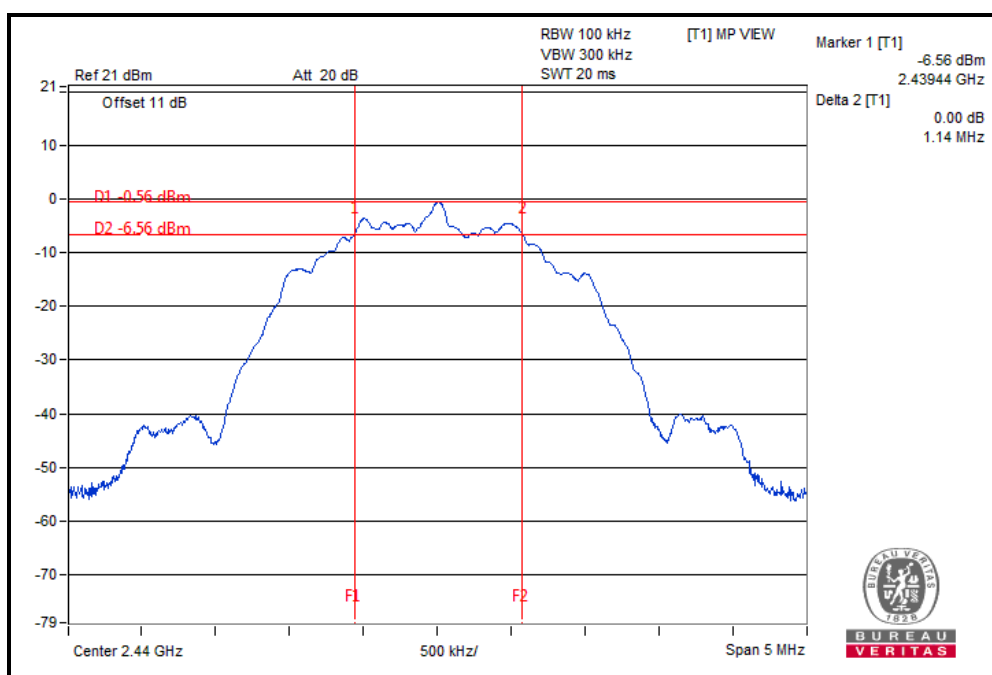
### BT-LE (GFSK) (1MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	0.67	0.5	PASS
19	2440	0.67	0.5	PASS
39	2480	0.67	0.5	PASS



### BT-LE (GFSK) (2MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	1.13	0.5	PASS
19	2440	1.14	0.5	PASS
39	2480	1.14	0.5	PASS



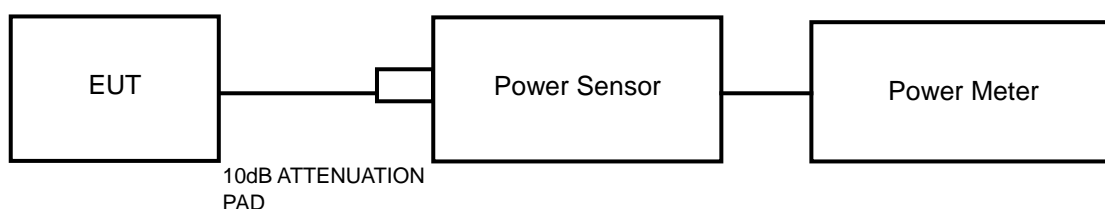
Note: The test, calibration and test results are compliance with the A2LA (Certificate # 3939.01).

## 4.4 CONDUCTED OUTPUT POWER

### 4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

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

### 4.4.2 TEST SETUP



### 4.4.3 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer Agilent	N9010A	MY52220314	No. 24, 2017	Nov. 23, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	100115	Nov. 23, 2017	Nov. 22, 2018
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-400)	Jun. 23, 2017	Jun. 22, 2018
MXG Vector signal generator Agilent	N5182B	MY53050430	Oct. 24, 2017	Oct. 23, 2018
Power Meter Anritsu	ML2495A	1012010	Aug. 15, 2017	Aug. 14, 2018
Power Sensor Anritsu	MA2411B	1315050	Aug. 15, 2017	Aug. 14, 2018
RF Coaxial Cable HUBER+SUHNNER	EMC104-SM-SM-8000 &3000	140811+170717	Oct. 20, 2017	Oct. 19, 2018
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1000(140807)	Oct. 20, 2017	Oct. 19, 2018
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 20, 2017	Oct. 19, 2018

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. The calibration interval of the loop antenna is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.

#### 4.4.4 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.

#### 4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.4.6 EUT OPERATING CONDITIONS

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



#### 4.4.7 TEST RESULTS

##### 4.4.7.1 MAXIMUM PEAK OUTPUT POWER

###### 802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT(W)	PASS/FAIL
1	2412	19.66	92.47	1	PASS
6	2437	19.58	90.78	1	PASS
11	2462	19.91	97.95	1	PASS

###### 802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT(W)	PASS/FAIL
1	2412	19.84	96.38	1	PASS
6	2437	19.80	95.50	1	PASS
11	2462	19.88	97.27	1	PASS

###### 802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT(W)	PASS/FAIL
1	2412	21.47	140.28	1	PASS
6	2437	21.55	142.89	1	PASS
11	2462	21.80	151.36	1	PASS

###### 802.11n (40MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT(W)	PASS/FAIL
3	2422	23.12	205.11	1	PASS
6	2437	23.21	209.41	1	PASS
9	2452	23.25	211.35	1	PASS

#### BT-LE (GFSK) (1MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT(W)	PASS/FAIL
0	2402	-0.65	0.86	1	PASS
19	2440	-1.06	0.78	1	PASS
39	2480	-0.12	<b>0.97</b>	1	PASS

#### BT-LE (GFSK) (2MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT(W)	PASS/FAIL
0	2402	-1.18	0.76	1	PASS
19	2440	-1.05	0.79	1	PASS
39	2480	-1.69	0.68	1	PASS

#### 4.4.7.2 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	16.83	N/A
6	2437	16.77	N/A
11	2462	16.92	N/A

##### 802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	PASS/FAIL
1	2412	14.83	N/A
6	2437	14.92	N/A
11	2462	14.96	N/A

##### 802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	PASS/FAIL
1	2412	12.63	N/A
6	2437	12.68	N/A
11	2462	12.73	N/A

##### 802.11n (40MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	PASS/FAIL
3	2422	12.71	N/A
6	2437	12.85	N/A
9	2452	12.89	N/A

**BT-LE (GFSK) (1MHz)**

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	PASS/FAIL
0	2402	-1.31	N/A
19	2440	-1.16	N/A
39	2480	-1.81	N/A

**BT-LE (GFSK) (2MHz)**

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	PASS/FAIL
0	2402	-1.34	N/A
19	2440	-1.16	N/A
39	2480	-1.81	N/A

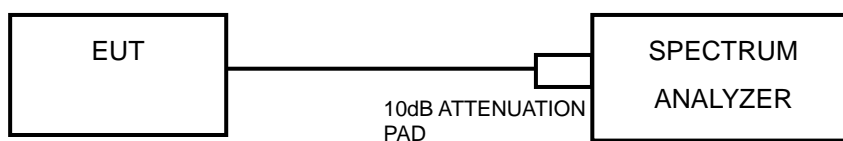
Note: Conducted power performed by **Bureau Veritas Consumer Products Services (H.K.) Ltd.,  
Taoyuan Branch.**

## 4.5 POWER SPECTRAL DENSITY MEASUREMENT

### 4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

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

### 4.5.2 TEST SETUP



### 4.5.3 TEST INSTRUMENTS

Refer to section 4.3.2 to get information of above instrument.

### 4.5.4 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.

### 4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

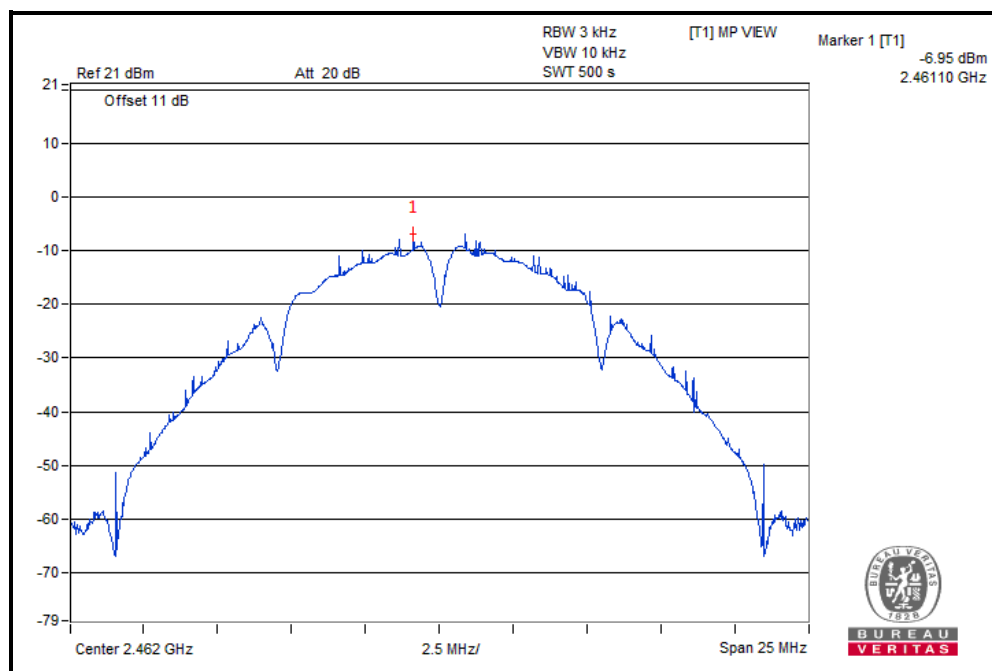
### 4.5.6 EUT OPERATING CONDITION

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

## 4.5.7 TEST RESULTS

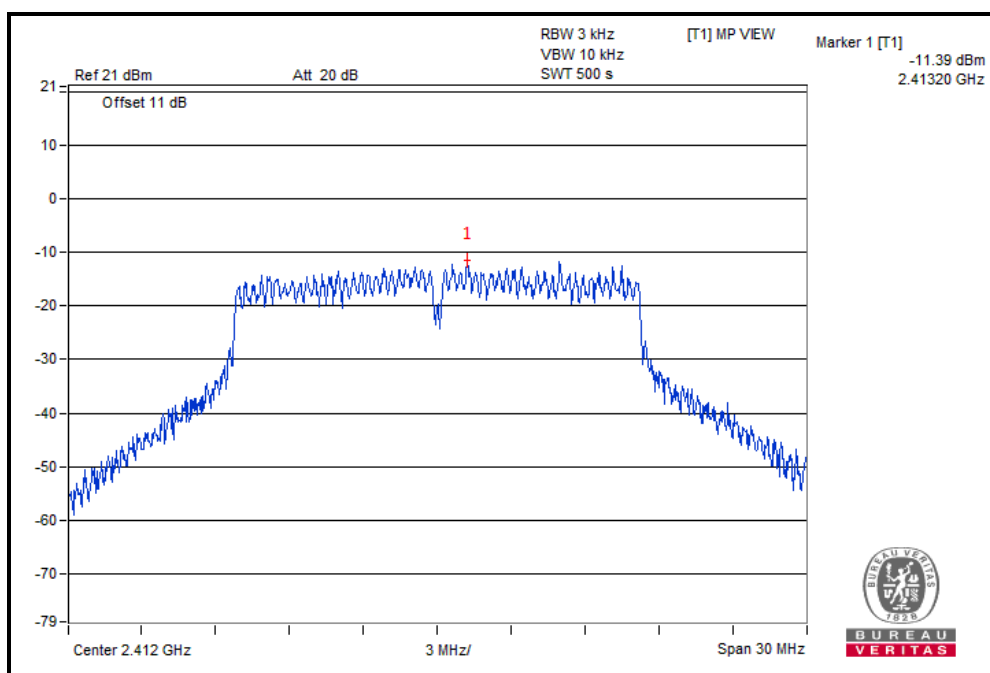
### 802.11b

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-7.05	8	PASS
6	2437	-7.78	8	PASS
11	2462	-6.95	8	PASS



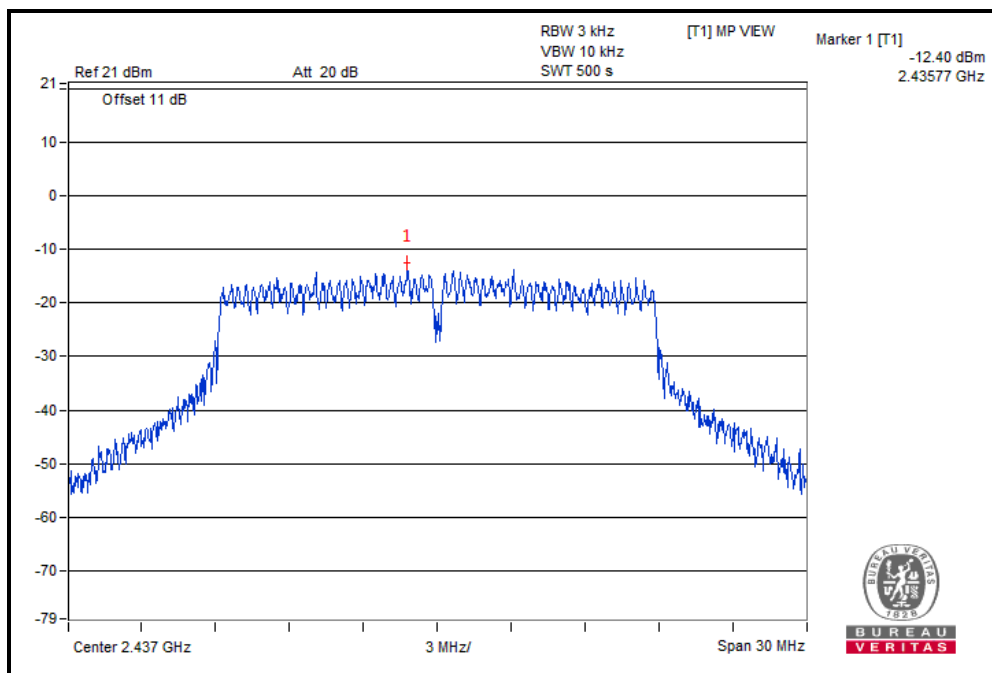
# 802.11g

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-11.39	8	PASS
6	2437	-11.94	8	PASS
11	2462	-11.45	8	PASS



### 802.11n (20MHz)

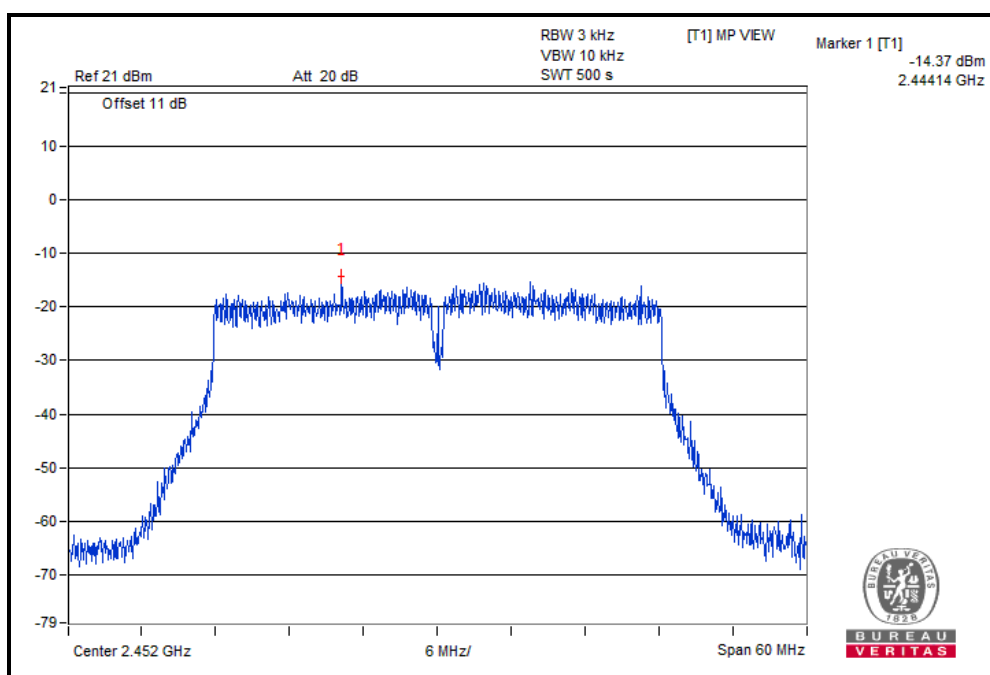
Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-12.76	8	PASS
6	2437	-12.40	8	PASS
11	2462	-13.25	8	PASS





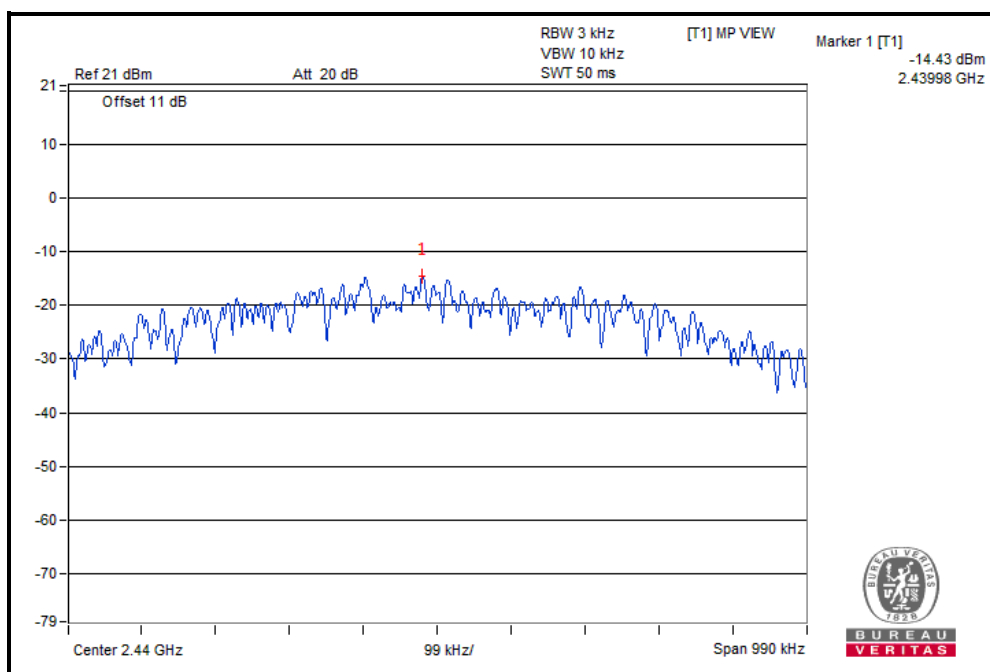
### 802.11n (40MHz)

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
3	2422	-14.96	8	PASS
6	2437	-15.39	8	PASS
9	2452	-14.37	8	PASS



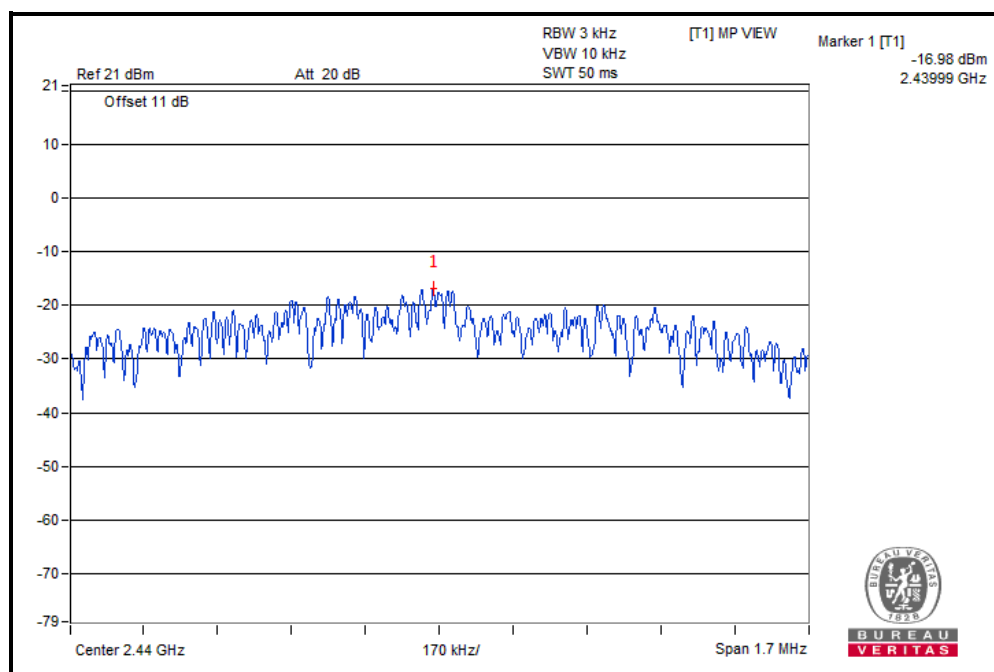
### BT-LE (GFSK) (1MHz)

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	2402	-14.62	8	PASS
19	2440	-14.43	8	PASS
39	2480	-15.02	8	PASS



### BT-LE (GFSK) (2MHz)

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	2402	-17.09	8	PASS
19	2440	-16.98	8	PASS
39	2480	-17.34	8	PASS



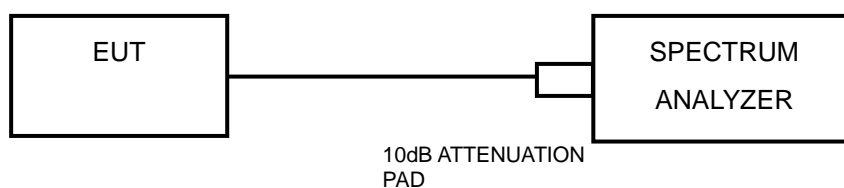
Note: The test, calibration and test results are compliance with the A2LA (Certificate # 3939.01).

## 4.6 OUT OF BAND EMISSION MEASUREMENT

### 4.6.1 LIMITS OF OUT OF BAND EMISSION MEASUREMENT

Below  $-20\text{dB}$  of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### 4.6.2 TEST SETUP



### 4.6.3 TEST INSTRUMENTS

Refer to section 4.3.2 to get information of above instrument.

### 4.6.4 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.

### 4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.6.6 EUT OPERATING CONDITION

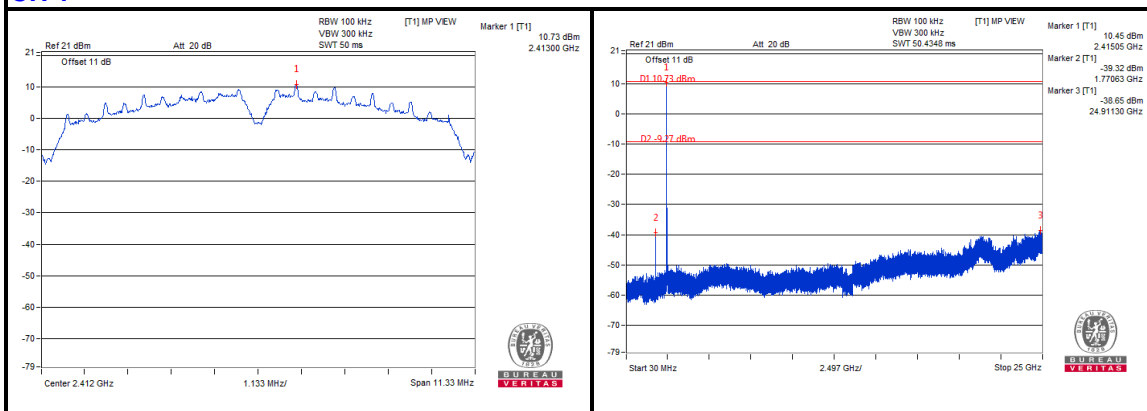
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

### 4.6.7 TEST RESULTS

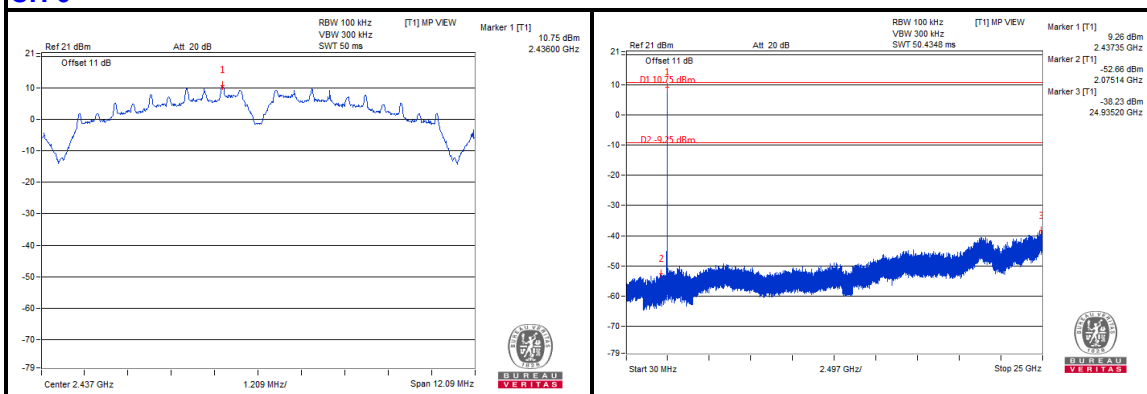
The spectrum plots are attached on the following images. D1 line indicates the highest level. D2 line indicates the 20dB offset below D1. It shows compliance to the requirement.

802.11b

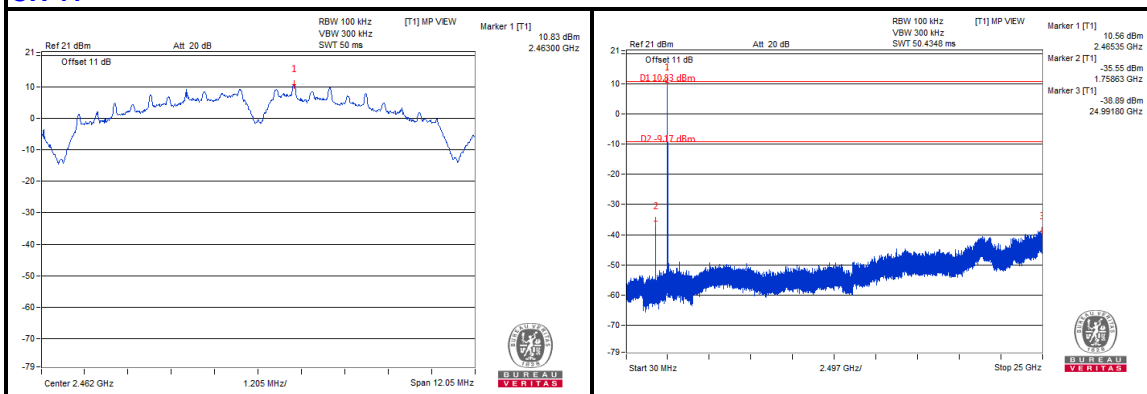
## CH 1



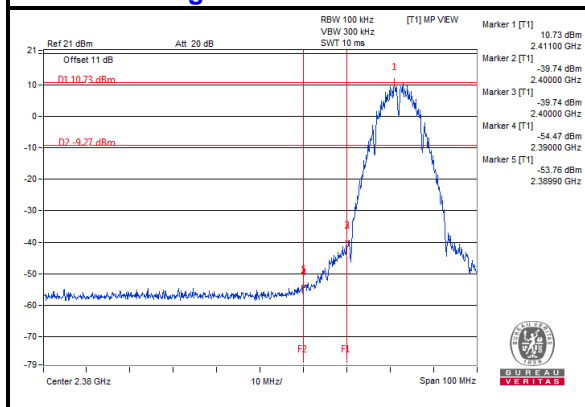
## CH 6



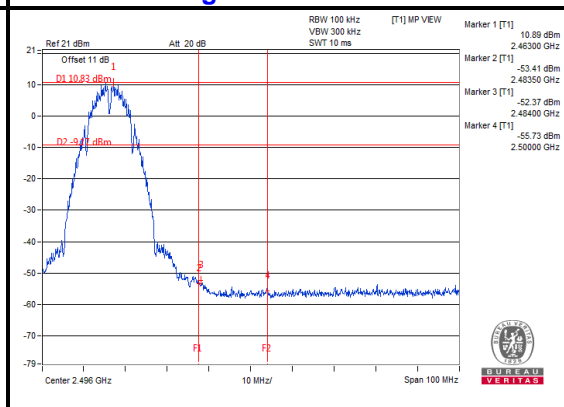
## CH 11



## CH 1 Band Edge

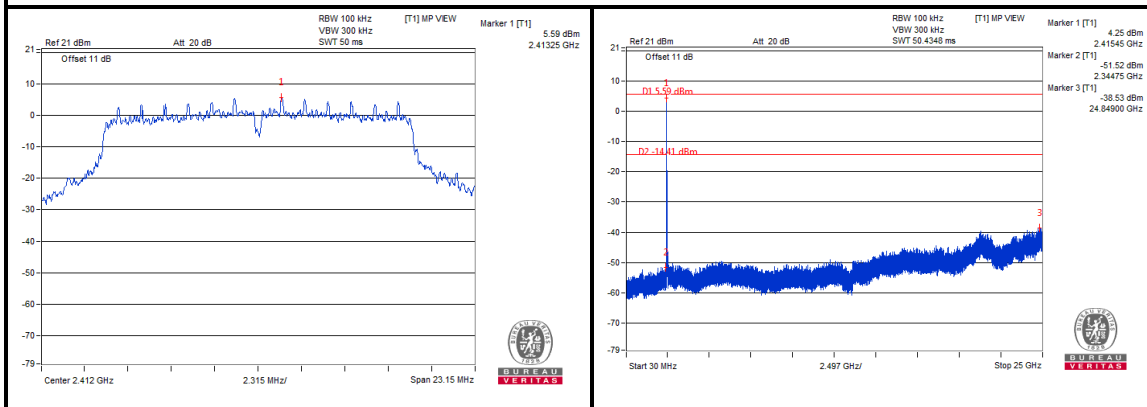


## CH 11 Band Edge

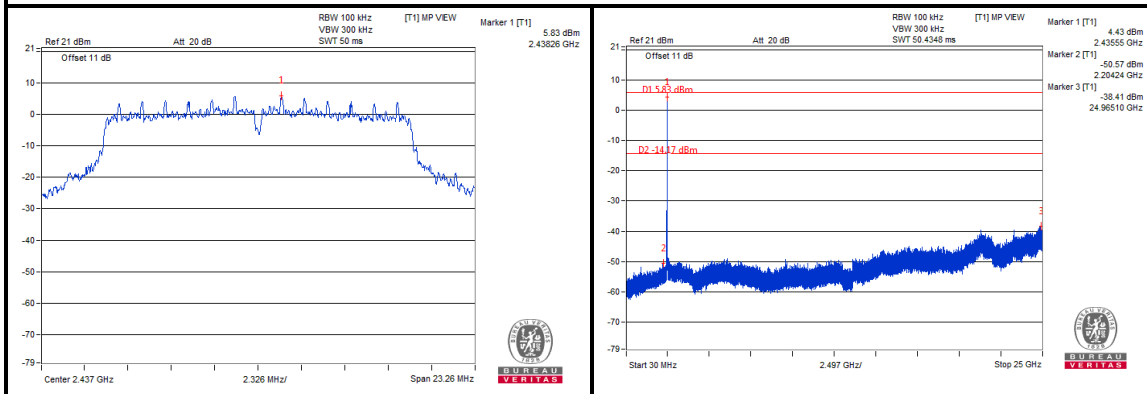


802.11g

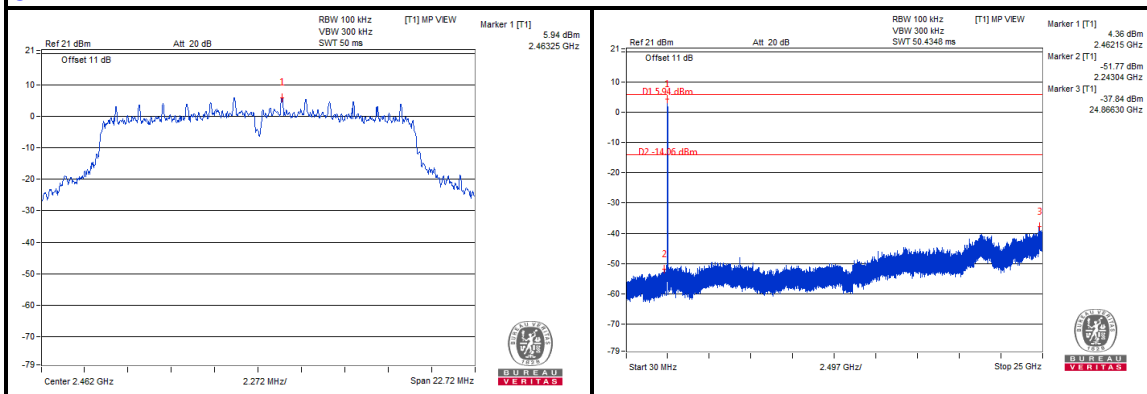
## CH 1



## CH 6

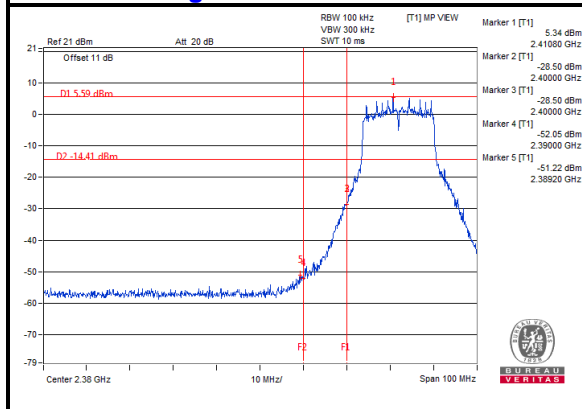


## CH 11

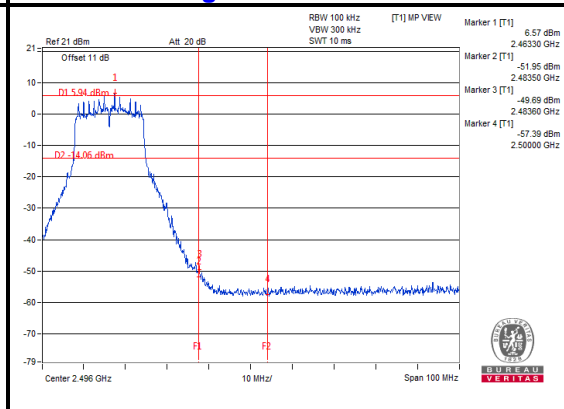




## CH 1 Band Edge

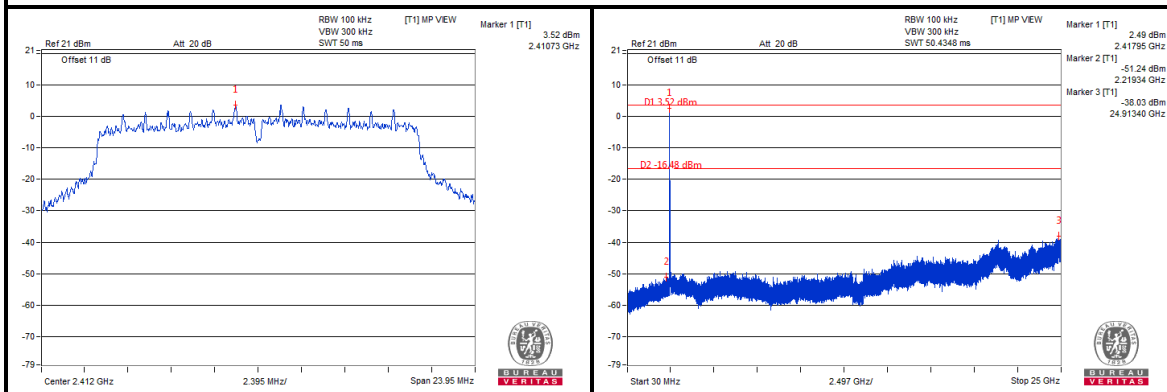


## CH 11 Band Edge

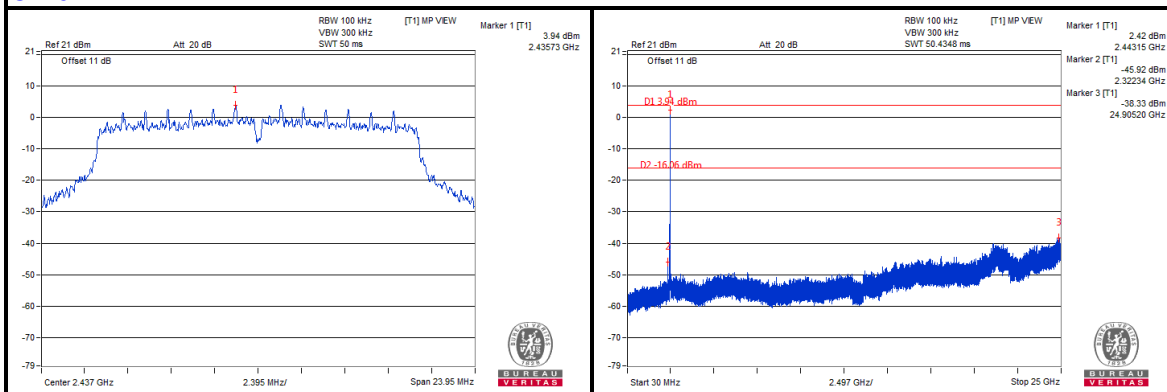


## 802.11n (20MHz)

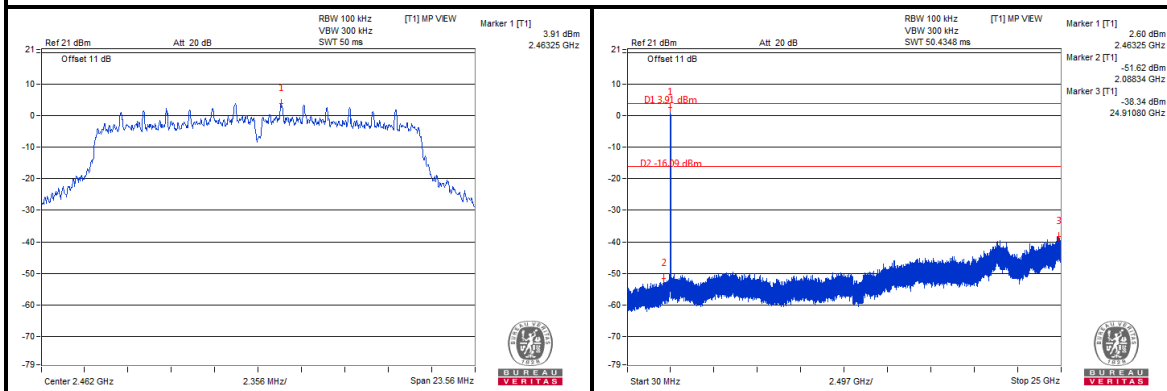
### CH 1



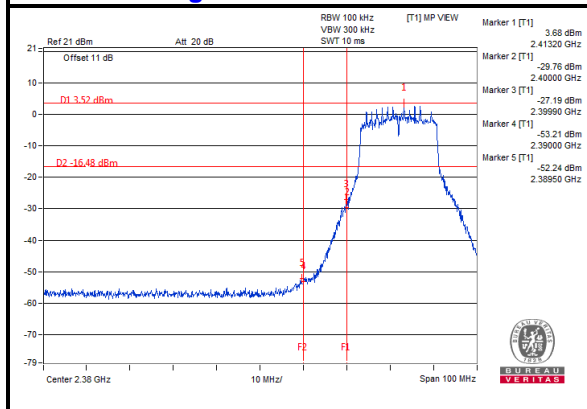
### CH 6



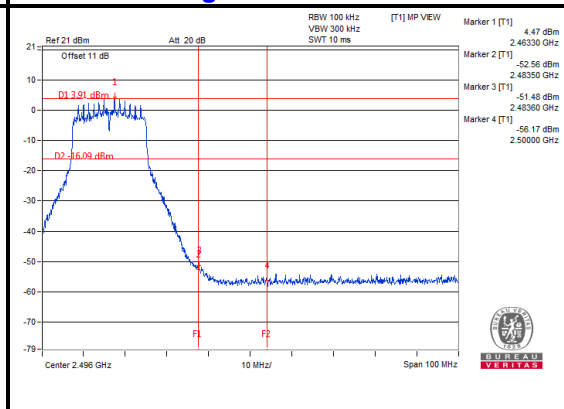
### CH 11



## CH 1 Band Edge

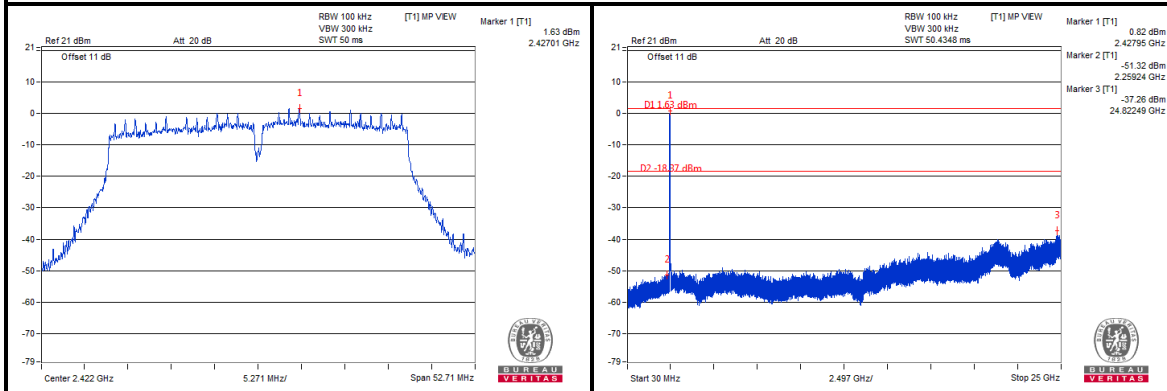


## CH 11 Band Edge

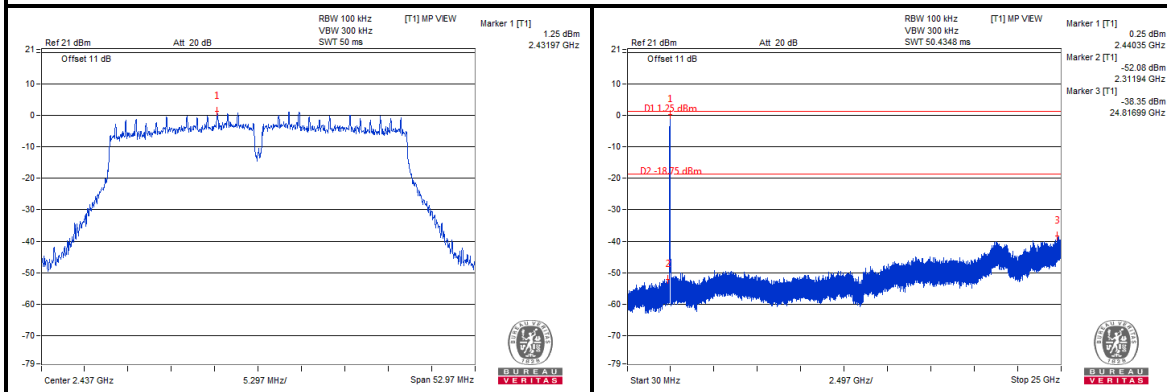


## 802.11n (40MHz)

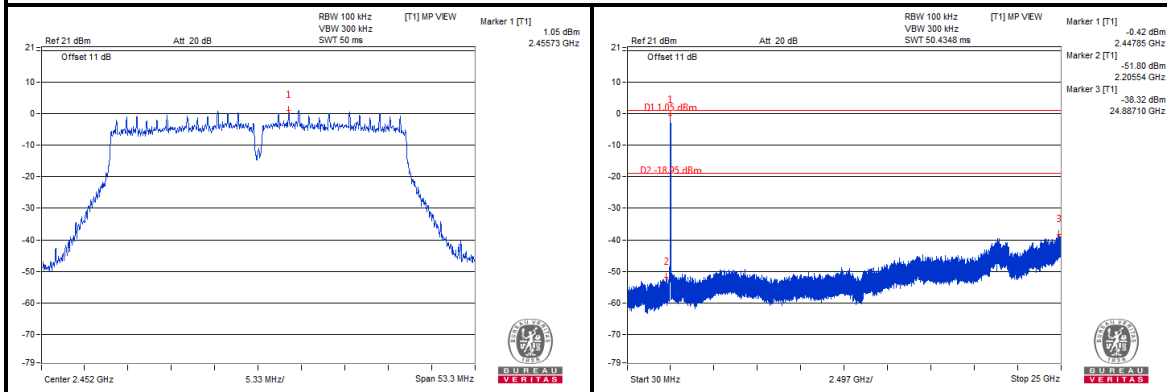
### CH 3

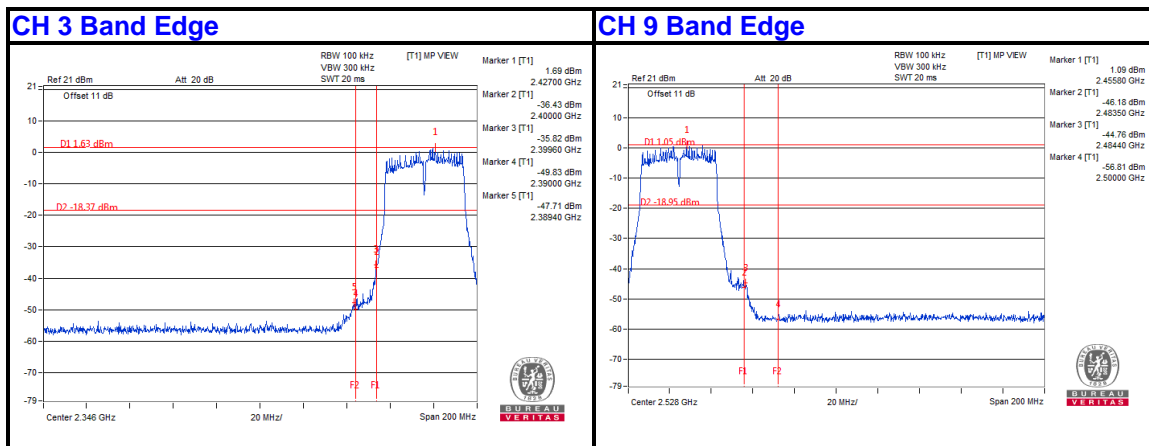


### CH 6



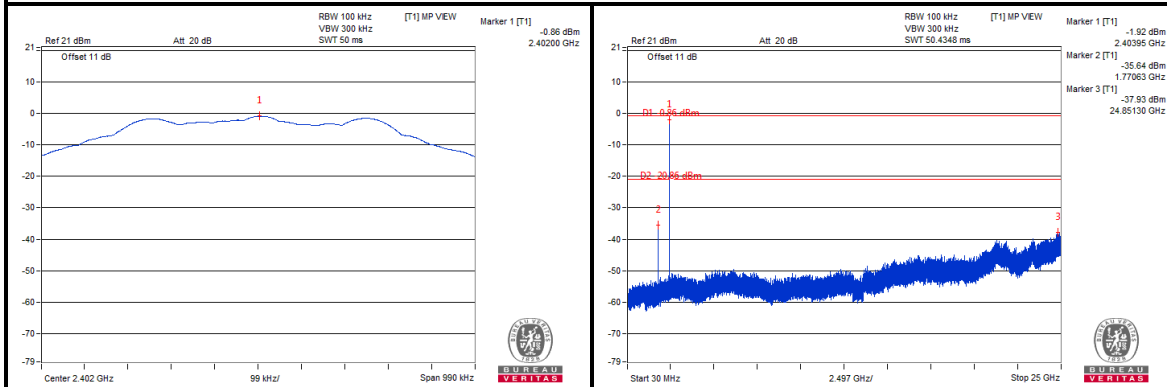
### CH 9



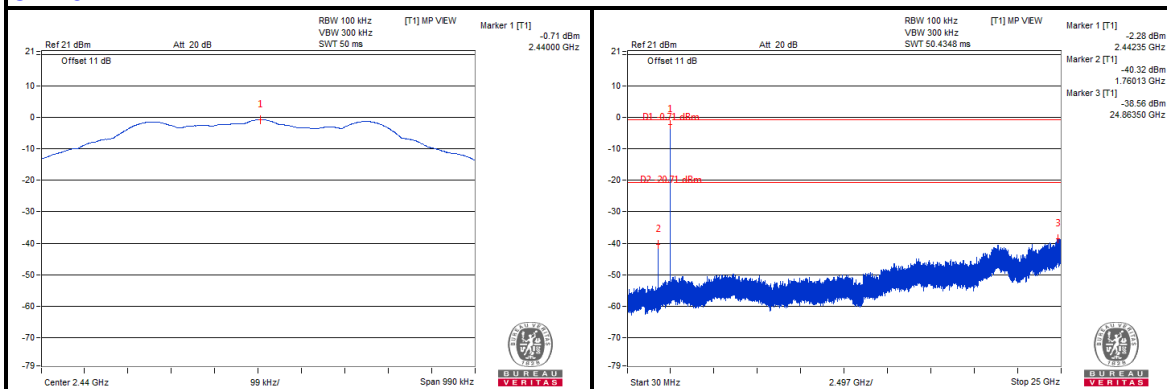


## BT-LE (GFSK) (1MHz)

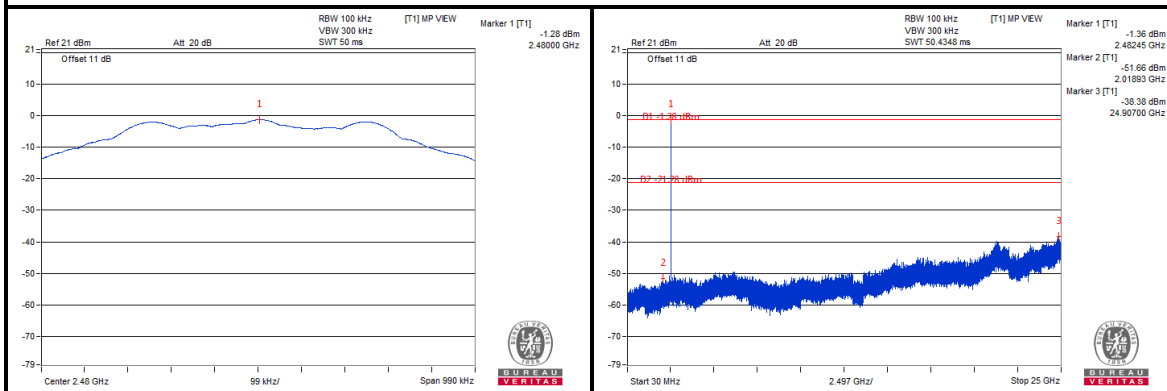
### CH 0



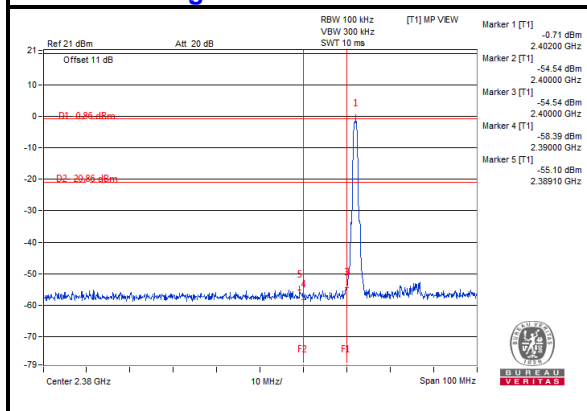
### CH 19



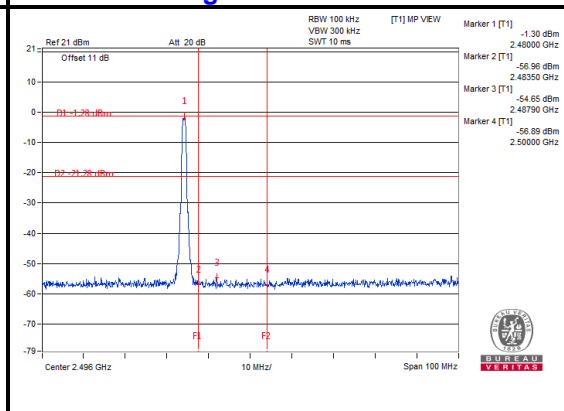
### CH 39



## CH 0 Band Edge

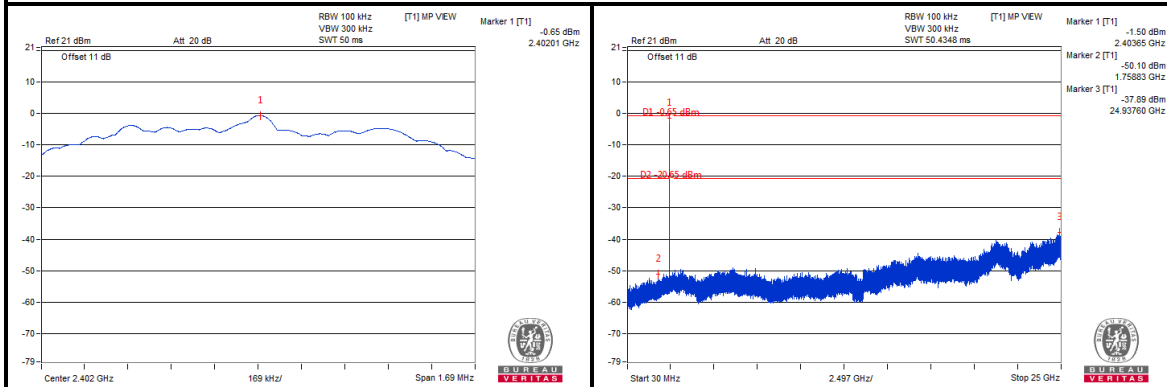


## CH 39 Band Edge

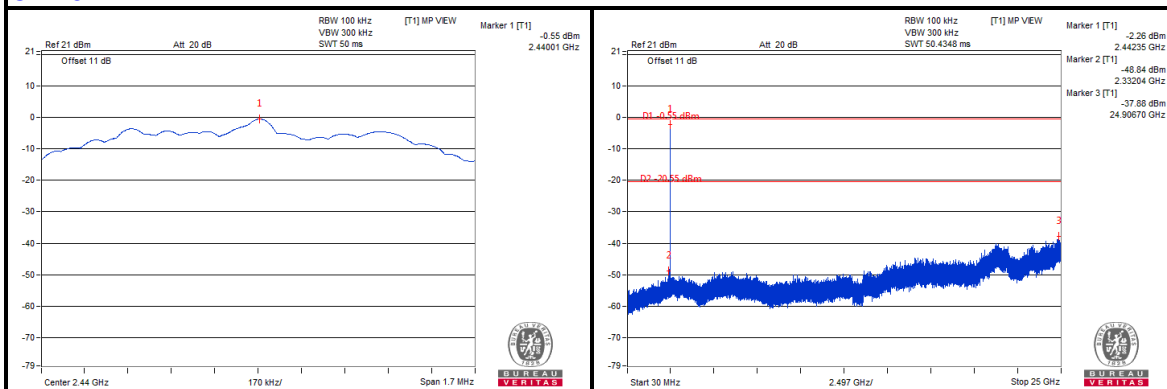


## BT-LE (GFSK) (2MHz)

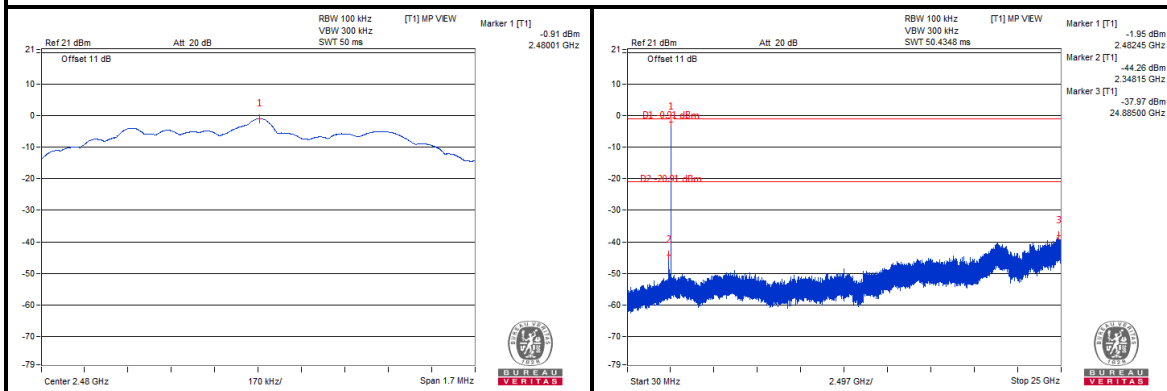
### CH 0



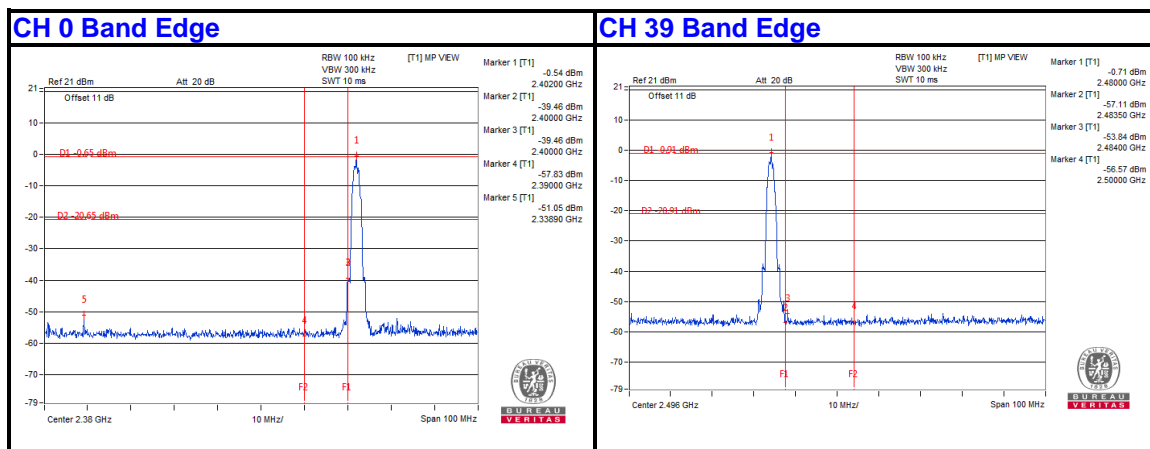
### CH 19



### CH 39







Note: The test, calibration and test results are compliance with the A2LA (Certificate # 3939.01).

## 5 PHOTOGRAPHS OF THE TEST CONFIGURATION

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

## **6 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---**