



BUREAU
VERITAS

Test Report No.: RF190522W010-2



FCC TEST REPORT (Part 15, Subpart C)

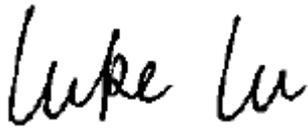
Applicant:	Lenovo(Shanghai) Electronics Technology Co., Ltd.
Address:	Section 304-305, Building No. 4, # 222, Meiyue Road, China (Shanghai) Pilot Free Trade Zone

Manufacturer or Supplier:	Lenovo PC HK Limited
Address:	23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong
Product:	Portable Tablet Computer
Brand Name:	Lenovo
Model Name:	Lenovo TB-X605FC
FCC ID:	O57TBX605FC
Date of tests:	Apr. 10, 2019 ~ May 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

Prepared by Alex Chen Engineer / Mobile Department	Approved by Luke Lu Manager / Mobile Department
 Date: Jun. 14, 2019	 Date: Jun. 14, 2019

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Test Report No.: RF190522W010-2

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF190522W010-2	Original release	Jun. 14, 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 -10.66dB at 0.572000MHz.
15.205 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -3.2dB 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	Portable Tablet Computer
BRAND NAME	Lenovo
MODEL NAME	Lenovo TB-X605FC
NOMINAL VOLTAGE	5.0Vdc (adapter or host equipment) 3.85Vdc (Li-ion, battery)
MODULATION TECHNOLOGY	DSSS, OFDM, DTS
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM BT-LE(GFSK) for DTS
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: 178.649mW (Maximum) BT-LE: 1.368mW (Maximum)
ANTENNA TYPE	PIFA Antenna with 2.93dBi gain
HW VERSION	Lenovo Tablet TB-X605FC
SW VERSION	TB-X605FC_RF01_20190611
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	USB cable: non-shielded, detachable, 1.0m

NOTE:

- For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
- There were Sample 1, 2, 3, 4, 5 and 6 for this project, the difference is as below:

SAMPLE	EUT CONFIGURATION INFORMATION
1	LCD Panel 1+Photo Camera 1+Photo Camera 3+CPU1+EMMC1+DDR1+speaker 1+speaker 2+motor1+Main Broad 1+ BT/WLAN Module+ Battery 1
2	LCD Panel 2+Photo Camera 2+Photo Camera 4+CPU1+EMMC2+DDR2+speaker 1+speaker 2+motor2+Main Broad 2+ BT/WLAN Module+ Battery 2
3	LCD Panel 1+Photo Camera 1+Photo Camera 3+CPU1+EMMC3+DDR3+speaker 1+speaker 2+motor1+Main Broad 1+ BT/WLAN Module+ Battery 1
4	LCD Panel 2+Photo Camera 2+Photo Camera 4+CPU1+EMMC4+DDR4+speaker 1+speaker 2+motor2+Main Broad 2+ BT/WLAN Module+ Battery 2
5	LCD Panel 1+Photo Camera 1+Photo Camera 3+CPU1+EMMC5+DDR5+speaker 1+speaker 2+motor1+Main Broad 1+ BT/WLAN Module+ Battery 1
6	LCD Panel 2+Photo Camera 2+Photo Camera 4+CPU1+EMMC6+DDR6+speaker 1+speaker 2+motor2+Main Broad 2+ BT/WLAN Module+ Battery 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

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

List of Accessory:

ACCESSORIES	BRAND	MODEL	SPECIFICATION
AC Adapter 1	Salom	SC-41	I/P:100-240Vac, 0.3A O/P: 5Vdc, 2A
AC Adapter 2	AcBel	SC-41	I/P:100-240Vac, 0.3A O/P: 5Vdc, 2A
Battery 1	SCUD	L16D2P31	Rating: 3.85Vdc, 7000mAh
Battery 2	Celxpert	L16D2P31	Rating: 3.85Vdc, 7000mAh
USB Cable 1	LiQi	L27B-052000100-TCCS	1.0m shielded cable w/o core
USB Cable 2	SaiBao	S27B-052000100-TCCS	1.0m shielded cable w/o core
LCD Panel1	BOE	TV101WUM-LL4	10.1 "
LCD Panel2	BOE	TV101WUM-LL5	10.1 "
Photo Camera 1	O-film	L4H7A00	8M AF
Photo Camera 2	Q-tech	F4H7YAZ	8M AF
Photo Camera 3	Lianyi	LE5220FM	5M FF
Photo Camera 4	Jinkang	G7B5-QL607XFF	5M FF
CPU	Qualcomm	SDA-450-A-792NSP-TR-01-0-AA	-
EMMC1+DDR1	SAMSUNG	KMRP60014M-B614(4+64)	64G
EMMC2+DDR2	HYNIX	H9TQ52ACLTMCUR-KUM(4+64)	64G
EMMC3+DDR3	SAMSUNG	KMGD6001BM-B421(3+32)	32G
EMMC4+DDR4	HYNIX	H9TQ27ADFTMCUR-KUM(3+32)	32G
EMMC5+DDR5	SAMSUNG	KMQE60013M-B318(2+16)	16G
EMMC6+DDR6	HYNIX	H9TQ17ABJTCCUR-KUM(2+16)	16G
Speaker 1	Xichun	KFSC1712SBC-S-B232-20J-GT	-
Speaker 2	Xichun	KFSC1712SBC-S-B233-20J-W	-
speaker 1	Haosheng	HB171219B08-13-B1F-RH	-
speaker 2	Haosheng	XHB171219B08-14-B1F-RH	-
motor1	Hongzhifa	HZF-Z04BE-RL67B25-90	-
Motor2	Kunwang	CY0408L-021HB-064	-
Main Broad 1	Hongban	Aae_MB_PCB_V3	-
Main Broad 2	Huashen	Aae_MB_PCB_V3	-
BT/WLAN Module	Qualcomm	WCN-3680B-0-79BWLNSP-TR-05-1	-



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



2.2.1 CONFIGURATION OF SYSTEM UNDER TEST

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

2.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

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

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

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

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

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

RADIATED EMISSION TEST (BELOW 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11g	1 to 11	1	OFDM	BPSK	6.0
BT-LE	0 to 39	0	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
BT-LE	0 to 39	0,19, 39	DTS	GFSK	1

POWER LINE CONDUCTED EMISSION TEST:

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

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11g	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	DTS	GFSK	1



ANTENNA PORT CONDUCTED MEASUREMENT:

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

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

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE	TESTED BY
RE<1G	22deg. C, 54%RH	DC 5V from adaptor	Star Le
RE≥1G	22deg. C, 54%RH	DC 5V from adaptor	Star Le
PLC	24deg. C, 55%RH	DC 5V from adaptor	John Wen
APCM	25deg. C, 60%RH	3.85Vdc from battery	Rain Wang



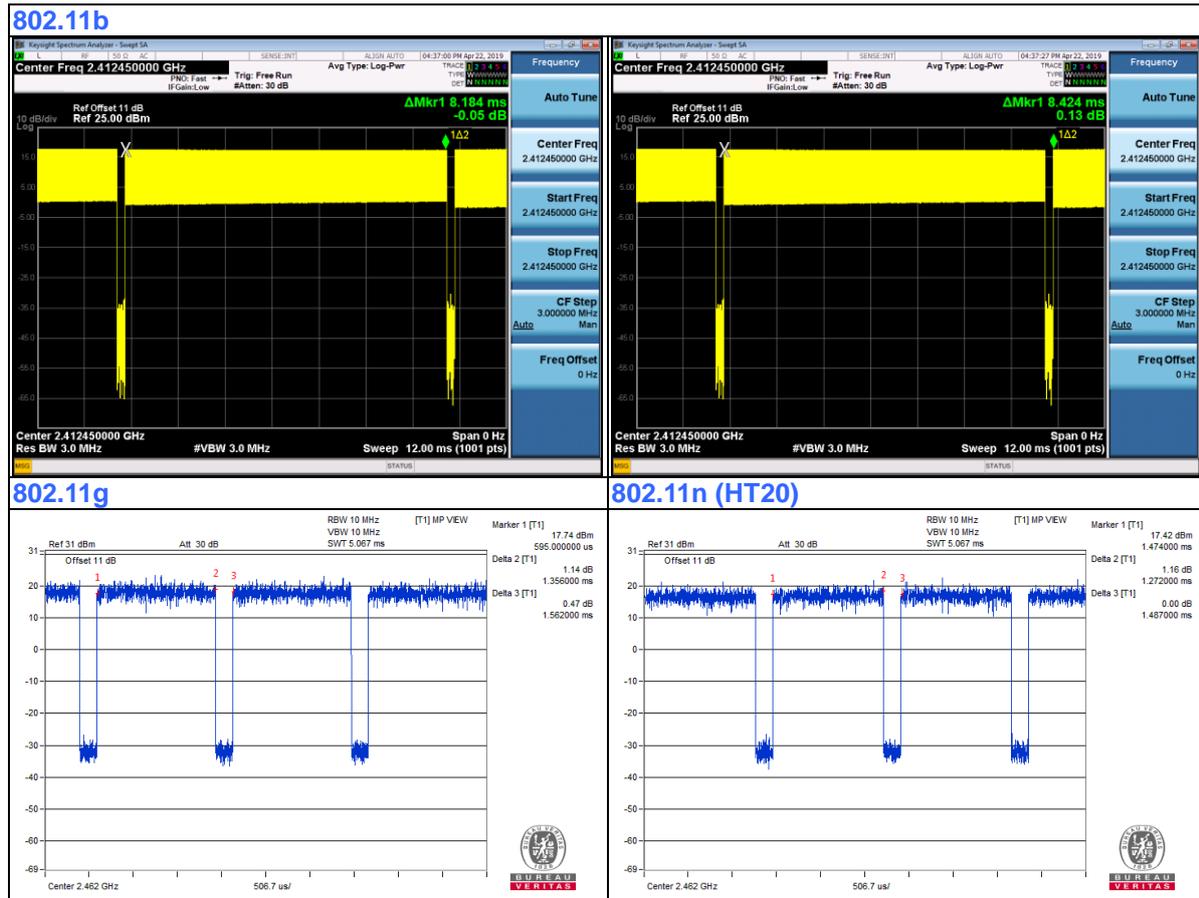
2.3 Duty Cycle of Test Signal

WIFI 2.4GHz

802.11b: Duty cycle = 8.184/8.424 = 0.972 < 98%, Duty factor = 10 * log(1/0.972) = 0.126

802.11g: Duty cycle = 1.356/1.562 = 0.868 < 98%, Duty factor = 10 * log(1/0.868) = 0.614

802.11n (HT20): Duty cycle = 1.272/1.487 = 0.855 < 98%, Duty factor = 10 * log(1/0.855) = 0.678





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	DC source	LONG WEI	PS-6403D	010934269	N/A
2	PC	HP	A6608CN	3CR83825X3	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	DC Line: Unshielded, Detachable 1.0m
2	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.

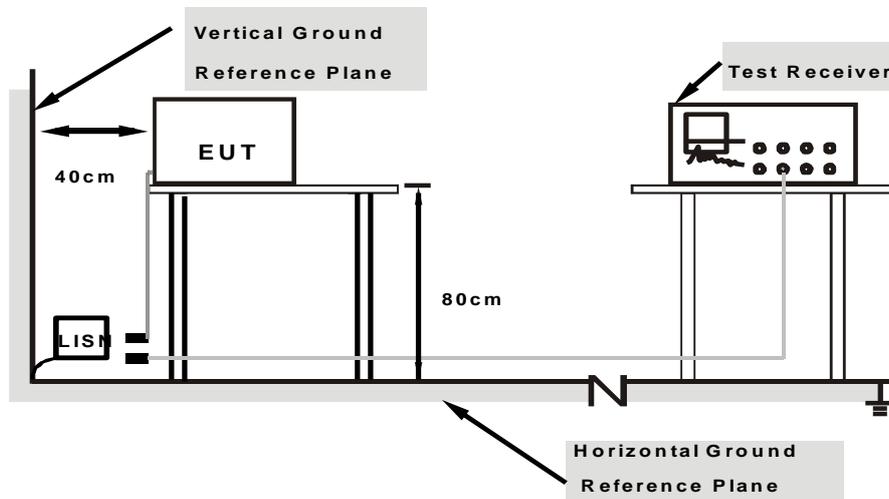
NOTE: All modes of operation were investigated and the worst-case emissions are reported.

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 cm 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

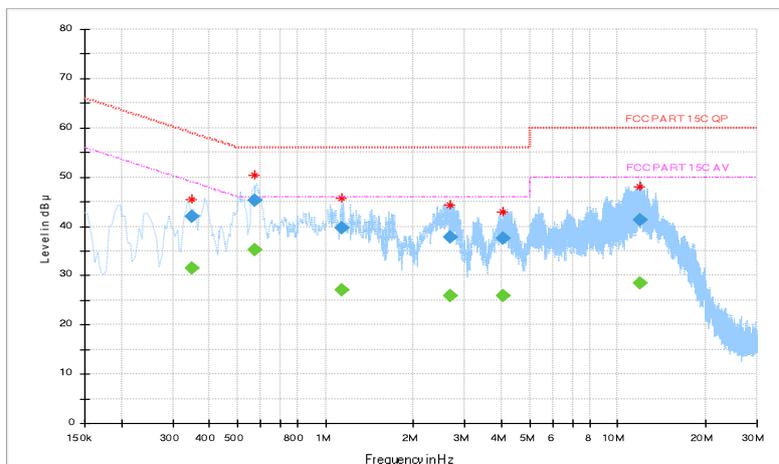
CONDUCTED WORST-CASE DATA:

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	2019/04/12
Test Voltage	DC 5V From Adapter		

Frequency (MHz)	QuasiPeak (dBUV)	CAverage (dBUV)	Limit (dBUV)	Margin (dB)	Line	Filter	Corr. (dB)
0.348000	---	31.52	49.01	-17.49	L	ON	10.0
0.348000	41.90	---	59.01	-17.11	L	ON	10.0
0.572000	---	35.29	46.00	-10.71	L	ON	10.0
0.572000	45.34	---	56.00	-10.66	L	ON	10.0
1.132000	---	27.09	46.00	-18.91	L	ON	10.1
1.132000	39.74	---	56.00	-16.26	L	ON	10.1
2.684000	---	25.89	46.00	-20.11	L	ON	10.2
2.684000	37.74	---	56.00	-18.26	L	ON	10.2
4.044000	---	25.95	46.00	-20.05	L	ON	10.2
4.044000	37.56	---	56.00	-18.44	L	ON	10.2
11.884000	---	28.45	50.00	-21.55	L	ON	10.5
11.884000	41.25	---	60.00	-18.75	L	ON	10.5

- 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

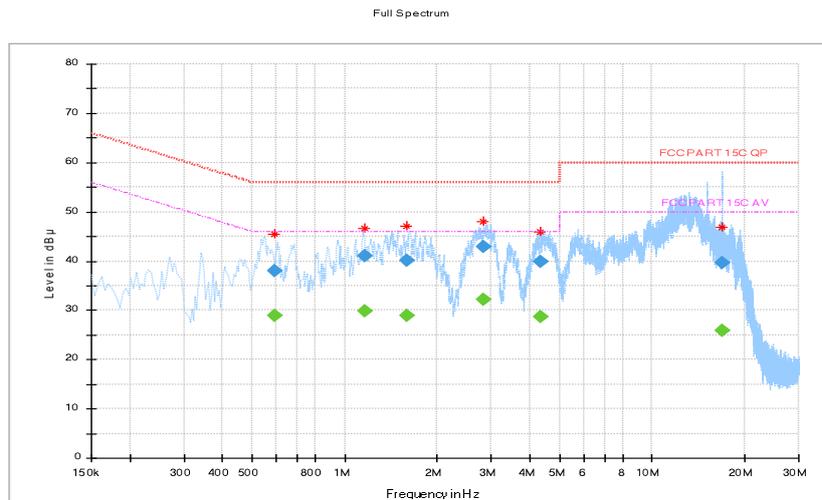




Frequency Range	150KHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25deg. C, 52RH
Tested By	John Wen	TEST DATE	2019/04/12
Test Voltage	DC 5V From Adapter		

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.590000	---	28.93	46.00	-17.07	N	ON	9.9
0.590000	38.11	---	56.00	-17.89	N	ON	9.9
1.156000	---	29.91	46.00	-16.09	N	ON	10.0
1.156000	41.00	---	56.00	-15.00	N	ON	10.0
1.584000	---	28.81	46.00	-17.19	N	ON	10.0
1.584000	40.05	---	56.00	-15.95	N	ON	10.0
2.824000	---	32.07	46.00	-13.93	N	ON	10.1
2.824000	42.95	---	56.00	-13.05	N	ON	10.1
4.354000	---	28.66	46.00	-17.34	N	ON	10.1
4.354000	39.92	---	56.00	-16.08	N	ON	10.1
16.880000	---	25.95	50.00	-24.05	N	ON	10.4
16.880000	39.58	---	60.00	-20.42	N	ON	10.4

- 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 $\geq 1/T$ (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.

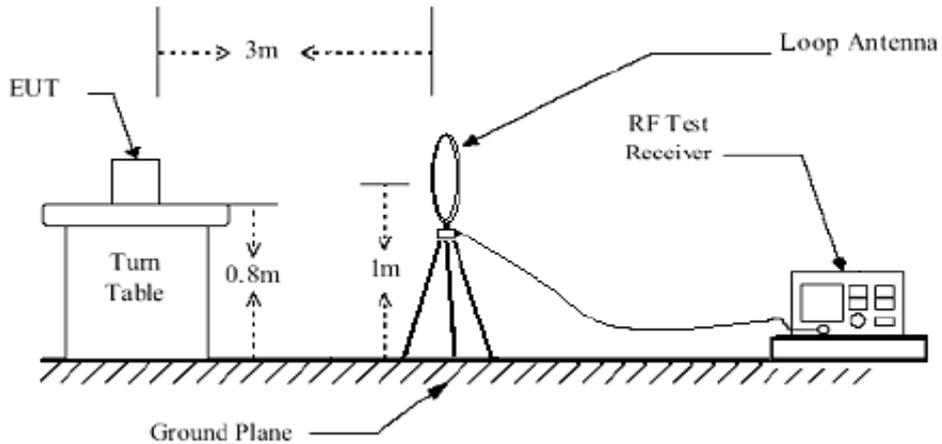
3.2.4 DEVIATION FROM TEST STANDARD

No deviation

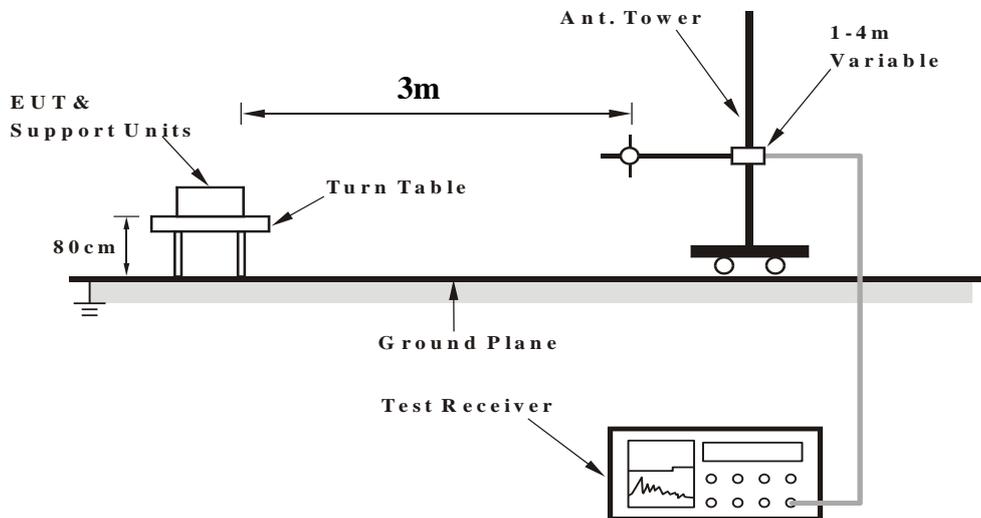


3.2.5 TEST SETUP

< Frequency Range below 30MHz >

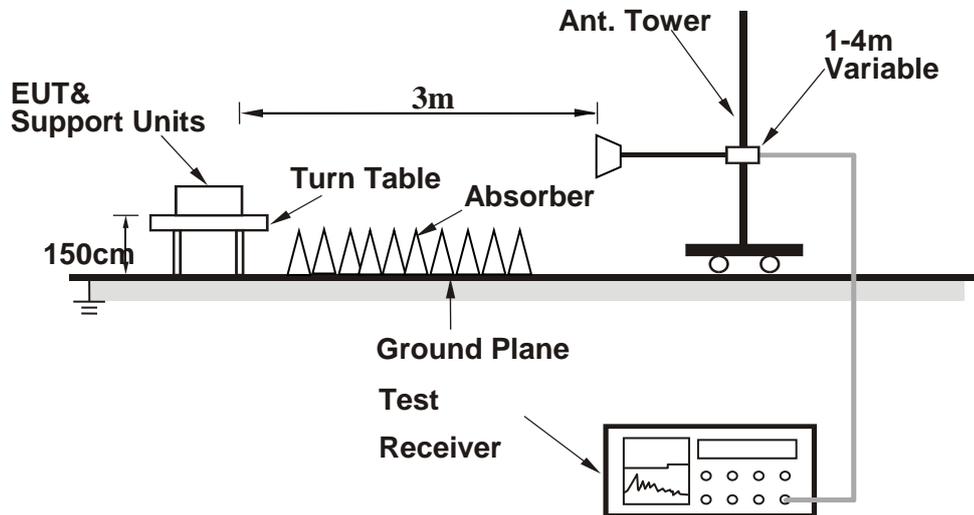


< Frequency Range 30MHz~1GHz >





<Frequency Range above 1GHz>



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

3.2.6 EUT OPERATING CONDITIONS

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



3.2.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA:

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

30 MHz – 1GHz data:

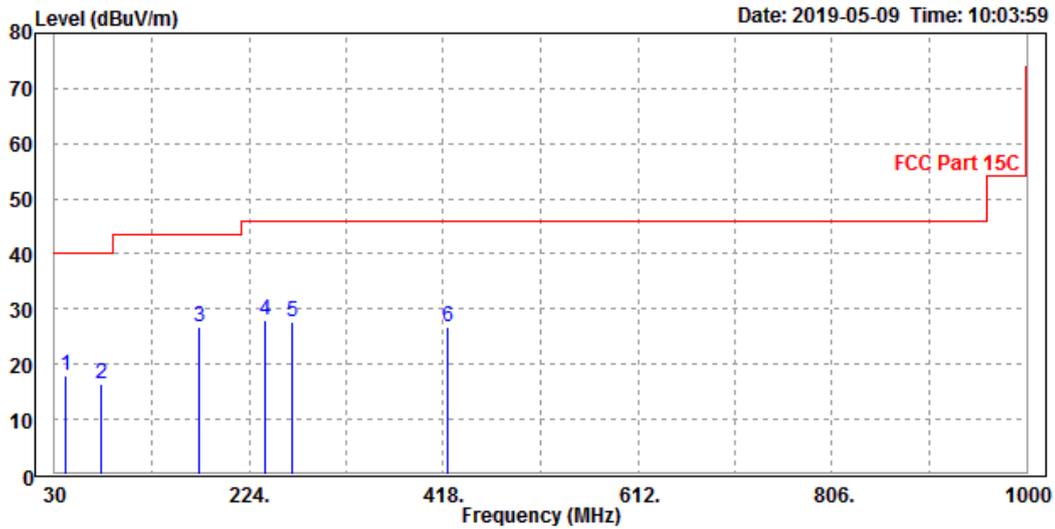
802.11g

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
40.67	17.99	41.86	40	-22.01	13.5	0.93	37.5	100	360	QP
76.56	16.43	44.68	40	-23.57	7.78	1.2	37.34	100	360	QP
173.56	26.73	51.35	43.5	-16.77	10.46	1.69	36.67	100	360	QP
239.52	27.97	50.07	46	-18.03	13.64	1.99	36.63	100	360	QP
266.68	27.72	48.93	46	-18.28	14.27	2.1	36.68	100	360	QP
422.85	26.62	43.29	46	-19.38	18.5	2.7	36.87	100	360	QP

REMARKS:

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



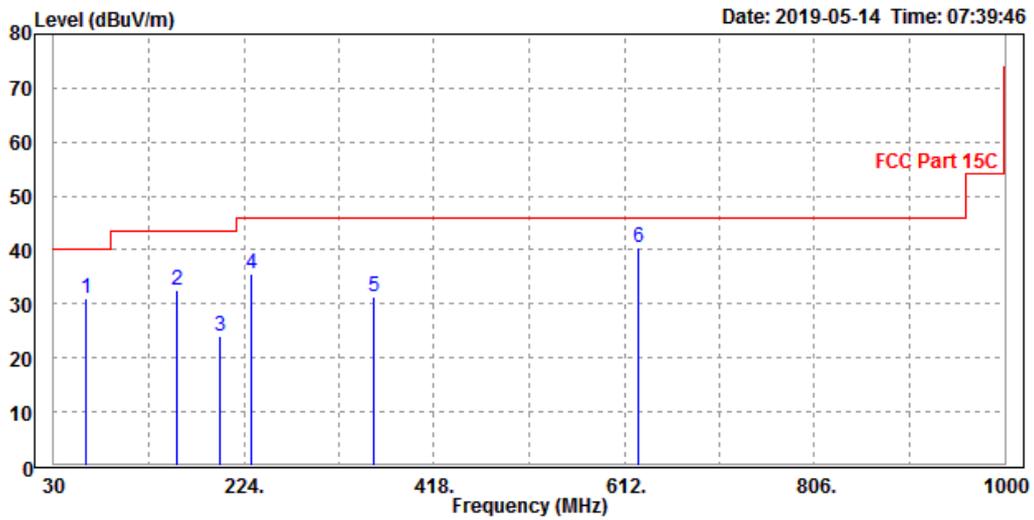


CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

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
62.54	31.13	60.36	40	-8.87	7	1.1	37.33	200	0	QP
155.23	32.62	57.71	43.5	-10.88	10.07	1.61	36.77	200	0	QP
200.36	24.18	48.12	43.5	-19.32	10.82	1.79	36.55	200	0	QP
231.15	35.47	57.83	46	-10.53	12.3	1.95	36.61	200	0	QP
356.28	31.44	49.86	46	-14.56	15.94	2.44	36.8	200	0	QP
625.89	40.39	53.69	46	-5.61	20.85	3.26	37.41	200	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)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	45.94	50.61	54	-8.06	33.1	8.15	45.92	114	320	Average
2390	58.15	62.82	74	-15.85	33.1	8.15	45.92	114	320	Peak
2412	108.99	113.57			33.14	8.19	45.91	114	320	Average
2412	111.64	116.22			33.14	8.19	45.91	114	320	Peak
2483.5	45.51	49.81	54	-8.49	33.27	8.32	45.89	114	320	Average
2483.5	56.46	60.76	74	-17.54	33.27	8.32	45.89	114	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	44.52	50.08	54	-9.48	32.21	8.15	45.92	100	118	Average
2390	56.33	61.89	74	-17.67	32.21	8.15	45.92	100	118	Peak
2412	107.48	112.93			32.27	8.19	45.91	100	118	Average
2412	110.5	115.95			32.27	8.19	45.91	100	118	Peak
2483.5	44.12	49.23	54	-9.88	32.46	8.32	45.89	100	118	Average
2483.5	55.41	60.52	74	-18.59	32.46	8.32	45.89	100	118	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	44.67	49.34	54	-9.33	33.1	8.15	45.92	100	132	Average
2390	56.84	61.51	74	-17.16	33.1	8.15	45.92	100	132	Peak
2437	108.79	113.27			33.19	8.24	45.91	100	132	Average
2437	111.51	115.99			33.19	8.24	45.91	100	132	Peak
2483.5	45.88	50.18	54	-8.12	33.27	8.32	45.89	100	132	Average
2483.5	57.47	61.77	74	-16.53	33.27	8.32	45.89	100	132	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	43.36	48.92	54	-10.64	32.21	8.15	45.92	100	120	Average
2390	55.38	60.94	74	-18.62	32.21	8.15	45.92	100	120	Peak
2437	106.99	112.32			32.34	8.24	45.91	100	120	Average
2437	109.63	114.96			32.34	8.24	45.91	100	120	Peak
2483.5	44.09	49.2	54	-9.91	32.46	8.32	45.89	100	120	Average
2483.5	55.39	60.5	74	-18.61	32.46	8.32	45.89	100	120	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	44.64	49.31	54	-9.36	33.1	8.15	45.92	100	135	Average
2390	54.15	58.82	74	-19.85	33.1	8.15	45.92	100	135	Peak
2462	108.49	112.88			33.23	8.28	45.9	100	135	Average
2462	110.97	115.36			33.23	8.28	45.9	100	135	Peak
2483.5	46.84	51.14	54	-7.16	33.27	8.32	45.89	100	135	Average
2483.5	57.33	61.63	74	-16.67	33.27	8.32	45.89	100	135	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	43.3	48.86	54	-10.7	32.21	8.15	45.92	100	115	Average
2390	53.75	59.31	74	-20.25	32.21	8.15	45.92	100	115	Peak
2462	106.48	111.7			32.4	8.28	45.9	100	115	Average
2462	109.33	114.55			32.4	8.28	45.9	100	115	Peak
2483.5	45.13	50.24	54	-8.87	32.46	8.32	45.89	100	115	Average
2483.5	56.36	61.47	74	-17.64	32.46	8.32	45.89	100	115	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	69.26	72.72	74	-4.74	33.1	4.88	41.44	195	67	Peak
2390	50.8	54.26	54	-3.2	33.1	4.88	41.44	195	67	Average
2412	109.74	113.15			33.14	4.9	41.45	195	67	Peak
2412	99.14	102.55			33.14	4.9	41.45	195	67	Average
2483.5	51.16	54.37	74	-22.84	33.27	4.98	41.46	195	67	Peak
2483.5	40.05	43.26	54	-13.95	33.27	4.98	41.46	195	67	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	68.77	73.12	74	-5.23	32.21	4.88	41.44	100	65	Peak
2390	49.11	53.46	54	-4.89	32.21	4.88	41.44	100	65	Average
2412	105.96	110.24			32.27	4.9	41.45	100	65	Peak
2412	96.14	100.42			32.27	4.9	41.45	100	65	Average
2483.5	50.34	54.36	74	-23.66	32.46	4.98	41.46	100	65	Peak
2483.5	38.56	42.58	54	-15.44	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. 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	48.38	53.05	54	-5.62	33.1	8.15	45.92	100	318	Average
2390	57.58	62.25	74	-16.42	33.1	8.15	45.92	100	318	Peak
2437	104.49	108.97			33.19	8.24	45.91	100	318	Average
2437	114.54	119.02			33.19	8.24	45.91	100	318	Peak
2483.5	46.96	51.26	54	-7.04	33.27	8.32	45.89	100	318	Average
2483.5	60.51	64.81	74	-13.49	33.27	8.32	45.89	100	318	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	46.81	52.37	54	-7.19	32.21	8.15	45.92	100	292	Average
2390	57.72	63.28	74	-16.28	32.21	8.15	45.92	100	292	Peak
2437	101.55	106.88			32.34	8.24	45.91	100	292	Average
2437	111.74	117.07			32.34	8.24	45.91	100	292	Peak
2483.5	45.13	50.24	54	-8.87	32.46	8.32	45.89	100	292	Average
2483.5	57.15	62.26	74	-16.85	32.46	8.32	45.89	100	292	Peak

REMARKS:

- Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
- 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	50.18	53.64	74	-23.82	33.1	4.88	41.44	200	65	Peak
2390	39.81	43.27	54	-14.19	33.1	4.88	41.44	200	65	Average
2462	109.95	113.21			33.23	4.96	41.45	200	65	Peak
2462	100.42	103.68			33.23	4.96	41.45	200	65	Average
2483.5	68.84	72.05	74	-5.16	33.27	4.98	41.46	200	65	Peak
2483.5	49.11	52.32	54	-4.89	33.27	4.98	41.46	200	65	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	49.86	54.21	74	-24.14	32.21	4.88	41.44	200	69	Peak
2390	38.34	42.69	54	-15.66	32.21	4.88	41.44	200	69	Average
2462	105.39	109.48			32.4	4.96	41.45	200	69	Peak
2462	95.56	99.65			32.4	4.96	41.45	200	69	Average
2483.5	69.52	73.54	74	-4.48	32.46	4.98	41.46	200	69	Peak
2483.5	48.99	53.01	54	-5.01	32.46	4.98	41.46	200	69	Average

REMARKS:

- Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
- 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	70.79	74.25	74	-3.21	33.1	4.88	41.44	172	64	Peak
2390	50.43	53.89	54	-3.57	33.1	4.88	41.44	172	64	Average
2412	109.29	112.7			33.14	4.9	41.45	172	64	Peak
2412	98.94	102.35			33.14	4.9	41.45	172	64	Average
2483.5	51.06	54.27	74	-22.94	33.27	4.98	41.46	172	64	Peak
2483.5	39.37	42.58	54	-14.63	33.27	4.98	41.46	172	64	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	68.54	72.89	74	-5.46	32.21	4.88	41.44	172	63	Peak
2390	49.21	53.56	54	-4.79	32.21	4.88	41.44	172	63	Average
2412	104.48	108.76			32.27	4.9	41.45	172	63	Peak
2412	93.59	97.87			32.27	4.9	41.45	172	63	Average
2483.5	48.1	52.12	74	-25.9	32.46	4.98	41.46	172	63	Peak
2483.5	39.49	43.51	54	-14.51	32.46	4.98	41.46	172	63	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)
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	48.29	52.96	54	-5.71	33.1	8.15	45.92	100	324	Average
2390	58.55	63.22	74	-15.45	33.1	8.15	45.92	100	324	Peak
2437	104.27	108.75			33.19	8.24	45.91	100	324	Average
2437	113.77	118.25			33.19	8.24	45.91	100	324	Peak
2483.5	46.61	50.91	54	-7.39	33.27	8.32	45.89	100	324	Average
2483.5	61.31	65.61	74	-12.69	33.27	8.32	45.89	100	324	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	46.62	52.18	54	-7.38	32.21	8.15	45.92	100	107	Average
2390	66.66	72.22	74	-7.34	32.21	8.15	45.92	100	107	Peak
2437	100.79	106.12			32.34	8.24	45.91	100	107	Average
2437	111.76	117.09			32.34	8.24	45.91	100	107	Peak
2483.5	44.73	49.84	54	-9.27	32.46	8.32	45.89	100	107	Average
2483.5	55.24	60.35	74	-18.76	32.46	8.32	45.89	100	107	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	49.78	53.24	74	-24.22	33.1	4.88	41.44	195	68	Peak
2390	39.05	42.51	54	-14.95	33.1	4.88	41.44	195	68	Average
2462	107.46	110.72			33.23	4.96	41.45	195	68	Peak
2462	97.09	100.35			33.23	4.96	41.45	195	68	Average
2483.5	68.36	71.57	74	-5.64	33.27	4.98	41.46	195	68	Peak
2483.5	50.25	53.46	54	-3.75	33.27	4.98	41.46	195	68	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	47.99	52.34	74	-26.01	32.21	4.88	41.44	195	75	Peak
2390	38.8	43.15	54	-15.2	32.21	4.88	41.44	195	75	Average
2462	102.68	106.77			32.4	4.96	41.45	195	75	Peak
2462	92.77	96.86			32.4	4.96	41.45	195	75	Average
2483.5	69.93	73.95	74	-4.07	32.46	4.98	41.46	195	75	Peak
2483.5	49.79	53.81	54	-4.21	32.46	4.98	41.46	195	75	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:

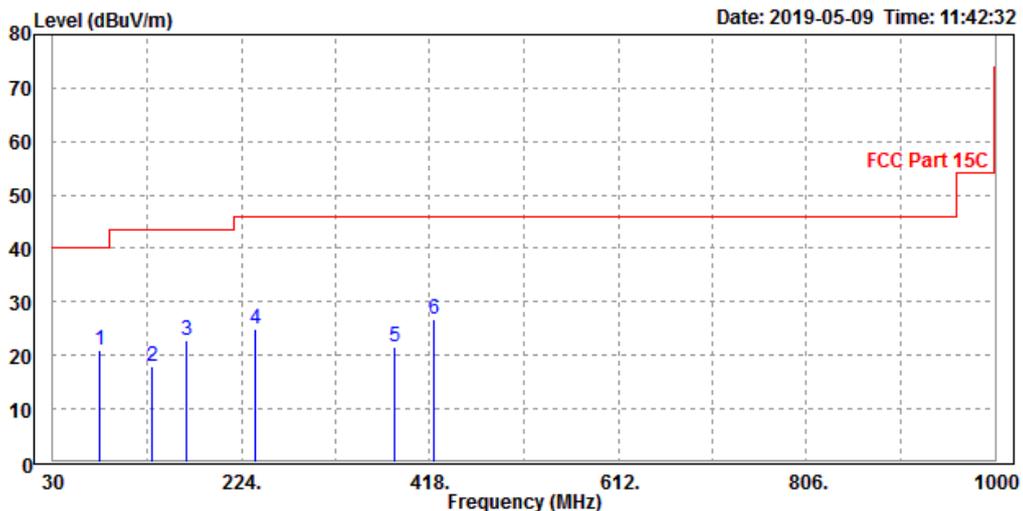
BT-LE (GFSK)

CHANNEL	TX Channel 0	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
78.5	20.89	49.02	40	-19.11	8.01	1.2	37.34	200	360	QP
131.85	17.94	44.63	43.5	-25.56	8.8	1.49	36.98	200	360	QP
167.74	22.69	47.29	43.5	-20.81	10.42	1.68	36.7	200	360	QP
237.58	25.01	47.21	46	-20.99	12.45	1.98	36.63	200	360	QP
381.14	21.52	39.17	46	-24.48	16.62	2.54	36.81	200	360	QP
422.85	26.62	43.29	46	-19.38	17.5	2.7	36.87	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



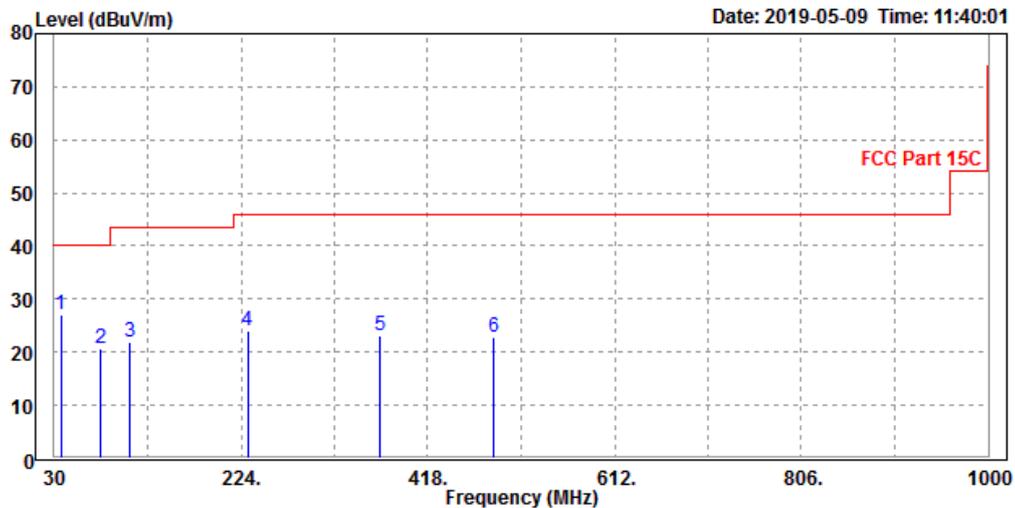


CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

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
36.79	26.95	49.75	40	-13.05	13.89	0.88	37.57	100	0	QP
77.53	20.68	48.69	40	-19.32	8.13	1.2	37.34	100	0	QP
108.57	21.96	48.39	43.5	-21.54	9.33	1.37	37.13	100	0	QP
230.79	24.1	46.49	46	-21.9	12.28	1.94	36.61	100	0	QP
367.56	23.1	41.12	46	-22.9	16.29	2.49	36.8	100	0	QP
486.87	22.81	38.33	46	-23.19	18.52	2.94	36.98	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)
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	40.83	49.45	54	-13.17	32.87	4.88	46.37	199	315	Average
2390	52.76	61.38	74	-21.24	32.87	4.88	46.37	199	315	Peak
2402	97.32	105.92			32.88	4.89	46.37	199	315	Average
2402	102.88	111.48			32.88	4.89	46.37	199	315	Peak
2483.5	42.47	50.88	54	-11.53	32.98	4.98	46.37	199	315	Average
2483.5	52.18	60.59	74	-21.82	32.98	4.98	46.37	199	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	39.6	48.88	54	-14.4	32.21	4.88	46.37	163	315	Average
2390	49.22	58.5	74	-24.78	32.21	4.88	46.37	163	315	Peak
2402	90.2	99.43			32.25	4.89	46.37	163	315	Average
2402	95.28	104.51			32.25	4.89	46.37	163	315	Peak
2483.5	40.56	49.49	54	-13.44	32.46	4.98	46.37	163	315	Average
2483.5	51.48	60.41	74	-22.52	32.46	4.98	46.37	163	315	Peak

REMARKS:

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



CHANNEL	TX Channel 19	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	40.82	49.44	54	-13.18	32.87	4.88	46.37	200	319	Average
2390	50.53	59.15	74	-23.47	32.87	4.88	46.37	200	319	Peak
2440	97.28	105.78			32.93	4.94	46.37	200	319	Average
2440	102.15	110.65			32.93	4.94	46.37	200	319	Peak
2483.5	41.75	50.16	54	-12.25	32.98	4.98	46.37	200	319	Average
2483.5	51.71	60.12	74	-22.29	32.98	4.98	46.37	200	319	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	40.24	49.52	54	-13.76	32.21	4.88	46.37	318	158	Average
2390	48.34	57.62	74	-25.66	32.21	4.88	46.37	318	158	Peak
2440	92.62	101.71			32.34	4.94	46.37	318	158	Average
2440	97.45	106.54			32.34	4.94	46.37	318	158	Peak
2483.5	40.44	49.37	54	-13.56	32.46	4.98	46.37	318	158	Average
2483.5	49.51	58.44	74	-24.49	32.46	4.98	46.37	318	158	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	40.89	49.51	54	-13.11	32.87	4.88	46.37	200	306	Average
2390	49.71	58.33	74	-24.29	32.87	4.88	46.37	200	306	Peak
2480	94.75	103.16			32.98	4.98	46.37	200	306	Average
2480	99.63	108.04			32.98	4.98	46.37	200	306	Peak
2483.5	40.86	49.27	54	-13.14	32.98	4.98	46.37	200	306	Average
2483.5	50.95	59.36	74	-23.05	32.98	4.98	46.37	200	306	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	40.18	49.46	54	-13.82	32.21	4.88	46.37	165	312	Average
2390	50.07	59.35	74	-23.93	32.21	4.88	46.37	165	312	Peak
2480	92.39	101.33			32.45	4.98	46.37	165	312	Average
2480	97.41	106.35			32.45	4.98	46.37	165	312	Peak
2483.5	40.73	49.66	54	-13.27	32.46	4.98	46.37	165	312	Average
2483.5	49.72	58.65	74	-24.28	32.46	4.98	46.37	165	312	Peak

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

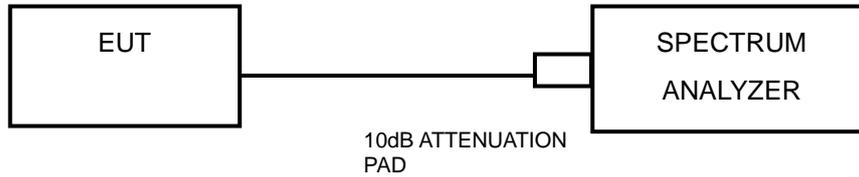
1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (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

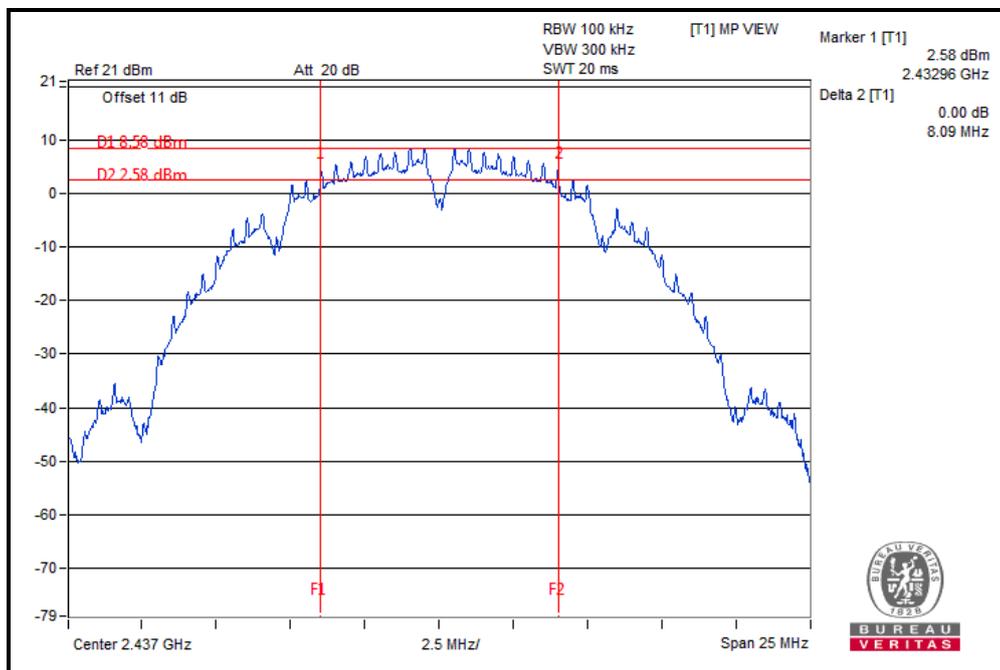
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



3.3.7 TEST RESULTS

802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	8.07	0.5	PASS
6	2437	8.09	0.5	PASS
11	2462	8.09	0.5	PASS



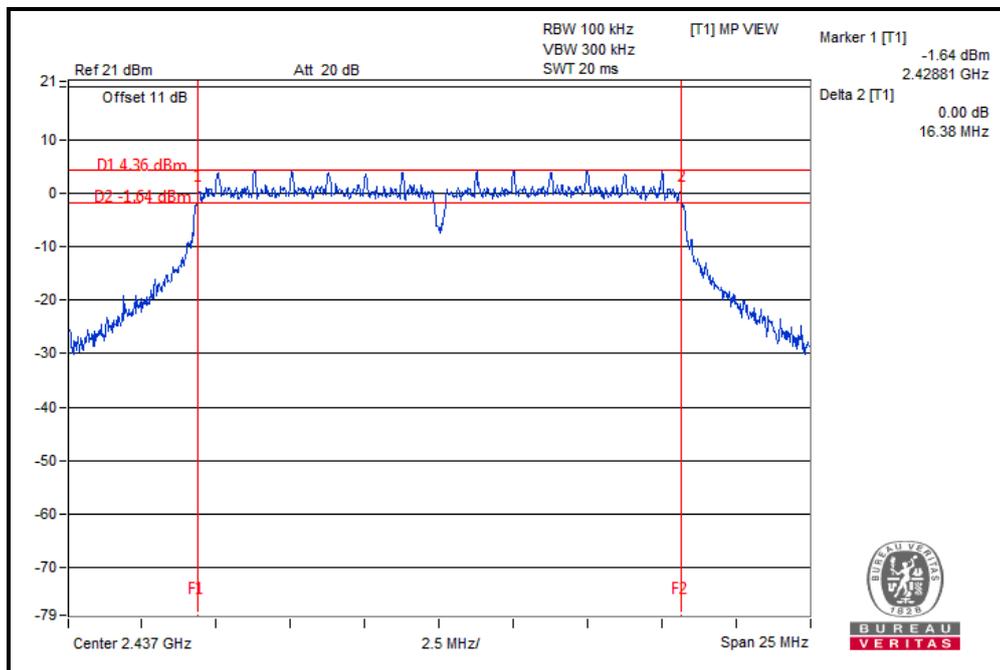


**BUREAU
VERITAS**

Test Report No.: RF190522W010-2

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.36	0.5	PASS
6	2437	16.38	0.5	PASS
11	2462	16.36	0.5	PASS



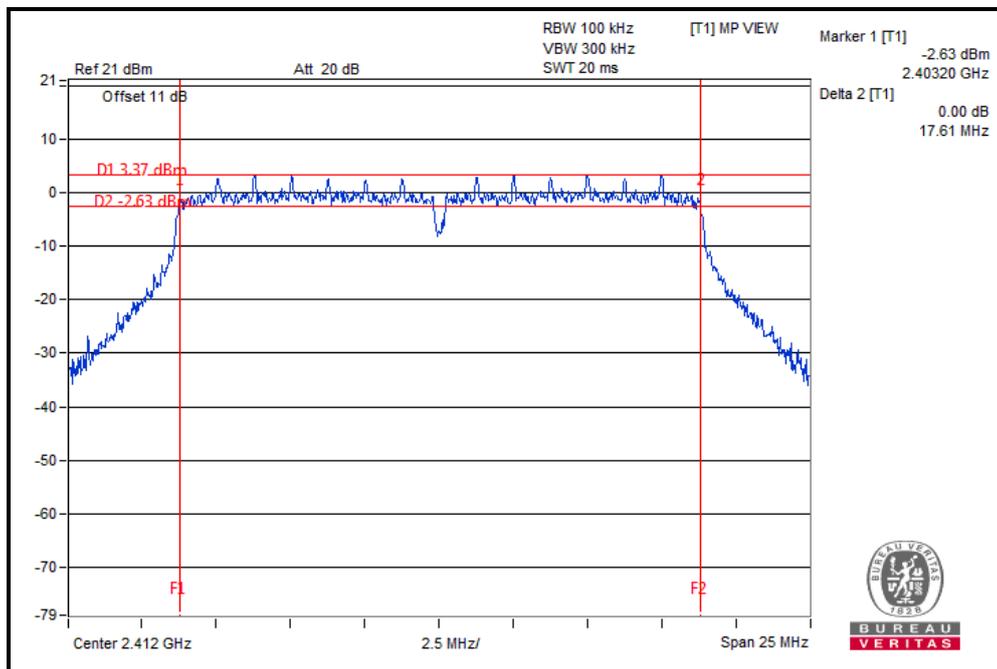


**BUREAU
VERITAS**

Test Report No.: RF190522W010-2

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	17.61	0.5	PASS
6	2437	17.59	0.5	PASS
11	2462	17.58	0.5	PASS



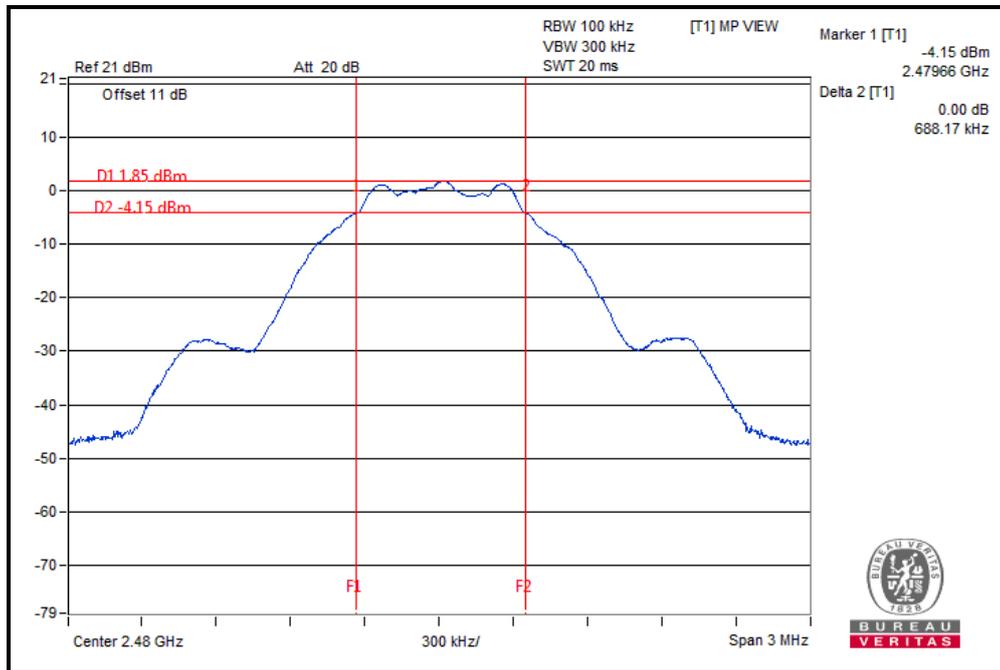


**BUREAU
VERITAS**

Test Report No.: RF190522W010-2

BT-LE (GFSK)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	0.69	0.5	PASS
19	2440	0.68	0.5	PASS
39	2480	0.69	0.5	PASS



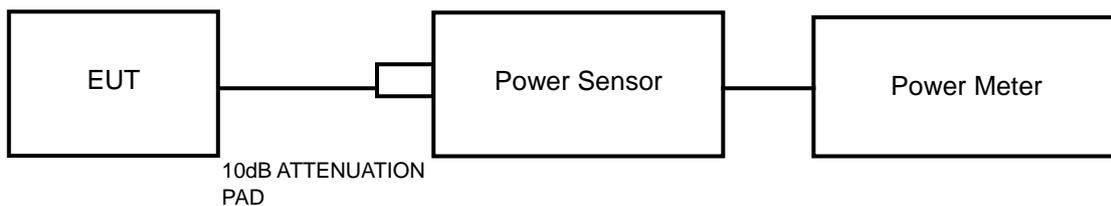


3.4 CONDUCTED OUTPUT POWER

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	19.03	79.983	1	PASS
6	2437	18.54	71.450	1	PASS
11	2462	17.92	61.944	1	PASS

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT(W)	PASS/FAIL
1	2412	22.52	178.649	1	PASS
6	2437	21.11	129.122	1	PASS
11	2462	22.17	164.816	1	PASS

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT(W)	PASS/FAIL
1	2412	21.51	141.579	1	PASS
6	2437	22.15	164.059	1	PASS
11	2462	22.18	165.196	1	PASS

BT-LE (GFSK)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT(W)	PASS/FAIL
0	2402	1.36	1.368	1	PASS
19	2440	0.68	1.169	1	PASS
39	2480	0.21	1.050	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	16.31	N/A
6	2437	16.09	N/A
11	2462	15.51	N/A

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	PASS/FAIL
1	2412	15.10	N/A
6	2437	14.44	N/A
11	2462	14.63	N/A

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	PASS/FAIL
1	2412	14.05	N/A
6	2437	14.53	N/A
11	2462	14.19	N/A

BT-LE (GFSK)

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	PASS/FAIL
0	2402	1.18	N/A
19	2440	0.51	N/A
39	2480	0.02	N/A

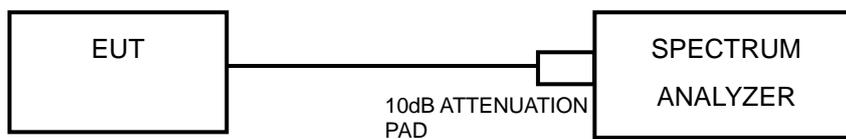


3.5 POWER SPECTRAL DENSITY MEASUREMENT

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 $\geq 3 \times$ RBW, Detector = peak.
3. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
4. Use the peak marker function to determine the maximum amplitude level.

3.5.5 DEVIATION FROM TEST STANDARD

No deviation.

3.5.6 EUT OPERATING CONDITION

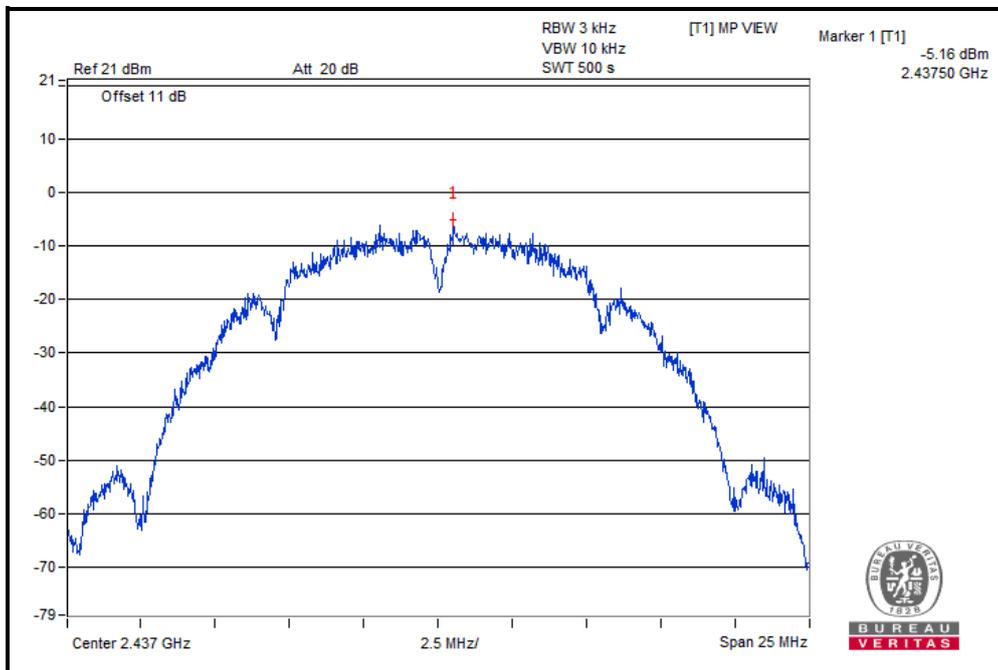
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



3.5.7 TEST RESULTS

802.11b

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-6.17	8	PASS
6	2437	-5.16	8	PASS
11	2462	-6.34	8	PASS



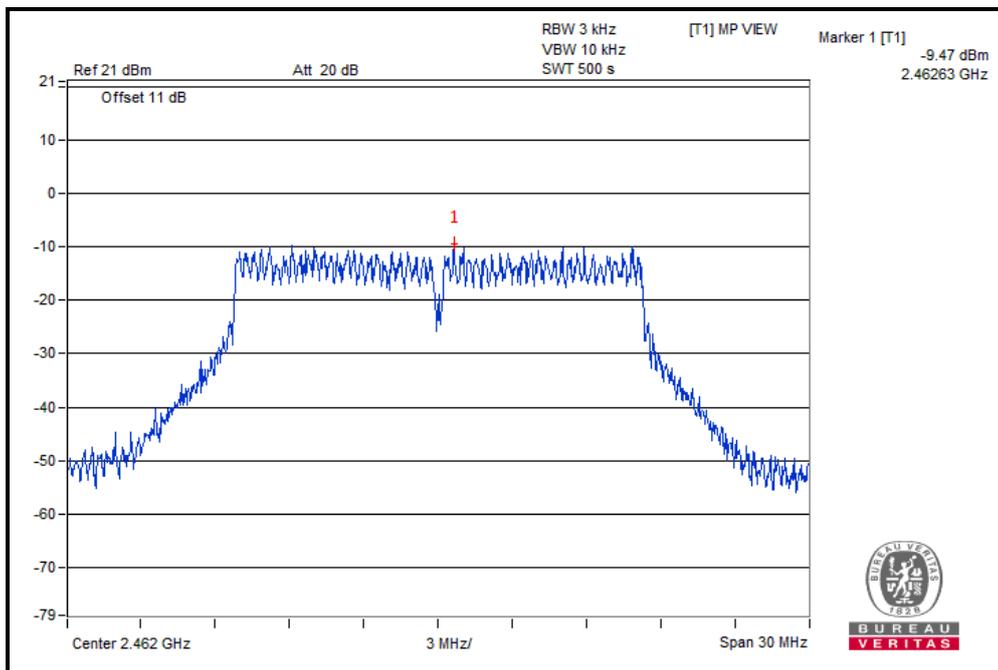


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802.11g

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-9.88	8	PASS
6	2437	-9.68	8	PASS
11	2462	-9.47	8	PASS



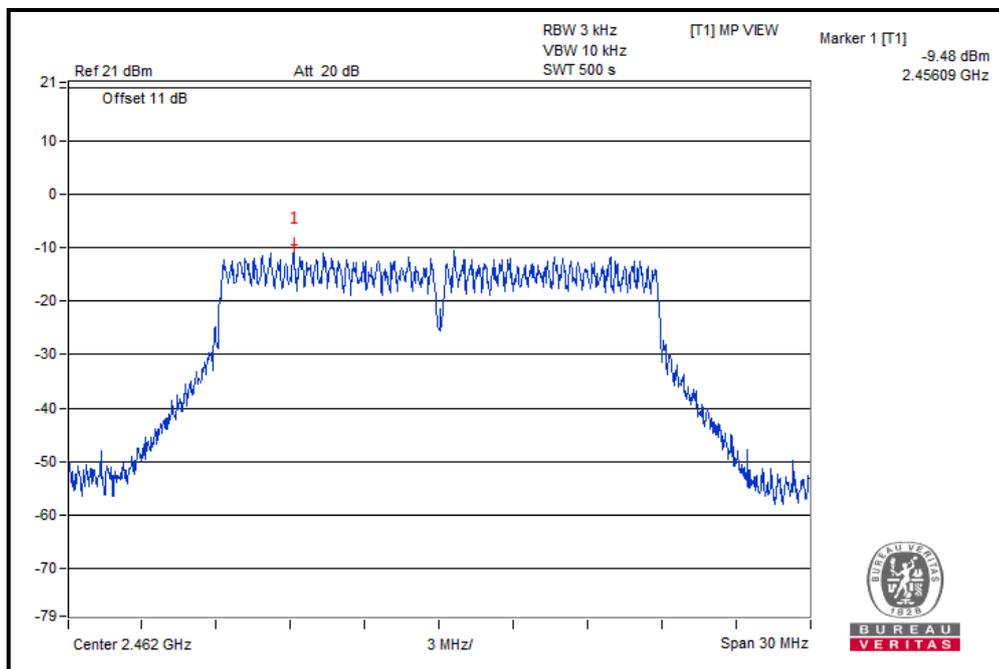


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Test Report No.: RF190522W010-2

802.11n (20MHz)

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-10.64	8	PASS
6	2437	-10.56	8	PASS
11	2462	-9.48	8	PASS



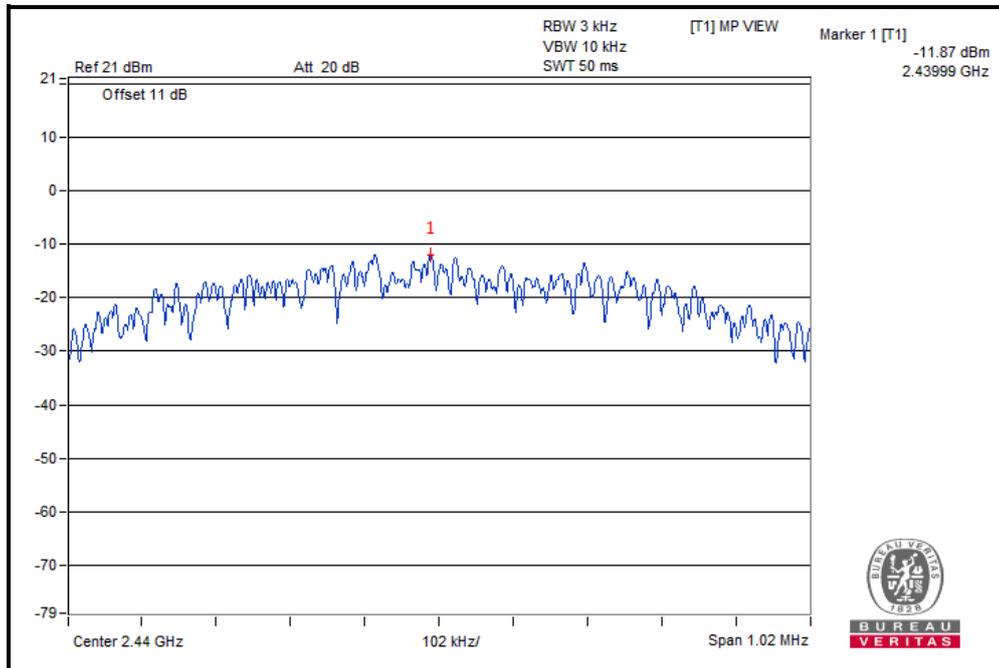


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Test Report No.: RF190522W010-2

BT-LE (GFSK)

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	2402	-12.09	8	PASS
19	2440	-11.87	8	PASS
39	2480	-12.23	8	PASS



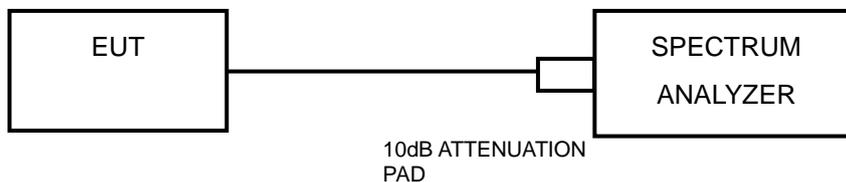


3.6 OUT OF BAND EMISSION MEASUREMENT

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



MEASUREMENT PROCEDURE OOB

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

3.6.5 DEVIATION FROM TEST STANDARD

No deviation.

3.6.6 EUT OPERATING CONDITION

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

3.6.7 TEST RESULTS

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

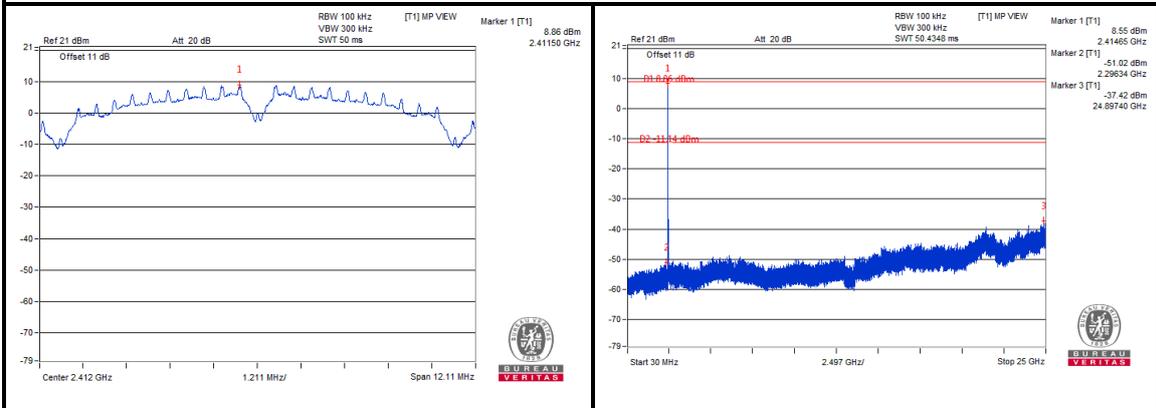


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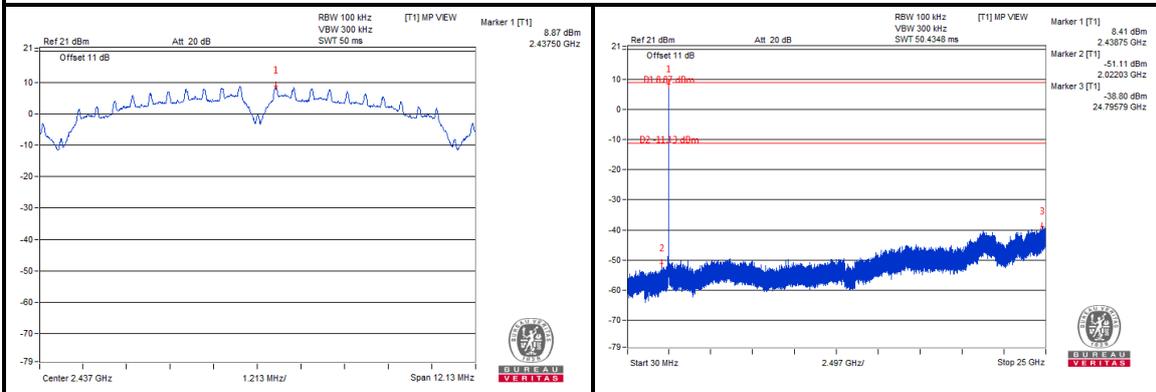
Test Report No.: RF190522W010-2

802.11b

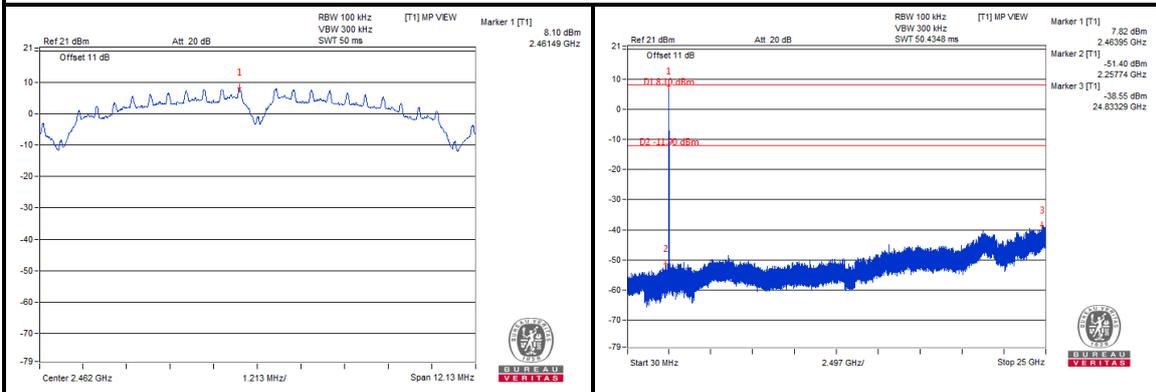
CH 1



CH 6



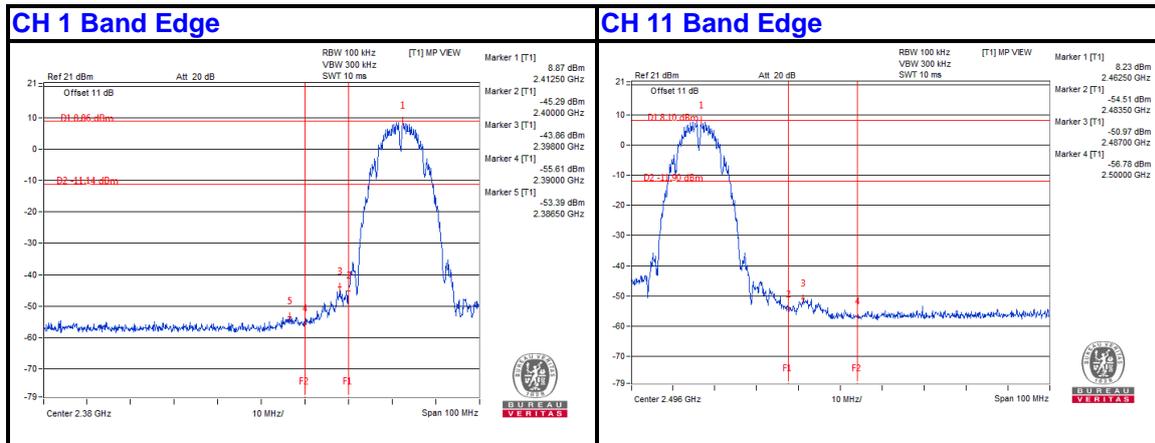
CH 11





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BV 7Layers Communications Technology
(Shenzhen) Co. Ltd

No.B102, Dazu Chuangxin Mansion, North of Beihuan
Avenue, North Area, Hi-Tech Industrial Park, Nanshan
District, Shenzhen, Guangdong, China

Tel: +86 755 8869 6566
Fax: +86 755 8869 6577
Email: customerservice.dq@cn.bureauveritas.com

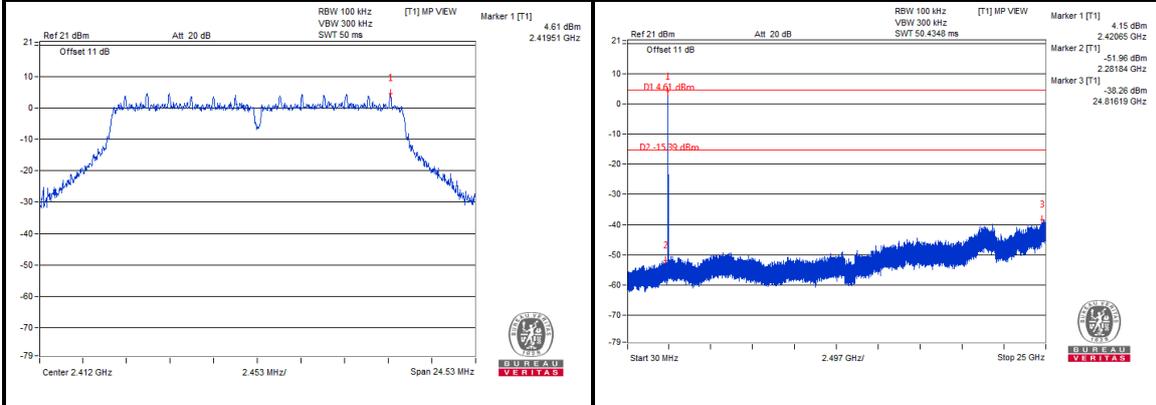


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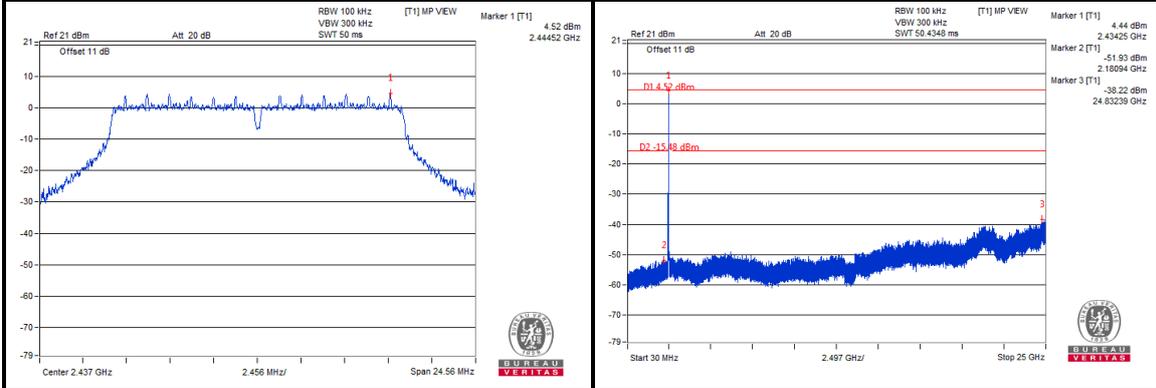
Test Report No.: RF190522W010-2

802.11g

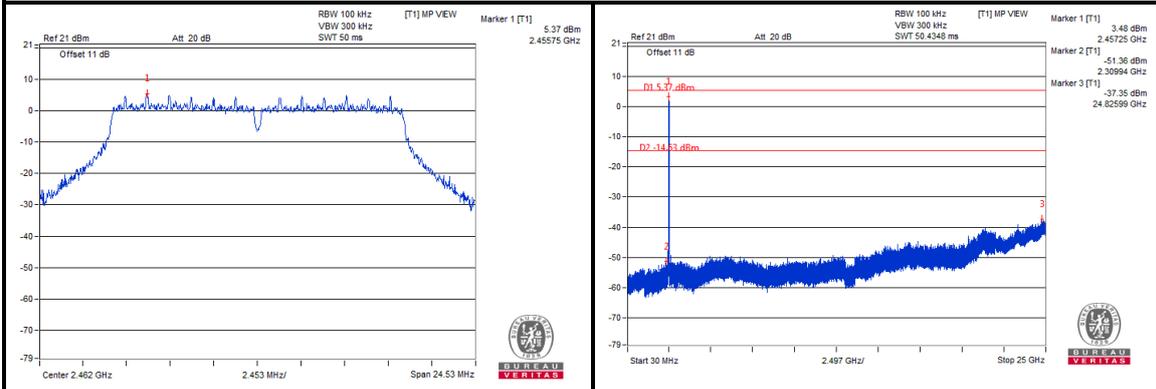
CH 1



CH 6



CH 11

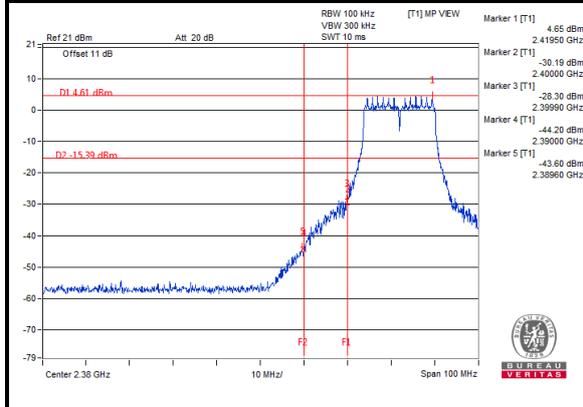




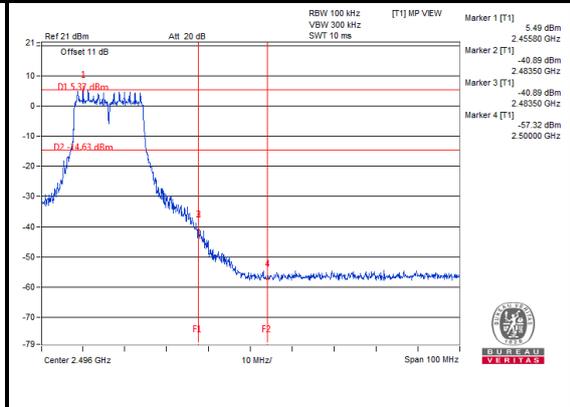
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CH 1 Band Edge



CH 11 Band Edge



BV 7Layers Communications Technology
(Shenzhen) Co. Ltd

No.B102, Dazu Chuangxin Mansion, North of Beihuan
Avenue, North Area, Hi-Tech Industrial Park, Nanshan
District, Shenzhen, Guangdong, China

Tel: +86 755 8869 6566
Fax: +86 755 8869 6577
Email: customerservice.dq@cn.bureauveritas.com

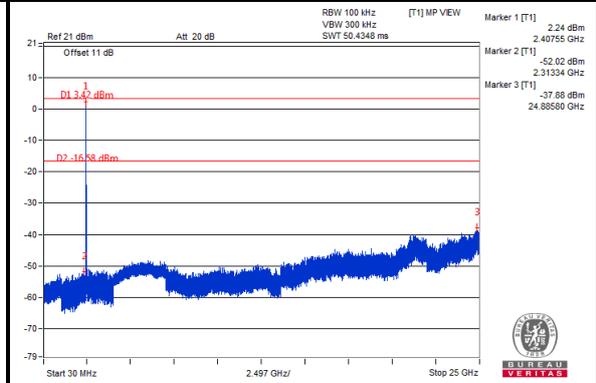
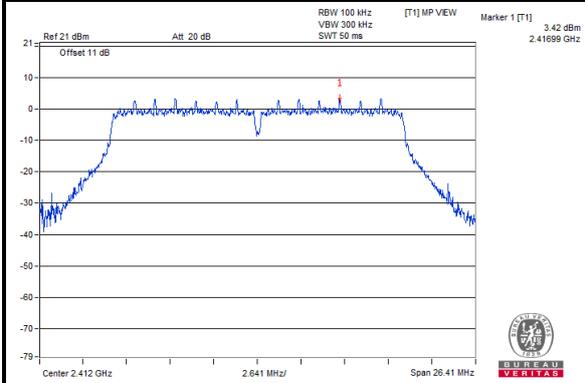


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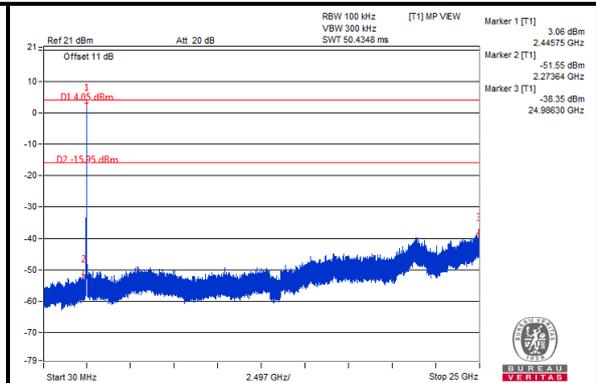
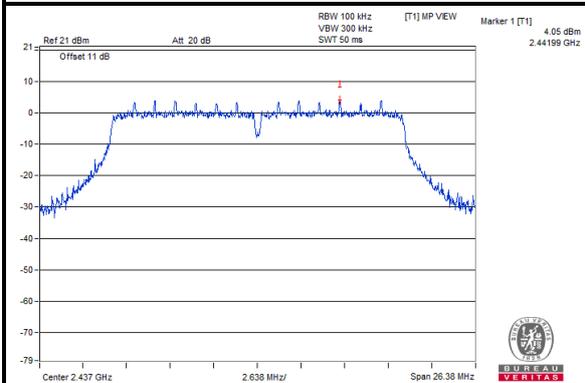
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802.11n (20MHz)

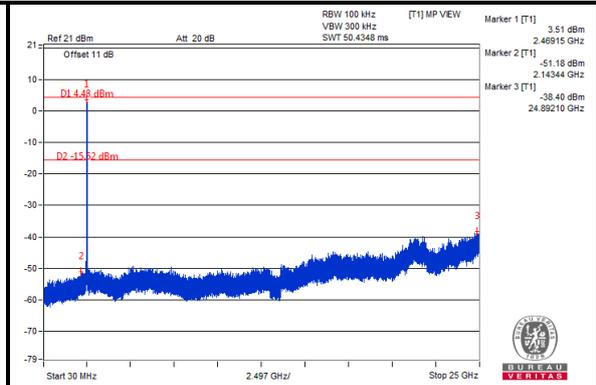
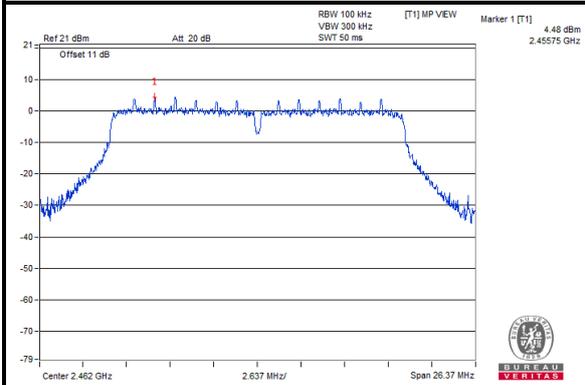
CH 1



CH 6



CH 11

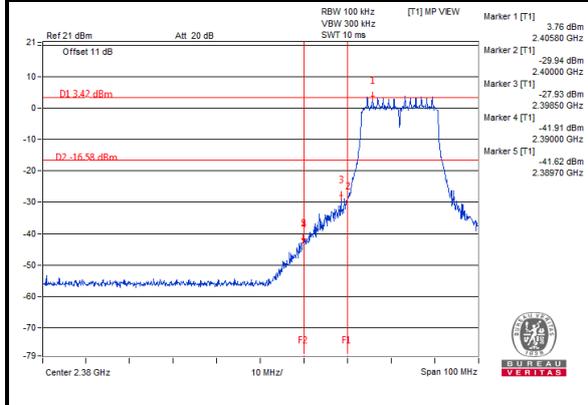




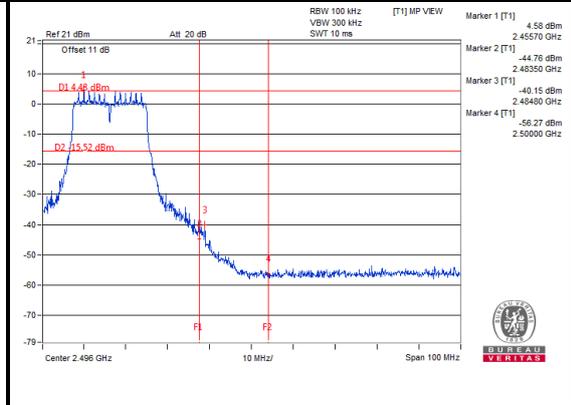
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Test Report No.: RF190522W010-2

CH 1 Band Edge



CH 11 Band Edge



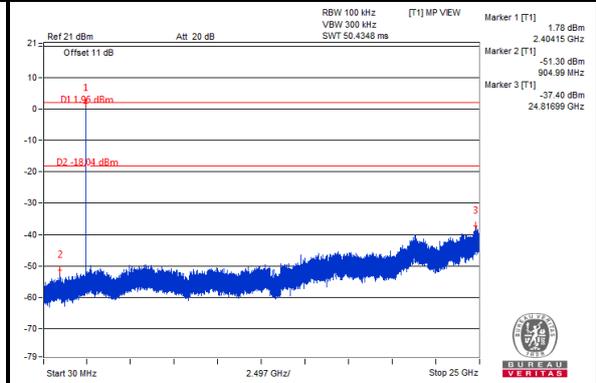
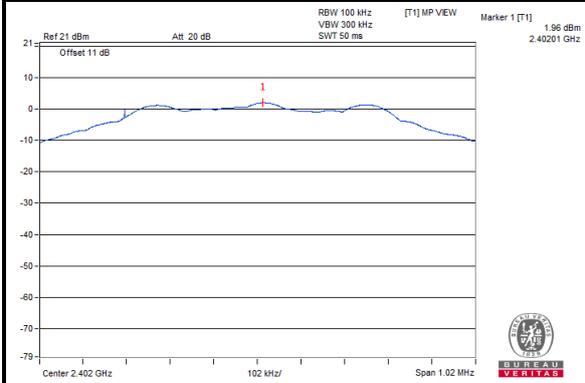


BUREAU VERITAS

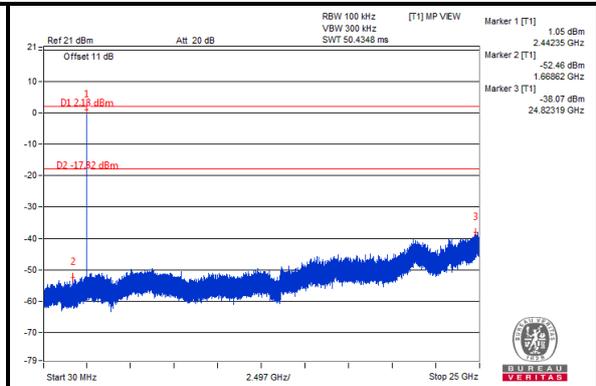
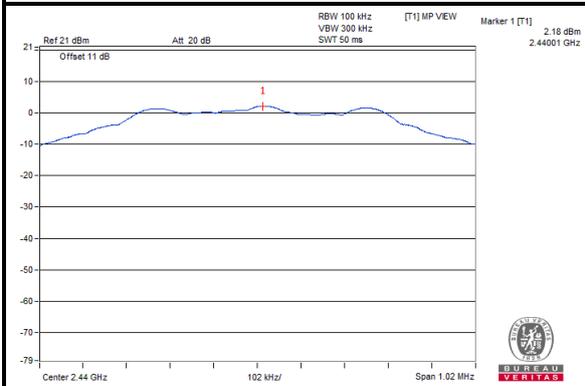
Test Report No.: RF190522W010-2

BT-LE (GFSK)

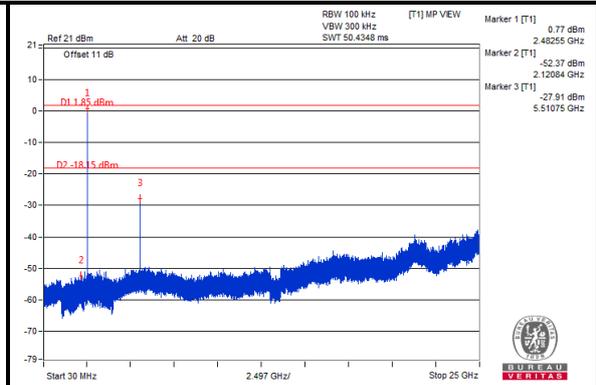
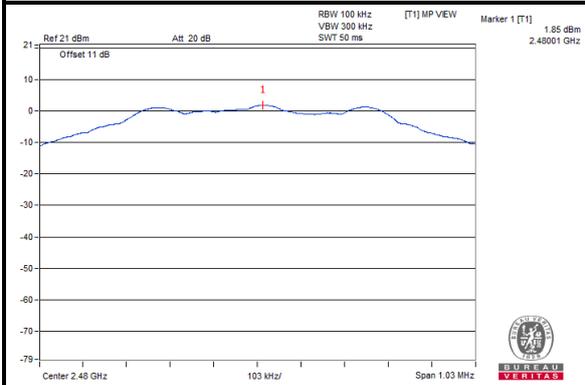
CH 0



CH 19



CH 39

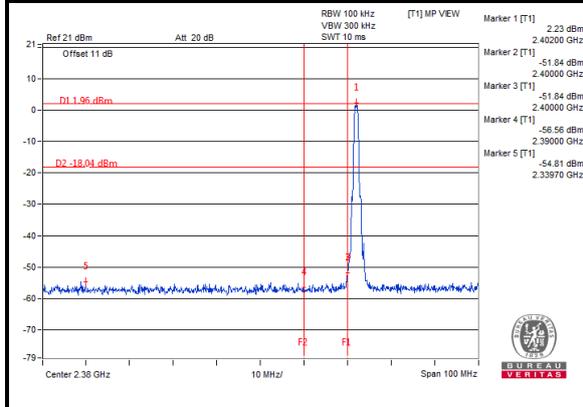




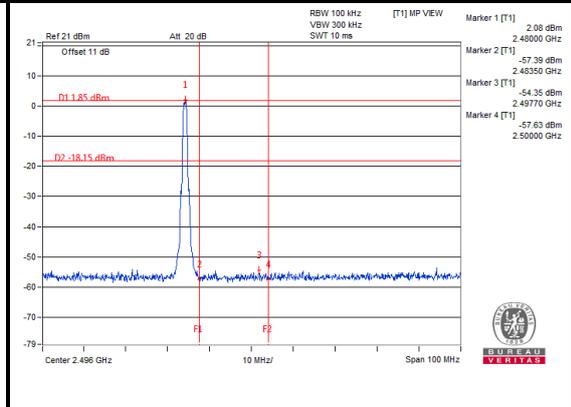
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Test Report No.: RF190522W010-2

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---