Test Lab
Cert 2951.01

FCC TEST REPORT

(WIFI 2.4G)

Product:	LTE Cellular Router
Model Name:	CDS-9070
FCC ID:	2AJLF-CDS-9070
Applicant:	DataRemote Incorporated
Address:	17755 Homestead Avenue, Miami, FL 33157
Manufacturer:	DataRemote Incorporated
Address:	17755 Homestead Avenue, Miami, FL 33157
Prepared by:	Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch
Lab Location:	No. 34, Chenwulu Section, Guantai Rd., Houjie Town, Dongguan City, Guangdong 523942, China
TEL:	+86 769 8593 5656
FAX:	+86 769 8593 1080
E-MAIL:	customerservice.dg@cn.bureauveritas.com
Report No.:	RE160830W002-1
Received Date:	Sep. 10, 2016
Test Date:	Sep. 11, 2016 ~ Nov. 07, 2016
Issued Date:	Nov. 08, 2016

This report should not be used by the client to claim product certification, approval, or endorsement by A2LA or any government agencies.

TABLE OF CONTENTS

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RE160830W002-1	Original release	Nov. 08, 2016

Bureau Veritas Shenzhen Co., Ltd.
Dongguan Branch

No. 34, Chenwulu Section, Guantai Rd., Houjie Town, Dongguan City, Guangdong 523942, China

Tel: +86 769 8593 5656
Fax: +86 769 8593 1080
Email: customerservice.dg@cn.bureauveritas.com

1 CERTIFICATION

PRODUCT:	LTE Cellular Router
BRAND NAME:	DataRemote
MODEL NAME:	CDS-9070
APPLICANT:	DataRemote Incorporated
TESTED:	Sep. 11, 2016 ~ Nov. 07, 2016
TEST SAMPLE:	Identical Prototype
STANDARDS:	**FCC Part 15, Subpart C. Section 15.247** ANSI C63.10-2013

The above equipment has been tested by **Bureau Veritas Shenzhen Co., Ltd. Dongguan 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:** Nov. 08, 2016
(Yuqiang Yin / Engineer)

APPROVED BY : _____ , **DATE:** Nov. 08, 2016
(Bill Yao / Manager)

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 -6.50dB at 0.15000MHz.
15.205 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -3.13dB at 305.48MHz.
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	2.74dB
	30MHz ~ 1GMHz	3.55dB
	1GHz ~ 18GHz	4.84dB
	18GHz ~ 40GHz	1.94dB

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

PRODUCT	LTE Cellular Router
MODEL NAME	CDS-9070
NOMINAL VOLTAGE	15.0Vdc (adapter or host equipment) 7.2Vdc (Li-ion, battery)
MODULATION TECHNOLOGY	DSSS, OFDM
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
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 135 Mbps
OPERATING FREQUENCY	2412-2462MHz for 11b/g/n(HT20) 2422-2452MHz for 11n(HT40)
MAX. OUTPUT POWER	WLAN: 38.726mW (Maximum)
ANTENNA TYPE	PCB Antenna with 4.5dBi gain
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	N/A

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. The EUT was powered by the following adapter:

ADAPTER	
BRAND:	Shenzhen Mass Power Electronic Limited
MODEL:	NBS40C150200B3
INPUT:	AC 100-240V, 1.0A
OUTPUT:	DC 15V, 2A

3. The EUT incorporates a MIMO function. Physically, the EUT provides two transmitters and two receivers.

MODULATION MODE	TX/RX FUNCTION
802.11b	1TX /1RX
802.11g	1TX /1RX
802.11n (20MHz)	2TX /2RX
802.11n (40MHz)	2TX /2RX

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

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		

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, XYZ axis 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	CCK	DBPSK	1.0

RADIATED EMISSION TEST (ABOVE 1GHz):

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

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, XYZ axis 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	CCK	DBPSK	1.0

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
802.11n HT40	3 to 9	3, 9	OFDM	BPSK	13.5

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

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE	TESTED BY
RE<1G	22deg. C, 54%RH	DC 15V from adaptor	Tony Zou
RE≥1G	22deg. C, 54%RH	DC 15V from adaptor	Tony Zou
PLC	25deg. C, 60%RH	DC 15V from adaptor	Yuqiang Yin
APCM	25deg. C, 60%RH	7.2Vdc from battery	Yuqiang Yin

3.3 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 v03r05

KDB 662911 D01 Multiple Transmitter Output v02r01

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.

3.4 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

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	ESR7	101588	Jan. 22,16	Jan. 21,17
Artificial Mains Network	Rohde&Schwarz	ENV216	101173	Mar. 04,16	Mar. 03,17
Artificial Mains Network	Rohde&Schwarz	ESH3-Z5	100317	Apr. 05,16	Apr. 04,17
Voltage probe	SCHWARZBECK	TK 9421	TK 9421-176	Jan. 08,16	Jan. 07,17
Test software	ADT	ADT_Cond_V7.3.7	N/A	N/A	N/A

NOTE:

1. The test was performed in shielded room 553.
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.

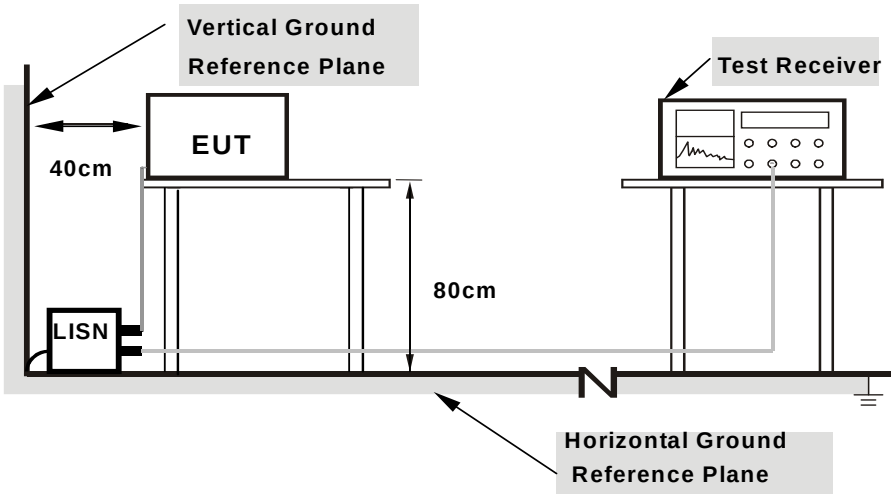
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

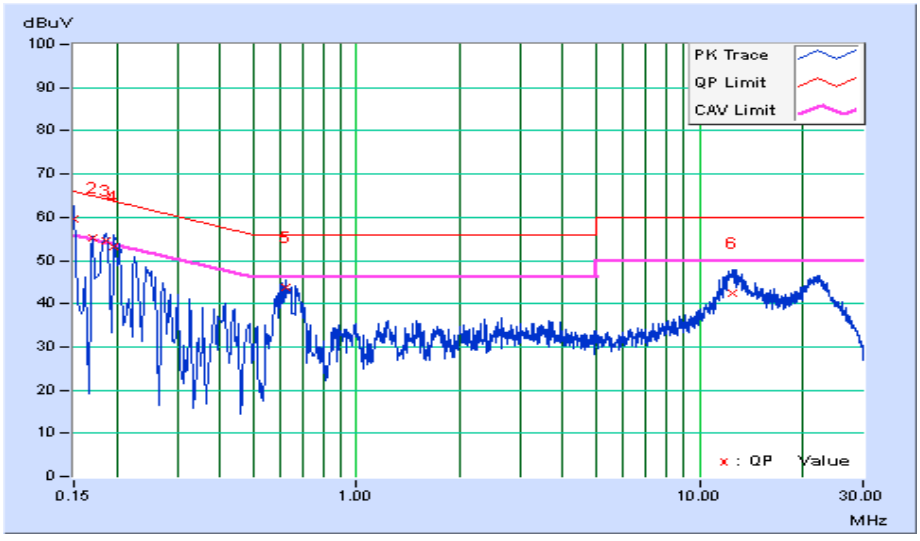
CONDUCTED WORST-CASE DATA:

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23℃, 65%RH
Tested by	Felix Chen	Test Date	2016/10/20
Test Mode	LTE Band 2 Idle+ WLAN(2.4G) Idle+ Adapter+ WLAN Link +LAN Link+ FXS Load		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.15000**	**10.01**	**49.49**	**29.06**	**59.50**	**39.07**	**66.00**	**56.00**	**-6.50**	**-16.93**
2	0.16967	10.02	45.27	24.31	55.29	34.33	64.98	54.98	-9.69	-20.65
3	0.18508	10.03	44.64	28.58	54.67	38.61	64.25	54.25	-9.58	-15.64
4	0.19692	10.03	43.15	24.62	53.18	34.65	63.74	53.74	-10.56	-19.09
5	0.61920	10.15	33.66	22.50	43.81	32.65	56.00	46.00	-12.19	-13.35
6	12.52515	10.87	31.61	23.70	42.48	34.57	60.00	50.00	-17.52	-15.43

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

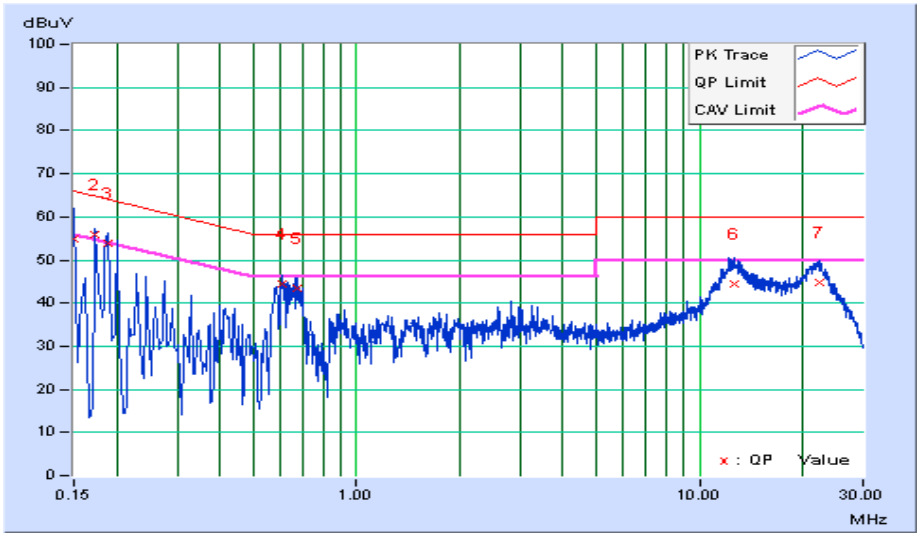


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23℃, 65%RH
Tested by	Felix Chen	Test Date	2016/10/20
Test Mode	LTE Band 2 Idle+ WLAN(2.4G) Idle+ Adapter+ WLAN Link +LAN Link+ FXS Load		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.03	44.75	22.99	54.78	33.02	66.00	56.00	-11.22	-22.98
2	0.17346	10.03	45.91	28.01	55.94	38.04	64.79	54.79	-8.85	-16.75
3	0.18903	10.04	43.87	28.20	53.91	38.24	64.08	54.08	-10.17	-15.84
4	0.60747	10.16	34.34	22.48	44.50	32.64	56.00	46.00	-11.50	-13.36
5	0.66781	10.17	33.43	22.63	43.60	32.80	56.00	46.00	-12.40	-13.20
6	12.59162	10.96	33.51	25.49	44.47	36.45	60.00	50.00	-15.53	-13.55
7	22.30797	11.64	32.98	27.02	44.62	38.66	60.00	50.00	-15.38	-11.34

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



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.
EMI Test Receiver	Rohde&Schwarz	ESR7	101494	Apr. 05,16	Apr. 04,17
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV7	102331	Nov. 04,16	Nov. 03,17
Bilog Antenna	Teseq	CBL 6111D	30643	Jul. 14, 16	Jul. 13, 17
Loop antenna	Daze	ZN30900A	0708	Dec. 30, 15	Dec. 29, 16
Horn Antenna (1GHz -18GHz)	ETS -Lindgren	3117	00062558	May 18,16	May 17,17
GPS Generator+ Antenna	TOJOIN	GNSS-5000A	E1-010119	Aug. 02, 15	Aug. 01, 17
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	NSEMC003	Mar. 12,16	Mar. 11,18
Test Software	ADT	ADT_Radiated _V7.6.15.9.2	N/A	N/A	N/A
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170242	Mar. 12,16	Mar. 11,17
Amplifier (9kHz-1GHz)	SONOMA	310D	186955	Mar. 04,16	Mar. 03, 17
Pre-Amplifier(1-18G)	HP	8449B	3008A00409	Apr. 25,16	Apr. 24,17
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Nov. 04,16	Nov. 03,17
BLUETOOTH TESTER	Rohde&Schwarz	CBT32	100811	Aug. 08,16	Aug. 07,17

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 966 Chamber.
3. The FCC Site Registration No. is 502831.

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:

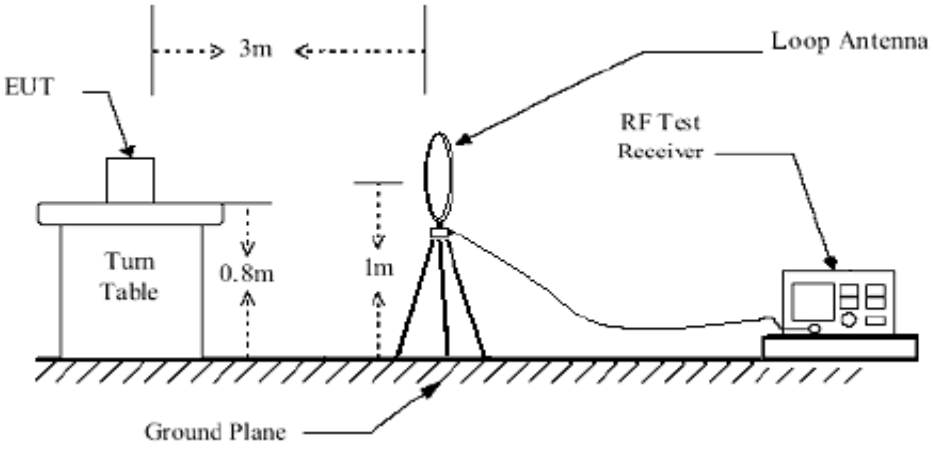
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution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

4.2.4 DEVIATION FROM TEST STANDARD

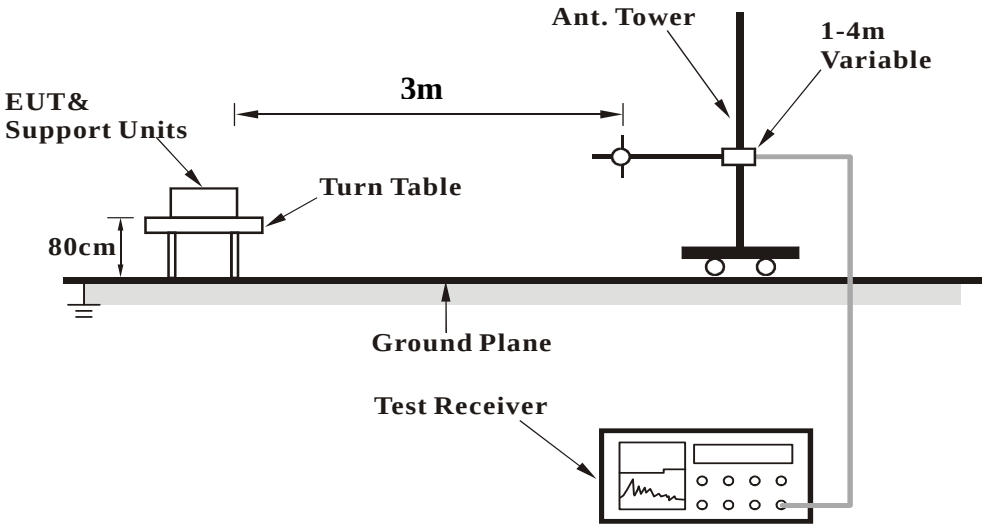
No deviation

4.2.5 TEST SETUP

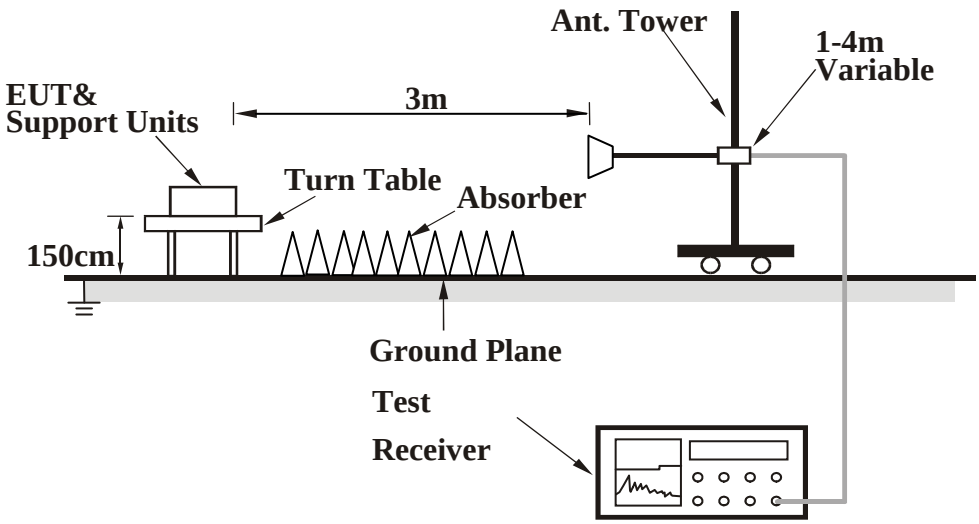
< Frequency Range below 30MHz >



< 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

a. Set the EUT under full load condition and placed them on a testing table.

b. Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.

c. The necessary accessories enable the EUT in full functions.

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:

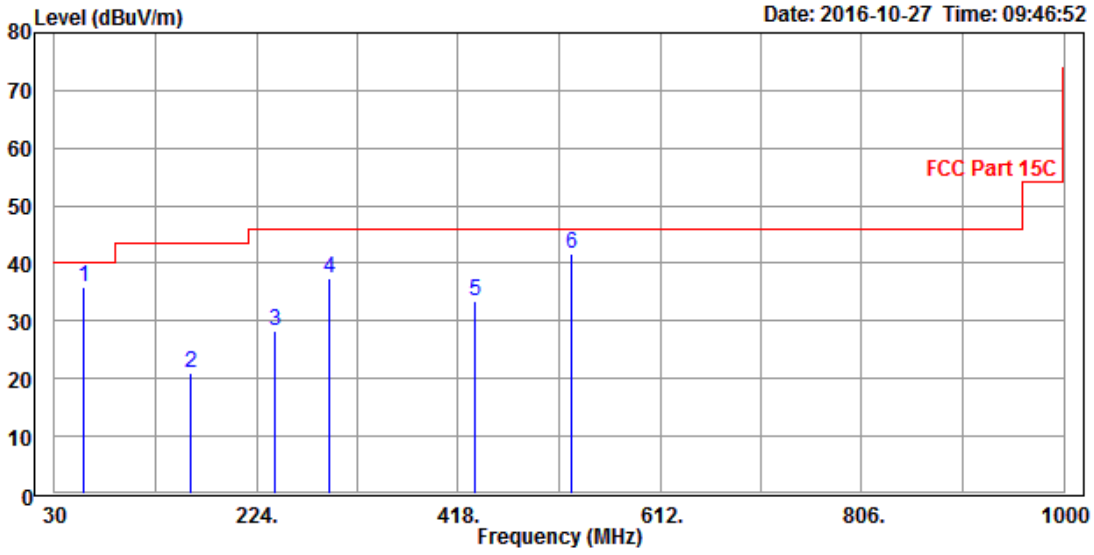
802.11g

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
57.16	27.28	57.04	40.00	-12.72	6.43	1.15	37.34	200	36	QP
114.39	24.01	51.82	43.50	-19.49	7.50	1.64	36.95	200	50	QP
241.46	31.86	53.97	46.00	-14.14	12.01	2.40	36.52	200	121	QP
305.48	**42.87**	**63.41**	**46.00**	**-3.13**	**13.23**	**2.74**	**36.51**	**200**	**148**	**QP**
433.52	28.26	44.21	46.00	-17.74	17.60	3.25	36.80	200	268	QP
531.49	31.15	45.57	46.00	-14.85	19.00	3.63	37.05	200	72	QP

REMARKS:

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

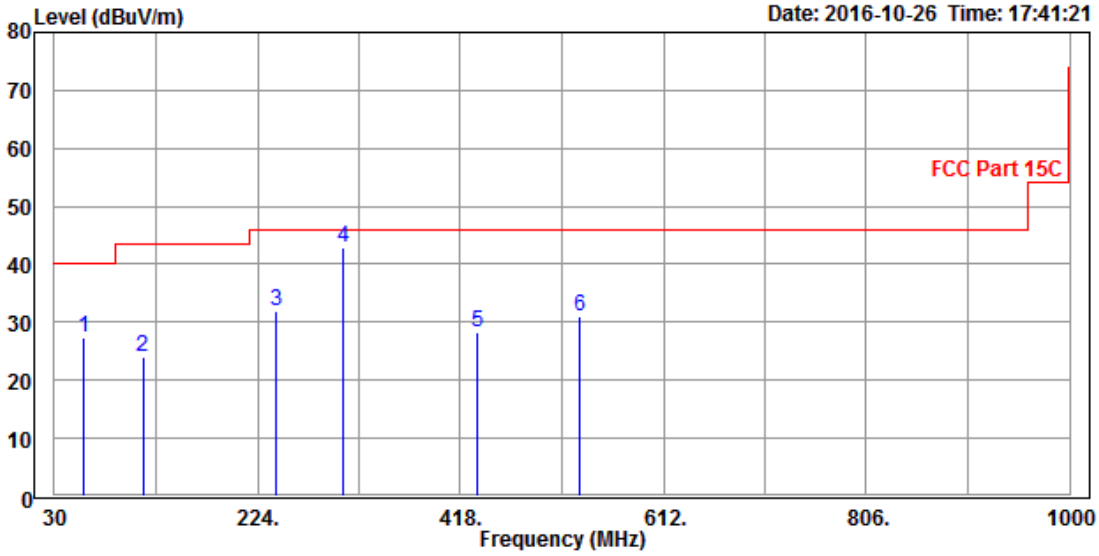


CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

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
57.16	35.94	65.70	40.00	-4.06	6.43	1.15	37.34	100	58	QP
159.98	20.98	45.59	43.50	-22.52	10.20	1.93	36.74	100	30	QP
241.46	28.37	50.48	46.00	-17.63	12.01	2.40	36.52	100	95	QP
293.84	37.39	58.27	46.00	-8.61	12.93	2.69	36.50	100	148	QP
434.49	33.44	49.37	46.00	-12.56	17.61	3.26	36.80	100	256	QP
527.61	41.67	56.18	46.00	-4.33	18.92	3.61	37.04	100	120	QP

REMARKS:

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



ABOVE 1GHz WORST-CASE DATA:

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	**EMISSION LEVEL (dBuV/m)**	**READ LEVEL (dBuV)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA FACTOR (dB /m)**	**CABLE LOSS (dB)**	**PREAMP FACTOR (dB)**	**ANTENNA HEIGHT (cm)**	**TABLE ANGLE (Degree)**	**REMARK**
2321	33.65	41.72	54.00	-20.35	32.22	8.03	48.32	262	80	Average
2321	45.19	53.26	74.00	-28.81	32.22	8.03	48.32	262	80	Peak
2412	89.31	97.12			32.31	8.19	48.31	262	80	Average
2412	91.59	99.40			32.31	8.19	48.31	262	80	Peak
2483.5	33.65	41.25	54.00	-20.35	32.38	8.32	48.30	262	80	Average
2483.5	46.44	54.04	74.00	-27.56	32.38	8.32	48.30	262	80	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	35.52	43.39	54.00	-18.48	32.29	8.15	48.31	160	170	Average
2390	50.44	58.31	74.00	-23.56	32.29	8.15	48.31	160	170	Peak
2412	94.20	102.01			32.31	8.19	48.31	160	170	Average
2412	96.42	104.23			32.31	8.19	48.31	160	170	Peak
2483.5	34.18	41.78	54.00	-19.82	32.38	8.32	48.30	160	170	Average
2483.5	46.79	54.39	74.00	-27.21	32.38	8.32	48.30	160	170	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
2. 2412MHz: Fundamental frequency.
3. Other Emissions are too low to be detected.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	33.08	40.95	54.00	-20.92	32.29	8.15	48.31	260	79	Average
2390	45.73	53.60	74.00	-28.27	32.29	8.15	48.31	260	79	Peak
2437	88.69	96.42			32.34	8.24	48.31	260	79	Average
2437	91.57	99.30			32.34	8.24	48.31	260	79	Peak
2483.5	33.29	40.89	54.00	-20.71	32.38	8.32	48.30	260	79	Average
2483.5	45.52	53.12	74.00	-28.48	32.38	8.32	48.30	260	79	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	34.35	42.22	54.00	-19.65	32.29	8.15	48.31	250	160	Average
2390	46.40	54.27	74.00	-27.60	32.29	8.15	48.31	250	160	Peak
2437	93.36	101.09			32.34	8.24	48.31	250	160	Average
2437	96.65	104.38			32.34	8.24	48.31	250	160	Peak
2483.5	34.32	41.92	54.00	-19.68	32.38	8.32	48.30	250	160	Average
2483.5	45.91	53.51	74.00	-28.09	32.38	8.32	48.30	250	160	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
2. 2437MHz: Fundamental frequency.
3. Other Emissions are too low to be detected.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	33.33	41.20	54.00	-20.67	32.29	8.15	48.31	253	75	Average
2390	45.00	52.87	74.00	-29.00	32.29	8.15	48.31	253	75	Peak
2462	90.21	97.87			32.36	8.28	48.30	253	75	Average
2462	92.64	100.30			32.36	8.28	48.30	253	75	Peak
2483.5	33.62	41.22	54.00	-20.38	32.38	8.32	48.30	253	75	Average
2483.5	45.38	52.98	74.00	-28.62	32.38	8.32	48.30	253	75	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	34.04	41.91	54.00	-19.96	32.29	8.15	48.31	223	160	Average
2390	45.71	53.58	74.00	-28.29	32.29	8.15	48.31	223	160	Peak
2462	93.70	101.36			32.36	8.28	48.30	223	160	Average
2462	97.00	104.66			32.36	8.28	48.30	223	160	Peak
2483.5	35.95	43.55	54.00	-18.05	32.38	8.32	48.30	223	160	Average
2483.5	58.75	66.35	74.00	-15.25	32.38	8.32	48.30	223	160	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
2. 2462MHz: Fundamental frequency.
3. Other Emissions are too low to be detected.

802.11g

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	40.12	47.99	54.00	-13.88	32.29	8.15	48.31	260	78	Average
2390	51.75	59.62	74.00	-22.25	32.29	8.15	48.31	260	78	Peak
2412	88.00	95.81			32.31	8.19	48.31	260	78	Average
2412	95.91	103.72			32.31	8.19	48.31	260	78	Peak
2483.5	33.50	41.10	54.00	-20.50	32.38	8.32	48.30	260	78	Average
2483.5	45.35	52.95	74.00	-28.65	32.38	8.32	48.30	260	78	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	50.59	58.46	54.00	-3.41	32.29	8.15	48.31	200	170	Average
2390	65.19	73.06	74.00	-8.81	32.29	8.15	48.31	200	170	Peak
2412	92.58	100.39			32.31	8.19	48.31	200	170	Average
2412	99.82	107.63			32.31	8.19	48.31	200	170	Peak
2483.5	34.19	41.79	54.00	-19.81	32.38	8.32	48.30	200	170	Average
2483.5	47.10	54.70	74.00	-26.90	32.38	8.32	48.30	200	170	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
2. 2412MHz: Fundamental frequency.
3. Other Emissions are too low to be detected.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2341	35.18	43.20	54.00	-18.82	32.24	8.06	48.32	260	75	Average
2341	45.53	53.55	74.00	-28.47	32.24	8.06	48.32	260	75	Peak
2437	87.07	94.80			32.34	8.24	48.31	260	75	Average
2437	94.36	102.09			32.34	8.24	48.31	260	75	Peak
2483.5	33.75	41.35	54.00	-20.25	32.38	8.32	48.30	260	75	Average
2483.5	45.46	53.06	74.00	-28.54	32.38	8.32	48.30	260	75	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	36.14	44.01	54.00	-17.86	32.29	8.15	48.31	210	160	Average
2390	47.01	54.88	74.00	-26.99	32.29	8.15	48.31	210	160	Peak
2437	92.20	99.93			32.34	8.24	48.31	210	160	Average
2437	100.08	107.81			32.34	8.24	48.31	210	160	Peak
2483.5	35.64	43.24	54.00	-18.36	32.38	8.32	48.30	210	160	Average
2483.5	47.13	54.73	74.00	-26.87	32.38	8.32	48.30	210	160	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
2. 2437MHz: Fundamental frequency.
3. Other Emissions are too low to be detected.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	35.26	43.13	54.00	-18.74	32.29	8.15	48.31	215	70	Average
2390	45.76	53.63	74.00	-28.24	32.29	8.15	48.31	215	70	Peak
2462	86.35	94.01			32.36	8.28	48.30	215	70	Average
2462	93.88	101.54			32.36	8.28	48.30	215	70	Peak
2483.5	35.65	43.25	54.00	-18.35	32.38	8.32	48.30	215	70	Average
2483.5	47.61	55.21	74.00	-26.39	32.38	8.32	48.30	215	70	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	35.10	42.97	54.00	-18.90	32.29	8.15	48.31	160	160	Average
2390	47.06	54.93	74.00	-26.94	32.29	8.15	48.31	160	160	Peak
2462	92.41	100.07			32.36	8.28	48.30	160	160	Average
2462	99.69	107.35			32.36	8.28	48.30	160	160	Peak
2483.5	49.46	57.06	54.00	-4.54	32.38	8.32	48.30	160	160	Average
2483.5	64.64	72.24	74.00	-9.36	32.38	8.32	48.30	160	160	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
2. 2462MHz: Fundamental frequency.
3. Other Emissions are too low to be detected.

802.11n (20MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	38.46	46.33	54.00	-15.54	32.29	8.15	48.31	180	315	Average
2390	55.59	63.46	74.00	-18.41	32.29	8.15	48.31	180	315	Peak
2412	87.32	95.13			32.31	8.19	48.31	180	315	Average
2412	95.15	102.96			32.31	8.19	48.31	180	315	Peak
2483.5	33.91	41.51	54.00	-20.09	32.38	8.32	48.30	180	315	Average
2483.5	46.11	53.71	74.00	-27.89	32.38	8.32	48.30	180	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	48.61	56.48	54.00	-5.39	32.29	8.15	48.31	240	220	Average
2390	64.53	72.40	74.00	-9.47	32.29	8.15	48.31	240	220	Peak
2412	91.76	99.57			32.31	8.19	48.31	240	220	Average
2412	99.79	107.60			32.31	8.19	48.31	240	220	Peak
2483.5	35.43	43.03	54.00	-18.57	32.38	8.32	48.30	240	220	Average
2483.5	48.07	55.67	74.00	-25.93	32.38	8.32	48.30	240	220	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
2. 2412MHz: Fundamental frequency.
3. Other Emissions are too low to be detected.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	34.22	42.09	54.00	-19.78	32.29	8.15	48.31	260	305	Average
2390	45.60	53.47	74.00	-28.40	32.29	8.15	48.31	260	305	Peak
2437	84.83	92.56			32.34	8.24	48.31	260	305	Average
2437	93.07	100.80			32.34	8.24	48.31	260	305	Peak
2483.5	33.82	41.42	54.00	-20.18	32.38	8.32	48.30	260	305	Average
2483.5	46.13	53.73	74.00	-27.87	32.38	8.32	48.30	260	305	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
2385	36.61	44.50	54.00	-17.39	32.28	8.14	48.31	218	240	Average
2385	47.41	55.30	74.00	-26.59	32.28	8.14	48.31	218	240	Peak
2437	90.52	98.25			32.34	8.24	48.31	218	240	Average
2437	98.69	106.42			32.34	8.24	48.31	218	240	Peak
2483.5	35.56	43.16	54.00	-18.44	32.38	8.32	48.30	218	240	Average
2483.5	47.91	55.51	74.00	-26.09	32.38	8.32	48.30	218	240	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
2. 2437MHz: Fundamental frequency.
3. Other Emissions are too low to be detected.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	33.71	41.58	54.00	-20.29	32.29	8.15	48.31	215	80	Average
2390	47.12	54.99	74.00	-26.88	32.29	8.15	48.31	215	80	Peak
2462	82.01	89.67			32.36	8.28	48.30	215	80	Average
2462	90.96	98.62			32.36	8.28	48.30	215	80	Peak
2483.5	34.37	41.97	54.00	-19.63	32.38	8.32	48.30	215	80	Average
2483.5	46.47	54.07	74.00	-27.53	32.38	8.32	48.30	215	80	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	37.08	44.95	54.00	-16.92	32.29	8.15	48.31	230	162	Average
2390	49.28	57.15	74.00	-24.72	32.29	8.15	48.31	230	162	Peak
2462	91.18	98.84			32.36	8.28	48.30	230	162	Average
2462	99.57	107.23			32.36	8.28	48.30	230	162	Peak
2483.5	41.45	49.05	54.00	-12.55	32.38	8.32	48.30	230	162	Average
2483.5	57.08	64.68	74.00	-16.92	32.38	8.32	48.30	230	162	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
2. 2462MHz: Fundamental frequency.
3. Other Emissions are too low to be detected.

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	38.08	45.95	54.00	-15.92	32.29	8.15	48.31	180	310	Average
2390	49.18	57.05	74.00	-24.82	32.29	8.15	48.31	180	310	Peak
2422	82.12	89.90			32.32	8.21	48.31	180	310	Average
2422	90.79	98.57			32.32	8.21	48.31	180	310	Peak
2483.5	33.80	41.40	54.00	-20.20	32.38	8.32	48.30	180	310	Average
2483.5	45.67	53.27	74.00	-28.33	32.38	8.32	48.30	180	310	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	50.48	58.35	54.00	-3.52	32.29	8.15	48.31	240	220	Average
2390	62.97	70.84	74.00	-11.03	32.29	8.15	48.31	240	220	Peak
2422	88.14	95.92			32.32	8.21	48.31	240	220	Average
2422	97.62	105.40			32.32	8.21	48.31	240	220	Peak
2483.5	34.43	42.03	54.00	-19.57	32.38	8.32	48.30	240	220	Average
2483.5	46.82	54.42	74.00	-27.18	32.38	8.32	48.30	240	220	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
2. 2422MHz: Fundamental frequency.
3. Other Emissions are too low to be detected.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	45.86	53.73	54.00	-8.14	32.29	8.15	48.31	100	290	Average
2390	34.50	42.37	54.00	-19.50	32.29	8.15	48.31	100	290	Average
2437	80.03	87.76			32.34	8.24	48.31	100	290	Average
2437	89.31	97.04			32.34	8.24	48.31	100	290	Peak
2483.5	34.41	42.01	54.00	-19.59	32.38	8.32	48.30	100	290	Average
2483.5	46.57	54.17	74.00	-27.43	32.38	8.32	48.30	100	290	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	41.39	49.26	54.00	-12.61	32.29	8.15	48.31	238	220	Average
2390	53.65	61.52	74.00	-20.35	32.29	8.15	48.31	238	220	Peak
2437	86.78	94.51			32.34	8.24	48.31	238	220	Average
2437	96.85	104.58			32.34	8.24	48.31	238	220	Peak
2483.5	40.77	48.37	54.00	-13.23	32.38	8.32	48.30	238	220	Average
2483.5	53.87	61.47	74.00	-20.13	32.38	8.32	48.30	238	220	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
2. 2437MHz: Fundamental frequency.
3. Other Emissions are too low to be detected.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2341	36.52	44.54	54.00	-17.48	32.24	8.06	48.32	255	305	Average
2341	46.72	54.74	74.00	-27.28	32.24	8.06	48.32	255	305	Peak
2452	80.54	88.23			32.35	8.26	48.30	255	305	Average
2452	89.94	97.63			32.35	8.26	48.30	255	305	Peak
2483.5	37.11	44.71	54.00	-16.89	32.38	8.32	48.30	255	305	Average
2483.5	51.68	59.28	74.00	-22.32	32.38	8.32	48.30	255	305	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	34.96	42.83	54.00	-19.04	32.29	8.15	48.31	240	225	Average
2390	46.47	54.34	74.00	-27.53	32.29	8.15	48.31	240	225	Peak
2452	87.57	95.26			32.35	8.26	48.30	240	225	Average
2452	97.09	104.78			32.35	8.26	48.30	240	225	Peak
2483.5	47.36	54.96	54.00	-6.64	32.38	8.32	48.30	240	225	Average
2483.5	60.98	68.58	74.00	-13.02	32.38	8.32	48.30	240	225	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Emission level – Limit value.
2. 2452MHz: Fundamental frequency.
3. Other Emissions are too low to be detected.

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 Sensor	Keysight	U2021XA	MY55060016	May 04,16	May 03,17
Power Sensor	Keysight	U2021XA	MY55060018	May 04,16	May 03,17
10dB Attenuator	JFW/USA	50HF-010-SMA	1505	Jul. 27, 16	Jul. 26, 17
Digital Multimeter	FLUKE	15B	A1220010DG	Oct. 09, 16	Oct. 08, 17
Humid & Temp Programmable Tester	Haida	HD-2257	110807201	Sep.05,16	Sep. 04,17
Oscilloscope	Agilent	DSO9254A	MY51260160	Sep.05,16	Sep. 04,17
Signal Analyzer	Rohde & Schwarz	FSV7	102331	Nov. 04,16	Nov. 03,17
Signal Generator	Agilent	N5183A	MY50140980	Nov. 04,16	Nov. 03,17
10dB Attenuator	JFW/USA	50HF-010-SMA	1505	Jul. 27, 16	Jul. 26, 17
ESG Vector Signal Generator	Agilent	E4438C	MY49072505	Apr. 22, 16	Apr. 21, 17
BLUETOOTH TESTER	Rohde&Schwarz	CBT32	100811	Aug.08, 16	Aug. 07, 17

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.

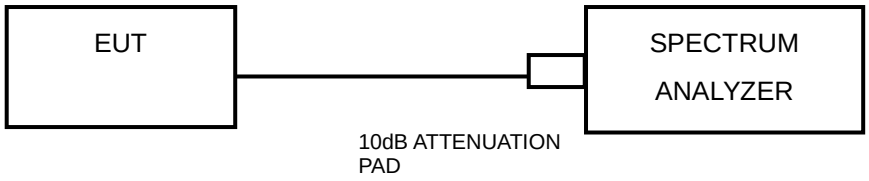
4.3.3 TEST PROCEDURE

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



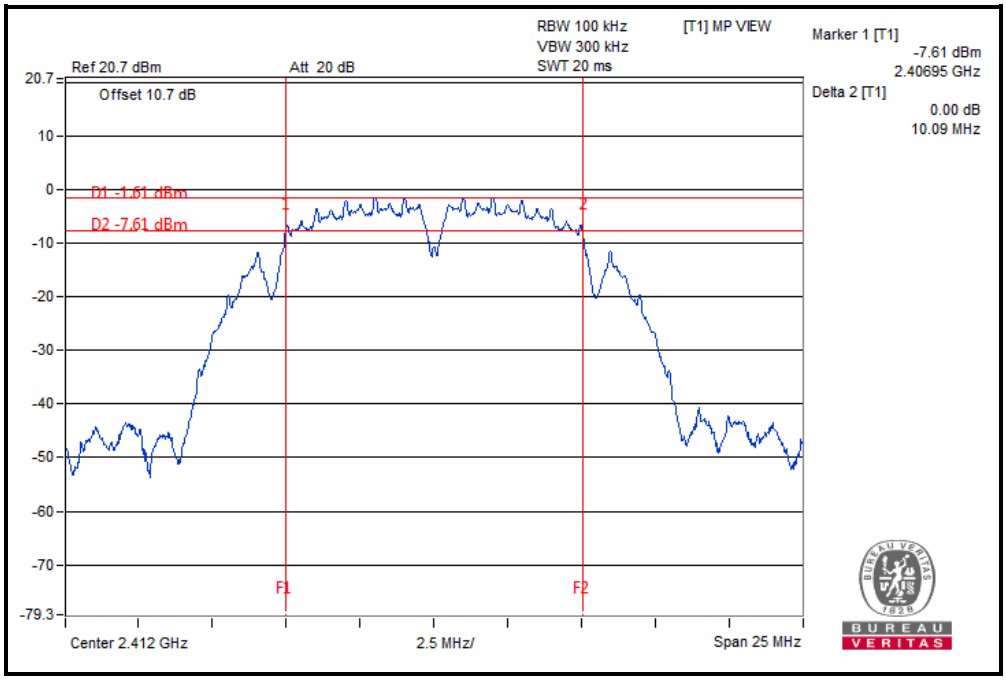
4.3.6 EUT OPERATING CONDITIONS

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

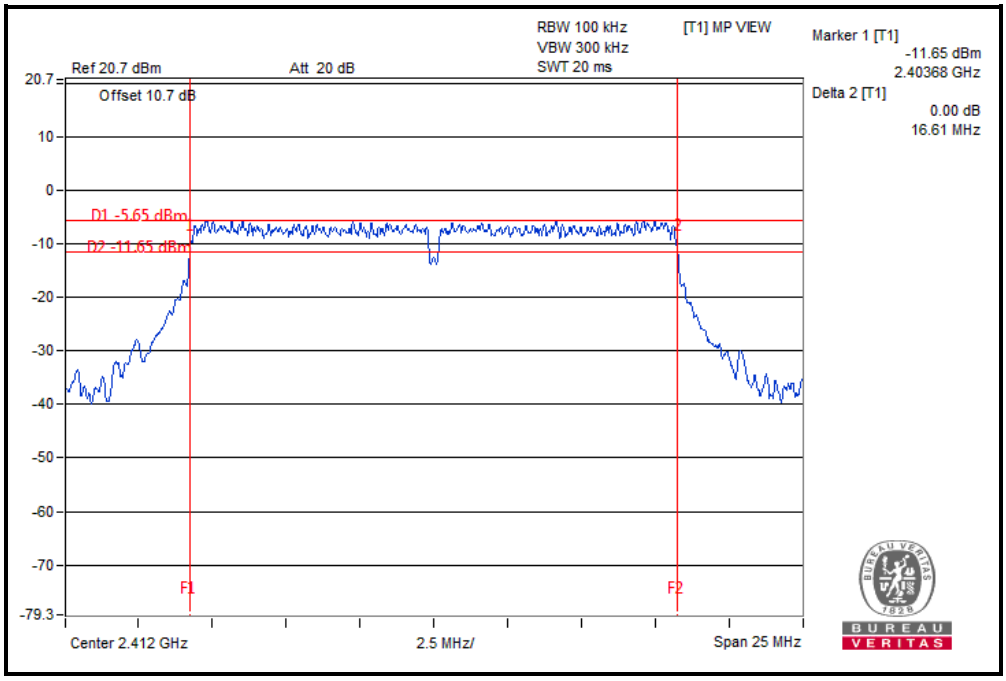
802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	10.09	0.5	PASS
6	2437	10.09	0.5	PASS
11	2462	10.09	0.5	PASS



802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.61	0.5	PASS
6	2437	16.59	0.5	PASS
11	2462	16.58	0.5	PASS



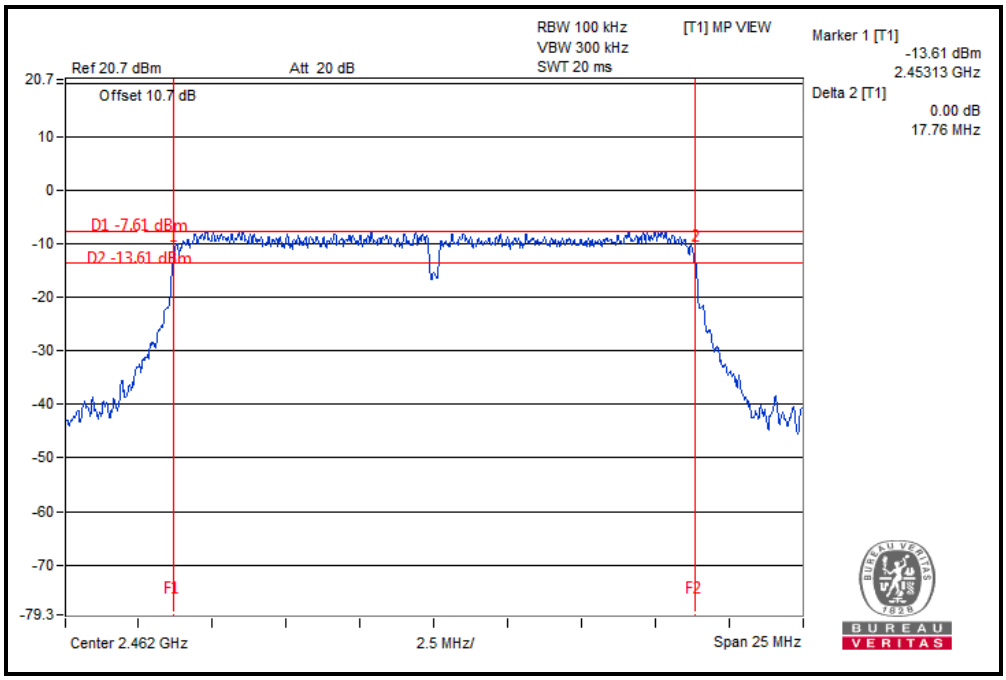
802.11n (20MHz)

CHAIN 0

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	17.71	0.5	PASS
6	2437	17.71	0.5	PASS
11	2462	17.76	0.5	PASS

CHAIN 1

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	17.64	0.5	PASS
6	2437	17.64	0.5	PASS
11	2462	17.64	0.5	PASS



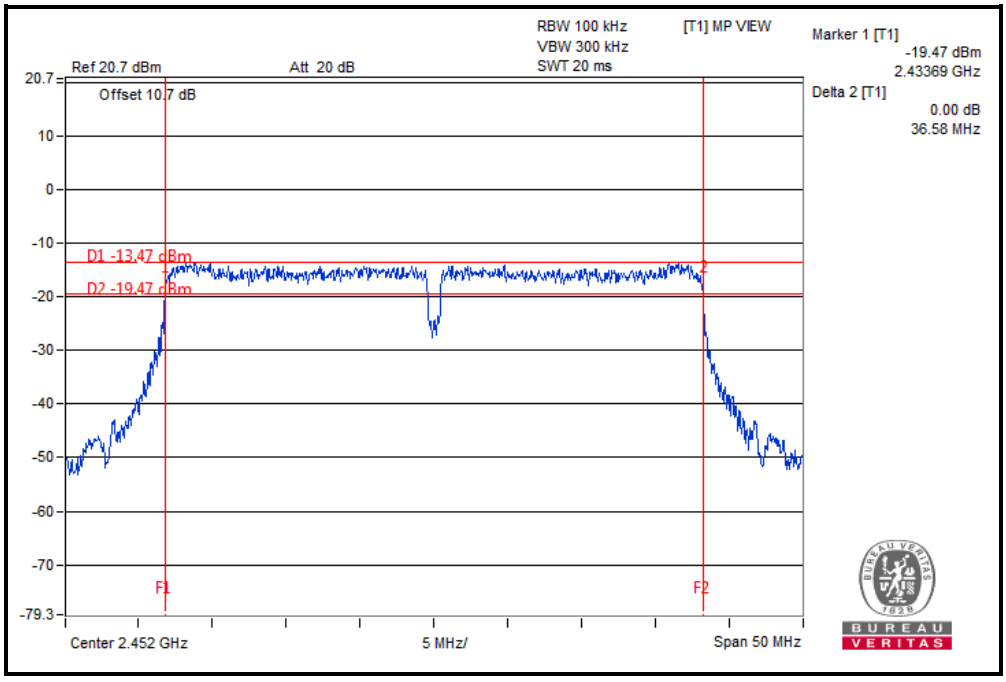
802.11n (40MHz)

CHAIN 0

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
3	2422	36.55	0.5	PASS
6	2437	36.57	0.5	PASS
9	2452	36.58	0.5	PASS

CHAIN 1

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
3	2422	36.43	0.5	PASS
6	2437	36.46	0.5	PASS
9	2452	36.49	0.5	PASS

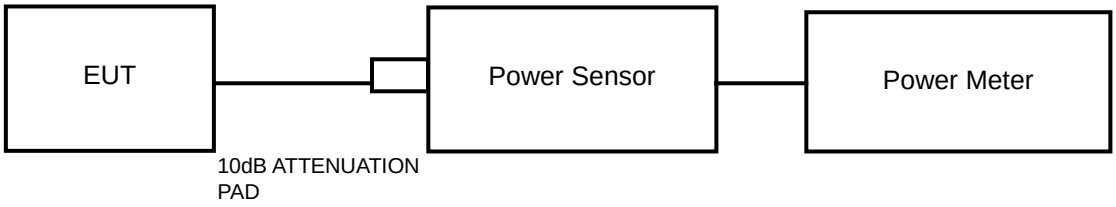


4.4 CONDUCTED OUTPUT POWER

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

Refer to section 4.3.3 to get information of above instrument.

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(dBm)	PASS/FAIL
1	2412	13.18	20.797	30	PASS
6	2437	13.30	21.380	30	PASS
11	2462	13.33	21.528	30	PASS

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT(dBm)	PASS/FAIL
1	2412	15.26	33.574	30	PASS
6	2437	15.77	37.757	30	PASS
11	2462	15.88	**38.726**	30	PASS

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	PEAK POWER LIMIT(dBm)	PASS/FAIL
		CHAIN 0	CHAIN 1				
1	2412	13.54	15.05	17.305	53.765	30	PASS
6	2437	13.29	15.30	17.305	53.765	30	PASS
11	2462	12.89	14.96	16.935	49.374	30	PASS

802.11n (40MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	PEAK POWER LIMIT(dBm)	PASS/FAIL
		CHAIN 0	CHAIN 1				
3	2422	10.21	11.29	13.760	23.768	30	PASS
6	2437	10.13	11.36	13.755	23.741	30	PASS
9	2452	9.67	11.20	13.445	22.105	30	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	9.49	N/A
6	2437	9.61	N/A
11	2462	9.73	N/A

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	PASS/FAIL
1	2412	9.11	N/A
6	2437	9.12	N/A
11	2462	9.31	N/A

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (dBm)	PASS/FAIL
		CHAIN 0	CHAIN 1		
1	2412	7.42	8.91	11.24	N/A
6	2437	7.10	9.01	11.17	N/A
11	2462	6.92	8.92	11.04	N/A

802.11n (40MHz)

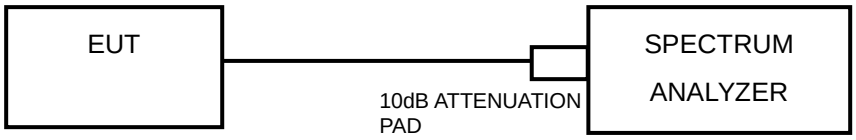
CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (dBm)	PASS/FAIL
		CHAIN 0	CHAIN 1		
3	2422	3.57	5.14	7.44	N/A
6	2437	3.51	5.21	7.45	N/A
9	2452	3.27	5.13	7.31	N/A

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

4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

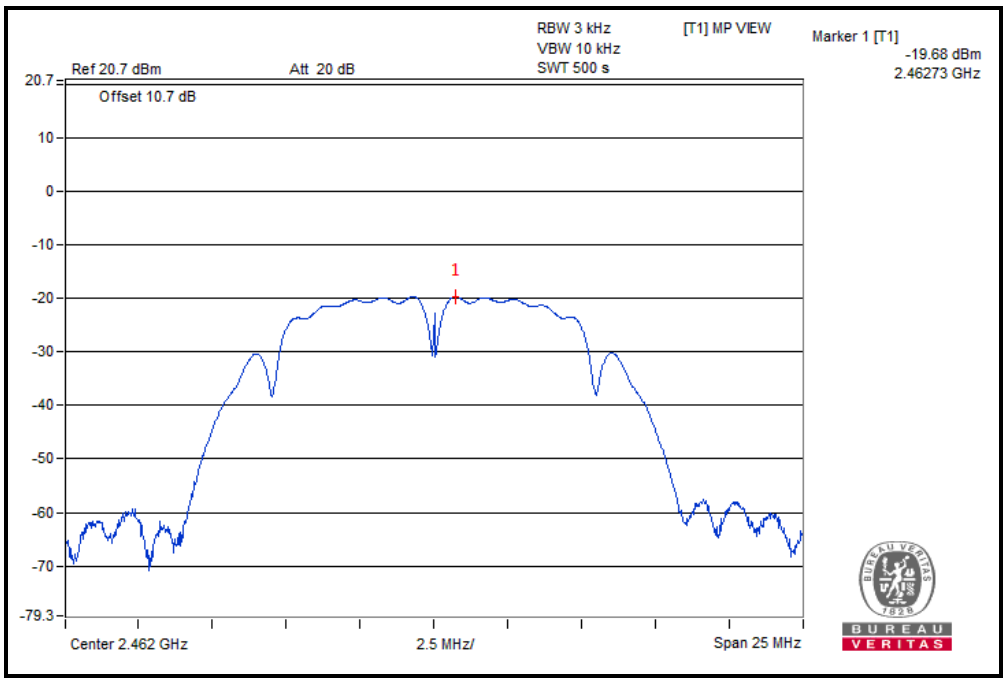
4.5.6 EUT OPERATING CONDITION

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

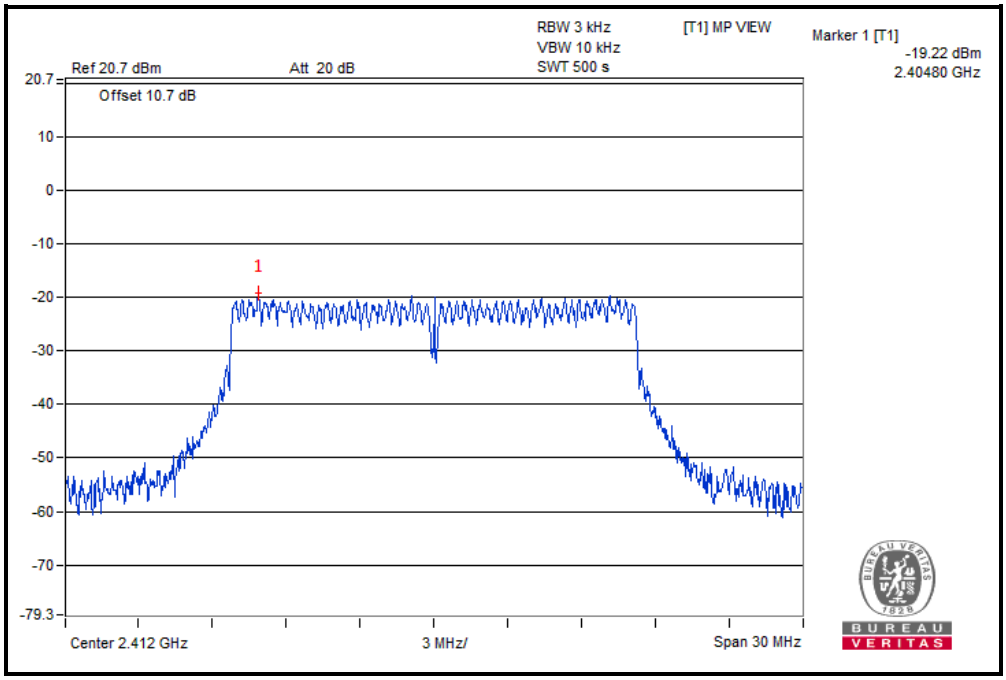
802.11b

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-19.99	8	PASS
6	2437	-19.88	8	PASS
11	2462	-19.68	8	PASS



802.11g

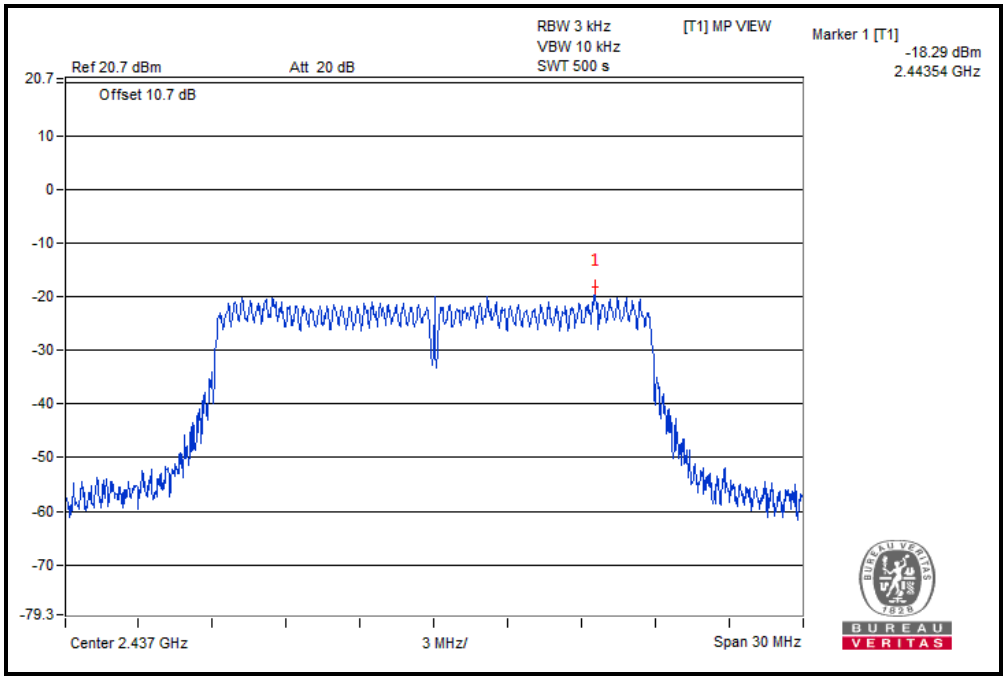
Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-19.22	8	PASS
6	2437	-19.73	8	PASS
11	2462	-19.67	8	PASS



802.11n (20MHz)

Channel	FREQ. (MHz)	PSD (dBm/3kHz)		TOTAL PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
		Chain 0	Chain 1			
1	2412	-20.94	-19.43	-17.175	6.49	PASS
6	2437	-20.33	-18.29	-16.30	6.49	PASS
11	2462	-20.87	-19.45	-17.15	6.49	PASS

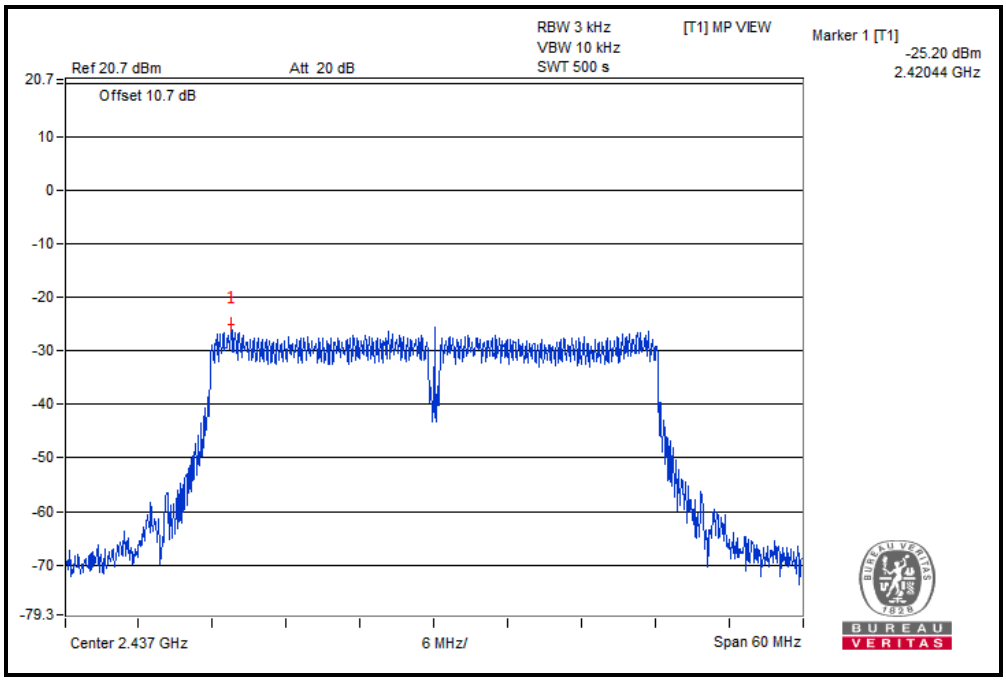
Note: N_{ANT} = 2, Directional gain = G_{ANT} + 10 log(N_{ANT}) dBi = 7.51dBi > 6dBi,so the power density limit shall be reduced to 8-(7.51-6) = 6.49dBm



802.11n (40MHz)

Channel	FREQ. (MHz)	PSD (dBm/3kHz)		TOTAL PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
		Chain 0	Chain 1			
3	2422	-26.13	-26.02	-23.065	6.49	PASS
6	2437	-26.99	-25.20	-23.085	6.49	PASS
9	2452	-26.73	-25.31	-23.01	6.49	PASS

Note: N_{ANT} = 2, Directional gain = G_{ANT} + 10 log(N_{ANT}) dBi = 7.51dBi > 6dBi,so the power density limit shall be reduced to 8-(7.51-6) = 6.49dBm

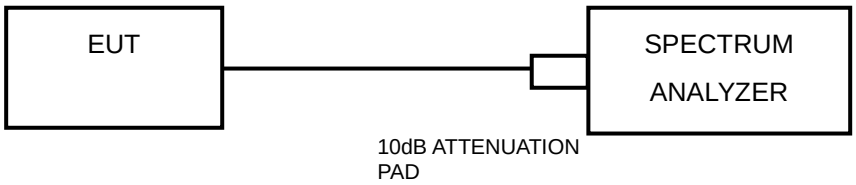


4.6 OUT OF BAND EMISSION MEASUREMENT

4.6.1 LIMITS OF OUT OF BAND EMISSION MEASUREMENT

Below –20dB 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 ≥ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

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

Note: only worst chain data was shown in test report.

4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

4.6.6 EUT OPERATING CONDITION

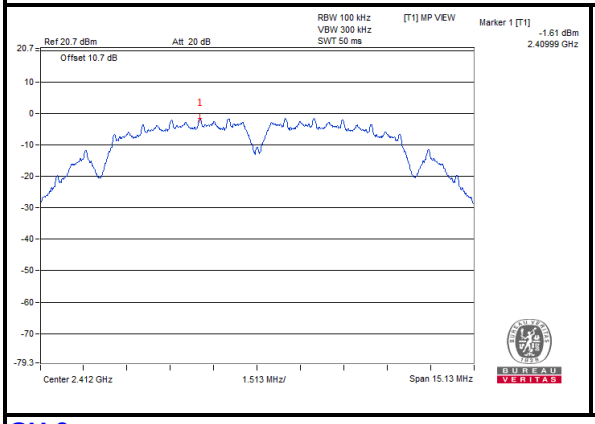
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

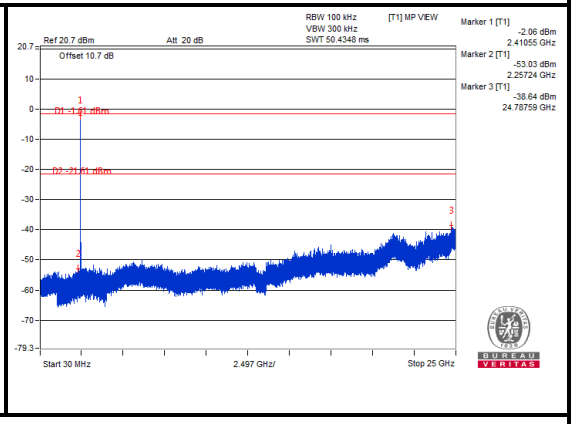
4.6.7 TEST RESULTS

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.

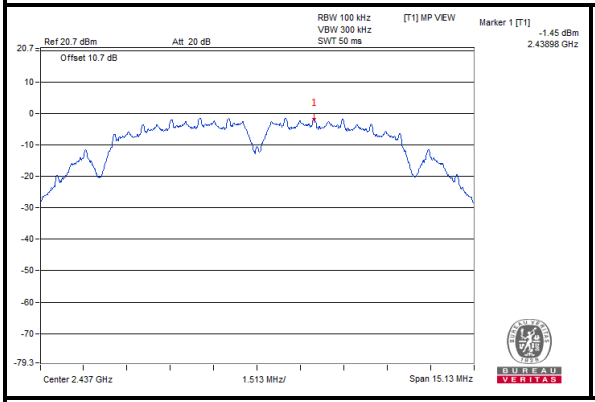
802.11b

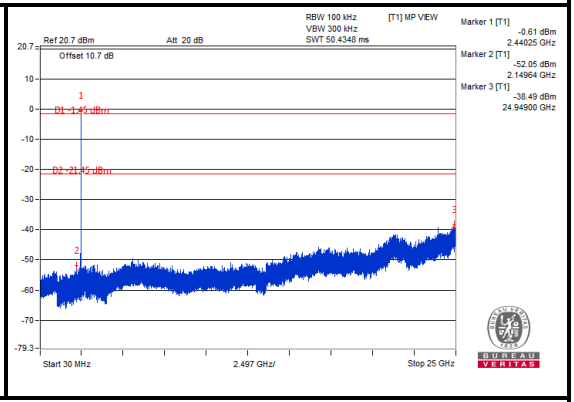
CH 1



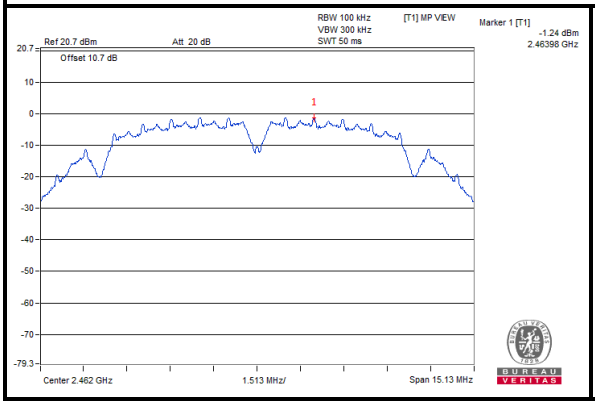


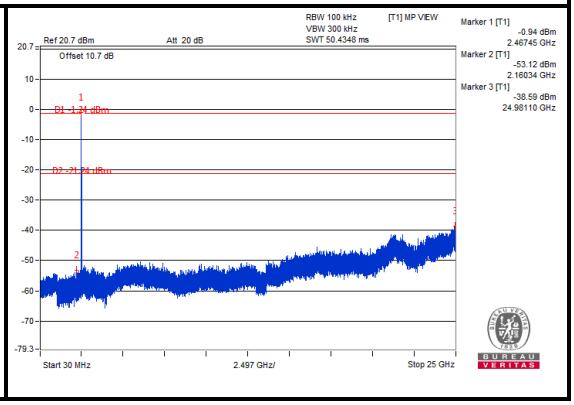
CH 6

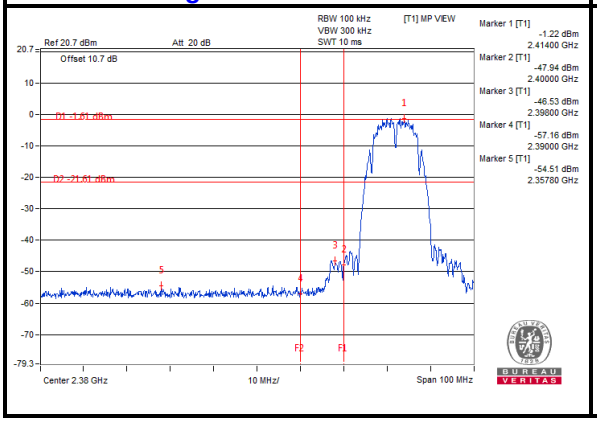
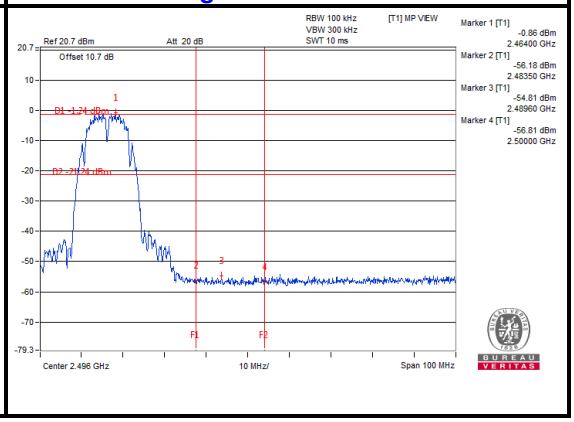




CH 11

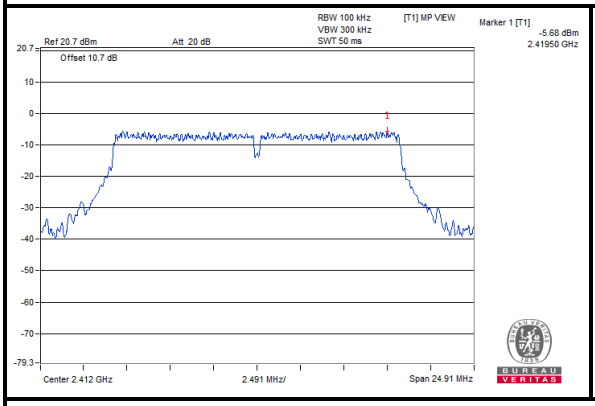


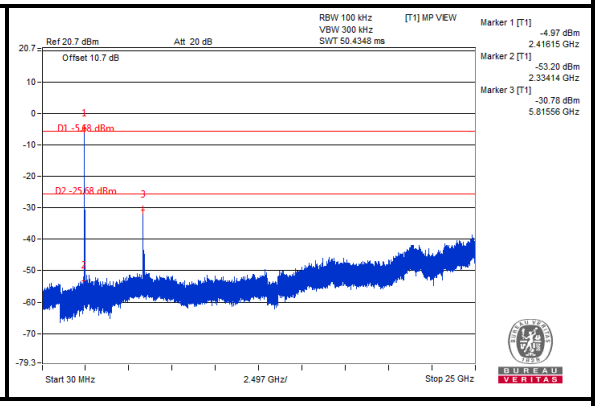


CH 1 Band Edge	CH 11 Band Edge
	

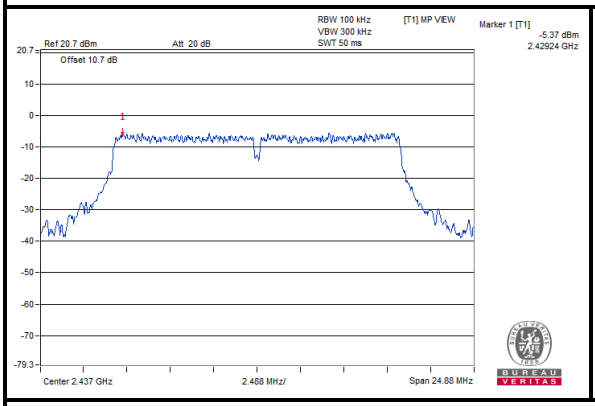
802.11g

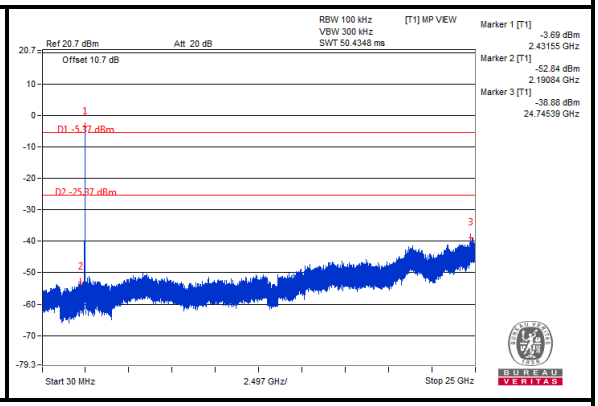
CH 1



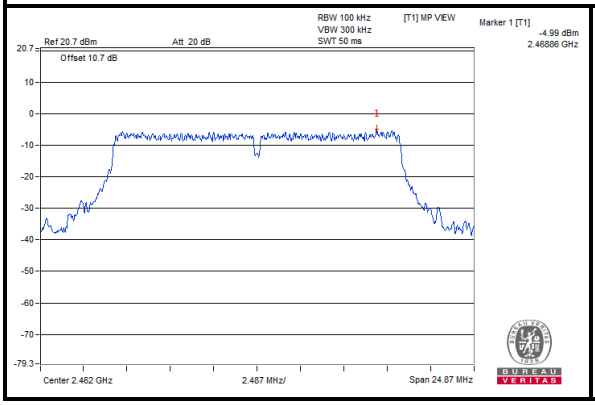


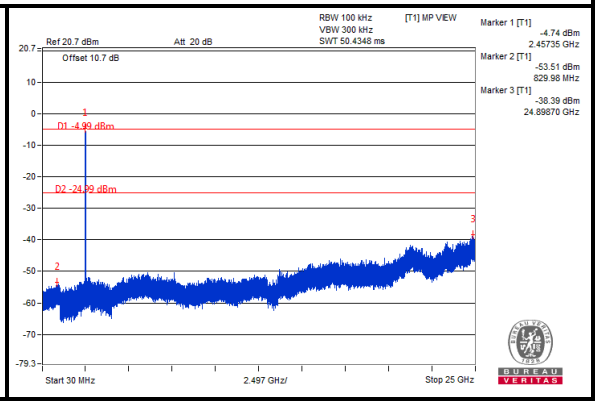
CH 6

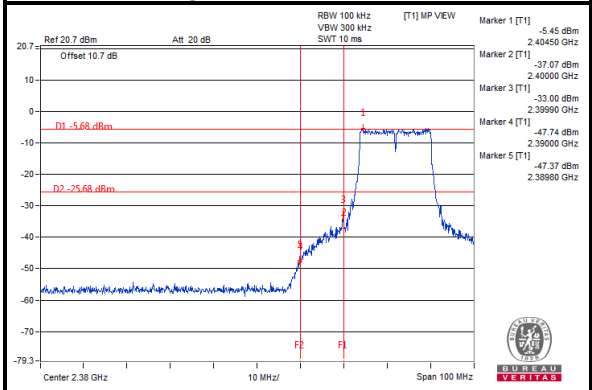
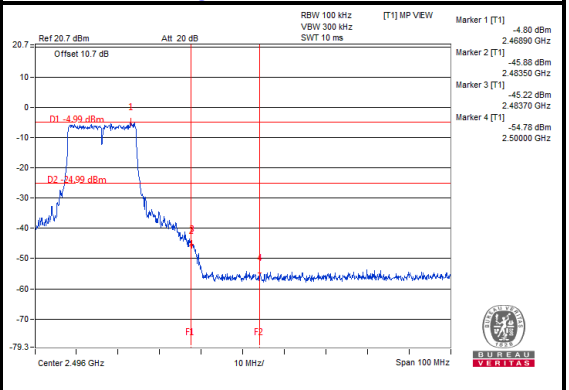




CH 11

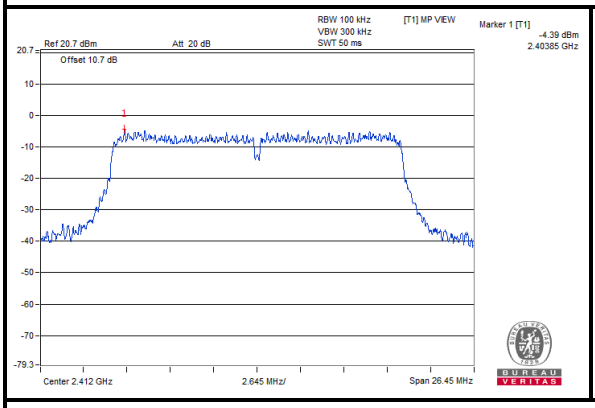


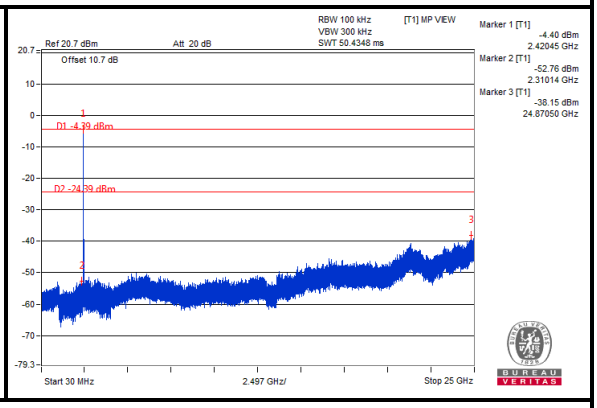


CH 1 Band Edge	CH 11 Band Edge
	

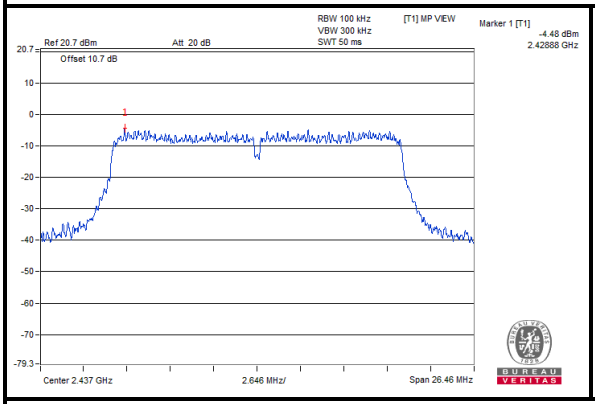
802.11n (20MHz)

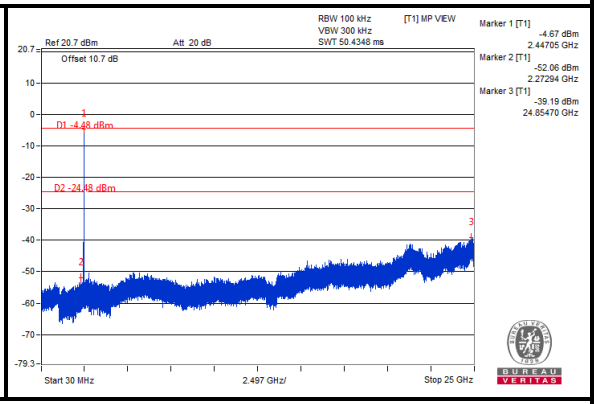
CH 1



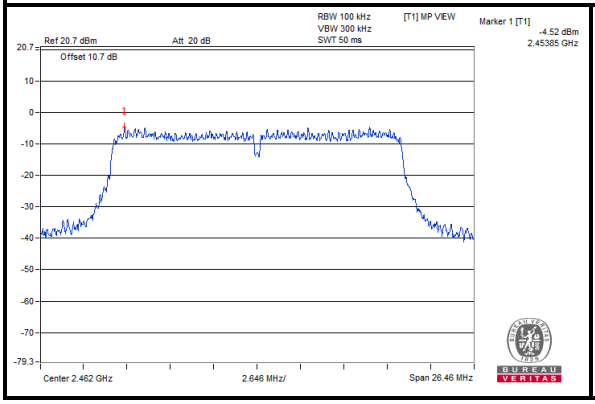


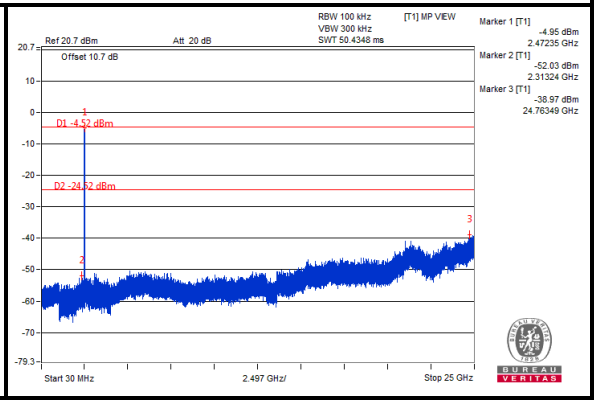
CH 6

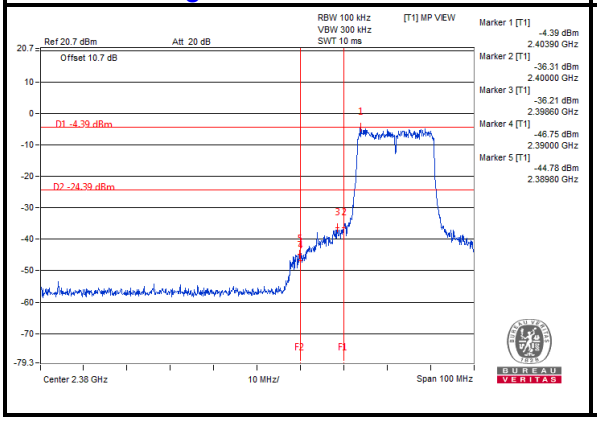
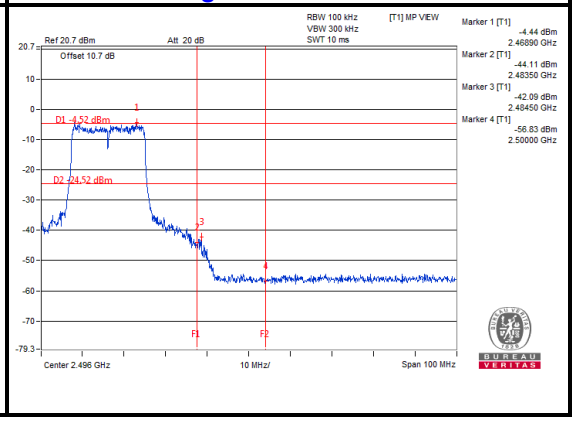




CH 11

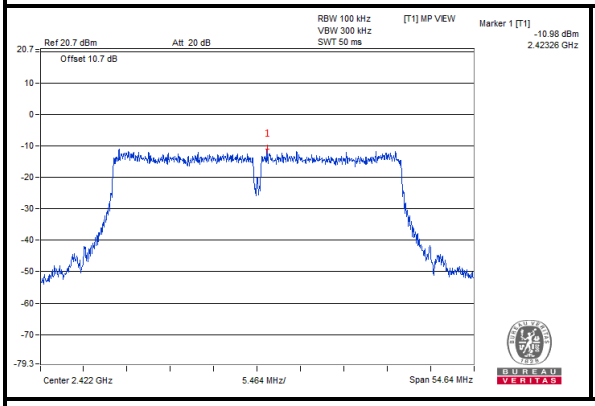


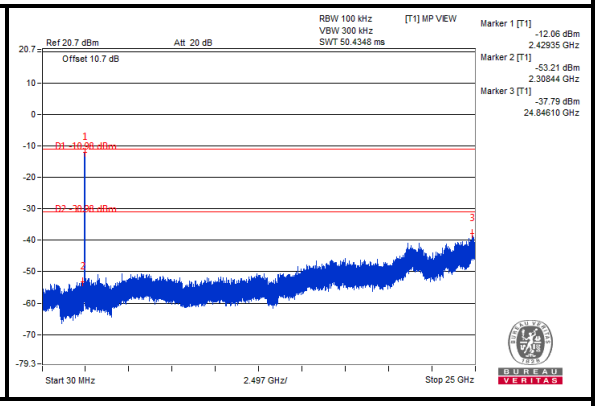


CH 1 Band Edge	CH 11 Band Edge
	

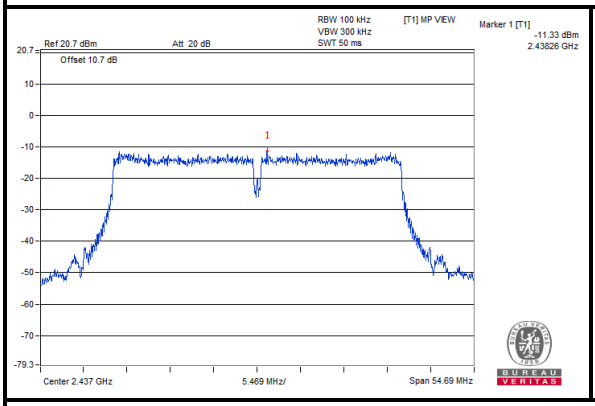
802.11n (40MHz)

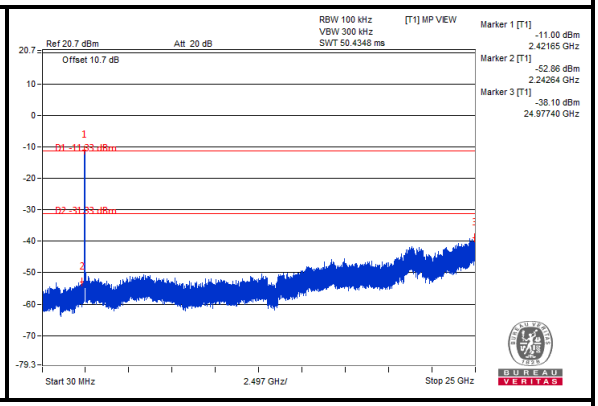
CH 3



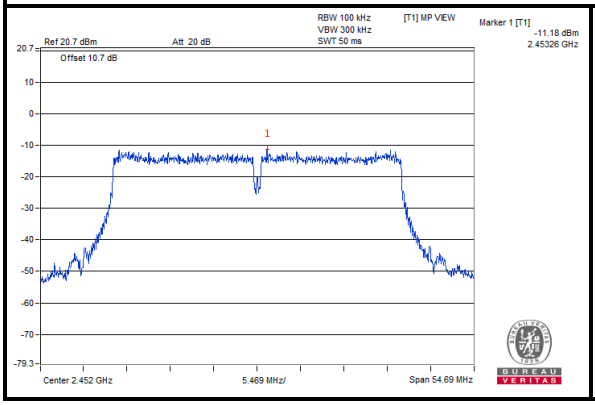


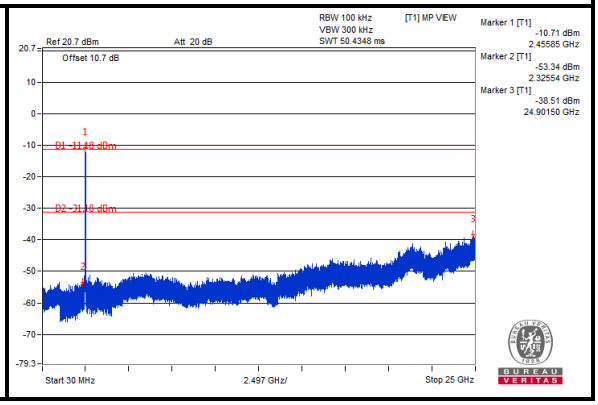
CH 6

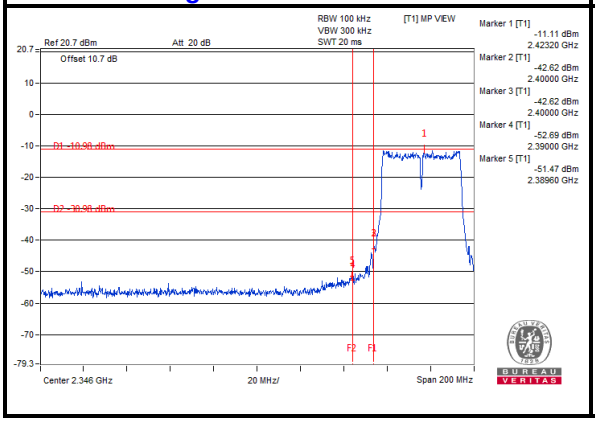
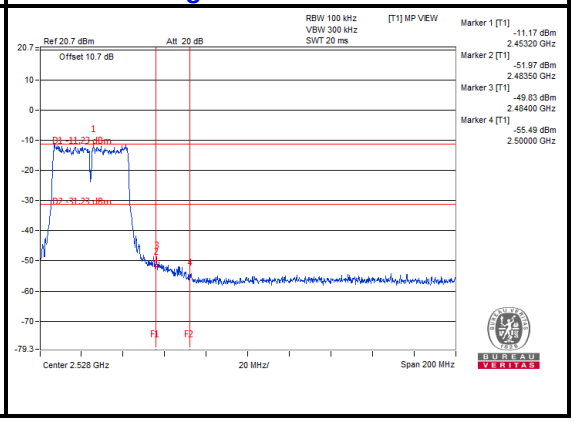




CH 9





CH 3 Band Edge	CH 9 Band Edge
	

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---

Bureau Veritas Shenzhen Co., Ltd.
Dongguan Branch

No. 34, Chenwulu Section, Guantai Rd., Houjie Town, Dongguan City, Guangdong 523942, China

Tel: +86 769 8593 5656
Fax: +86 769 8593 1080
Email: customerservice.dg@cn.bureauveritas.com