FCC Test Report

Report No.:	RF191023C07
FCC ID:	BABTN0002A
Test Model:	TN0002A
Received Date:	Oct. 23, 2019
Test Date:	Dec. 16, 2019 ~ Dec. 24, 2019
Issued Date:	Jan. 06, 2020
Applicant:	DENSO TEN Limited
Address:	2-28, GOSHO-DORI 1-CHOME, HYOGO-KU, KOBE 652-8510 JAPAN
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location:	No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration / Designation Number:	788550 / TW0003

Testing Laboratory
2021

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RF191023C07	Original Release	Jan. 06, 2020

1 Certificate of Conformity

Product:	Car Audio
Brand:	ISUZU
Test Model:	TN0002A
Sample Status:	Engineering Sample
Applicant:	DENSO TEN Limited
Test Date:	Dec. 16, 2019 ~ Dec. 24, 2019
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) ANSI C63.10:2013

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

Prepared by : _____ , **Date:** Jan. 06, 2020

Shelly Hsueh / Specialist

Approved by : _____ , **Date:** Jan. 06, 2020

Dylan Chiou / Senior Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	**Test Item**	**Result**	**Remarks**
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -25.46 dB at 0.15225 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.5 dB at 2483.50 MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6 dB Bandwidth	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	Pass	Reference only
15.247(b)	Conducted 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.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.79 dB
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Car Audio
Brand	ISUZU
Test Model	TN0002A
Status of EUT	Engineering Sample
Power Supply Rating	12Vdc (from car battery)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: 11 Mbps 802.11g: 54.0 Mbps 802.11n: up to 65 Mbps
Operating Frequency	2412 ~ 2462 MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20)
Output Power	88.716 mW
Antenna Type	Inverted F antenna with 2.98 dBi gain
Antenna Connector	N/A
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

1. The EUT incorporates a SISO function. Physically, the EUT provides one completed transmitters and one receivers.

Modulation Mode	Tx Function
802.11b	1TX
802.11g	1TX
802.11n (HT20)	1TX

2. WLAN 2.4GHz & WLAN 5GHz & BT technology cannot transmit at same time.
3. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

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

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	X-plane

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

NOTE: "-"means no effect.

Radiated Emission Test (Above 1 GHz):

☒ 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.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	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

Radiated Emission Test (Below 1 GHz):

☒ 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.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11g	1 to 11	11	OFDM	BPSK	6.0

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.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11g	1 to 11	11	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.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 11	1, 11	DSSS	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

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.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	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

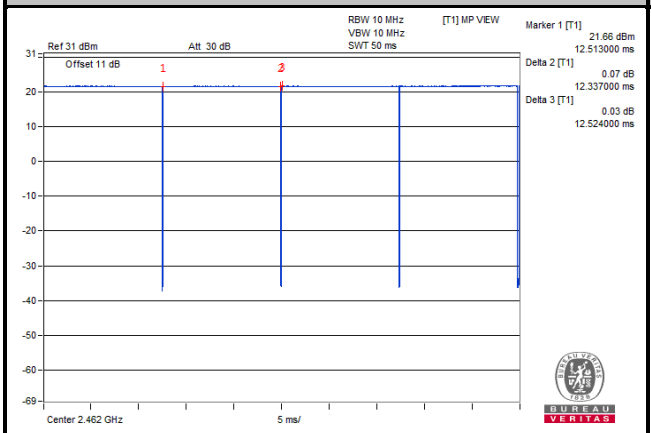
Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE≥1G	25 deg. C, 65 % RH	12 Vdc	Han Wu
RE<1G	25 deg. C, 65 % RH	12 Vdc	Han Wu
PLC	25 deg. C, 65 % RH	12 Vdc	Jones Chang
APCM	25 deg. C, 65 % RH	12 Vdc	Jisyong Wang

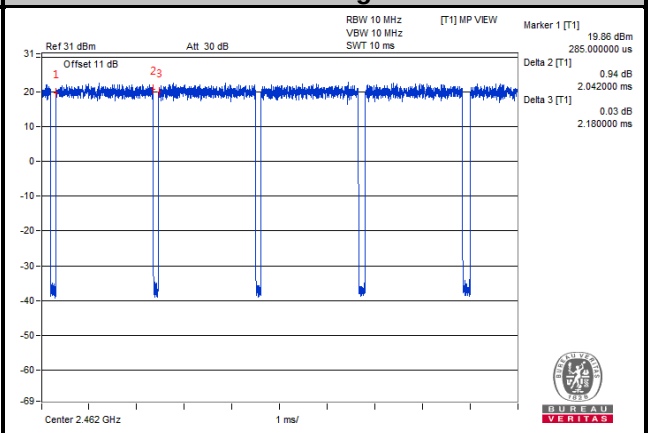
3.3 Duty Cycle of Test Signal

802.11b: Duty cycle = 12.337/12.524 = 98.5%, Duty cycle of test signal is ≥ 98 %, duty factor is not required.
802.11g: Duty cycle = 2.042/2.18 = 0.937, Duty factor = 10 * log(1/0.937) = 0.28
802.11n (HT20): Duty cycle = 1.908/2.028 = 0.941, Duty factor = 10 * log(1/0.941) = 0.26

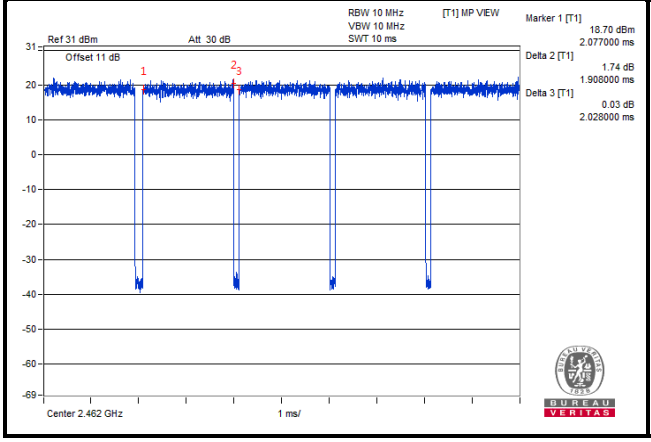
802.11b



802.11g



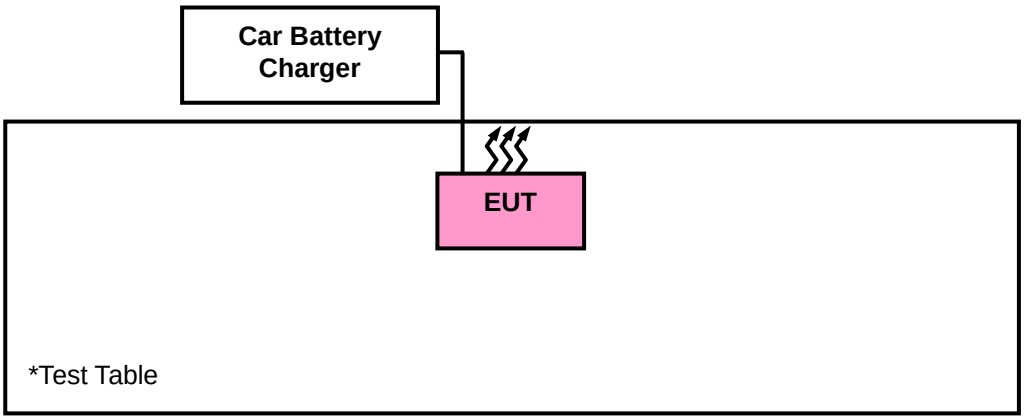
802.11n (HT20)



3.4 Description of Support Units

The EUT has been tested as an independent unit.

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards and References

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards and references:

Test Standard:

FCC Part 15, Subpart C (15.247)
ANSI C63.10-2013

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

References Test Guidance:

KDB 558074 D01 Meas Guidance v05r02

All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 30 dB below the highest level of the desired power:

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. For frequencies above 1000 MHz, 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 20 dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038A	MY55420137	Apr. 15, 2019	Apr. 14, 2020
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Jun. 12, 2019	Jun. 11, 2020
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Nov. 07, 2019	Nov. 06, 2020
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Nov. 24, 2019	Nov. 23, 2020
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 24, 2019	Nov. 23, 2020
Loop Antenna TESEQ	HLA 6121	45745	Jul. 01, 2019	Jun. 30, 2020
Preamplifier Agilent (Below 1GHz)	8447D	2944A10638	Jul. 11, 2019	Jul. 10, 2020
Preamplifier Agilent (Above 1GHz)	8449B	3008A02367	Feb. 19, 2019	Feb. 18, 2020
RF signal cable HUBER+SUHNER&EMCI	SUCOFLEX 104 & EMC104-SM-SM8000	CABLE-CH9-02 (248780+171006)	Jan. 19, 2019	Jan. 18, 2020
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	Jul. 11, 2019	Jul. 10, 2020
RF signal cable Woken	8D-FB	Cable-CH9-01	Jul. 30, 2019	Jul. 29, 2020
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY55190004/MY55190007/MY55210005	Jul. 15, 2019	Jul. 14, 2020

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 9.

4.1.3 Test Procedures

For Radiated Emission below 30 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. 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. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case 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 Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30 MHz.

For Radiated Emission above 30 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) 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 height of antenna 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 quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

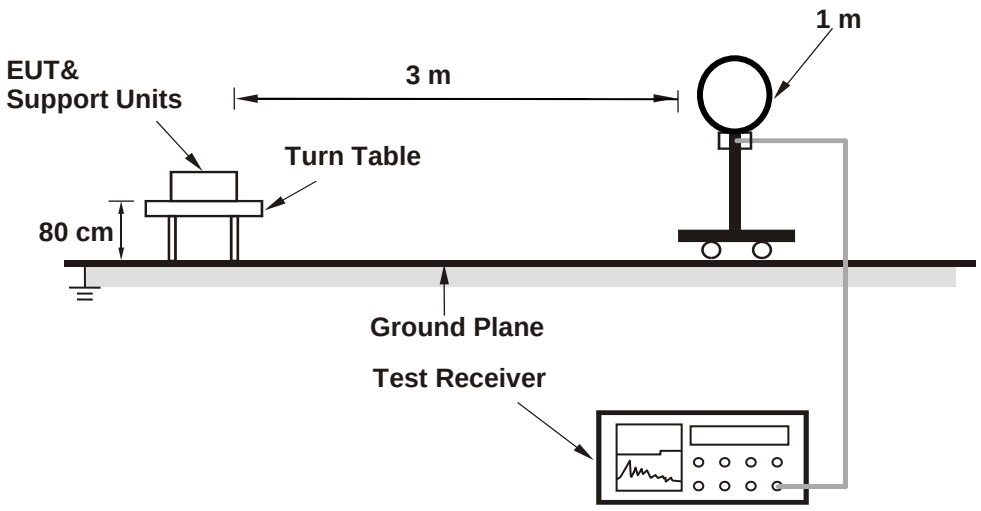
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98 %) or 10 Hz (Duty cycle ≥ 98 %) for Average detection (AV) at frequency above 1 GHz. (11b: RBW = 1 MHz, VBW =10 Hz ; 11g: RBW = 1 MHz, VBW = 1 kHz ;
   11n (HT20): RBW = 1 MHz, VBW = 1 kHz)
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

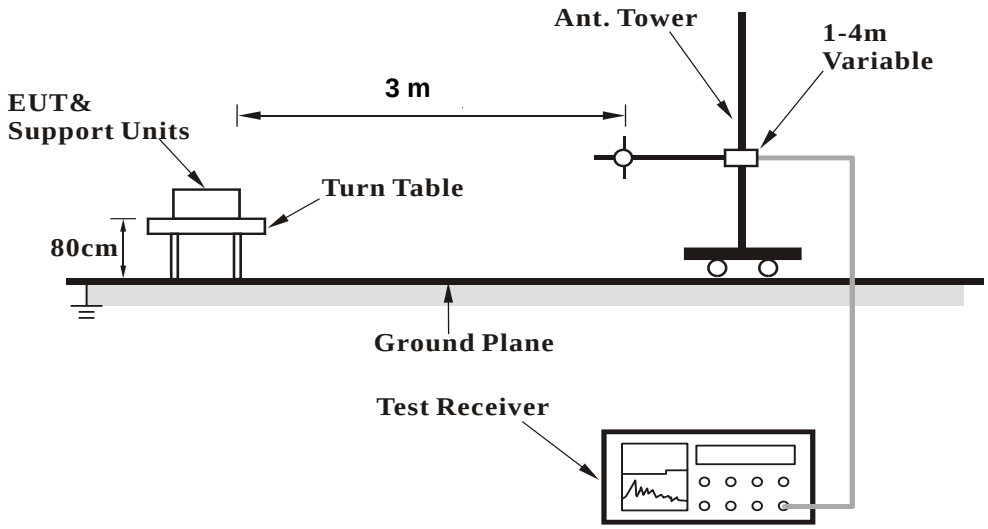
No deviation.

4.1.5 Test Set Up

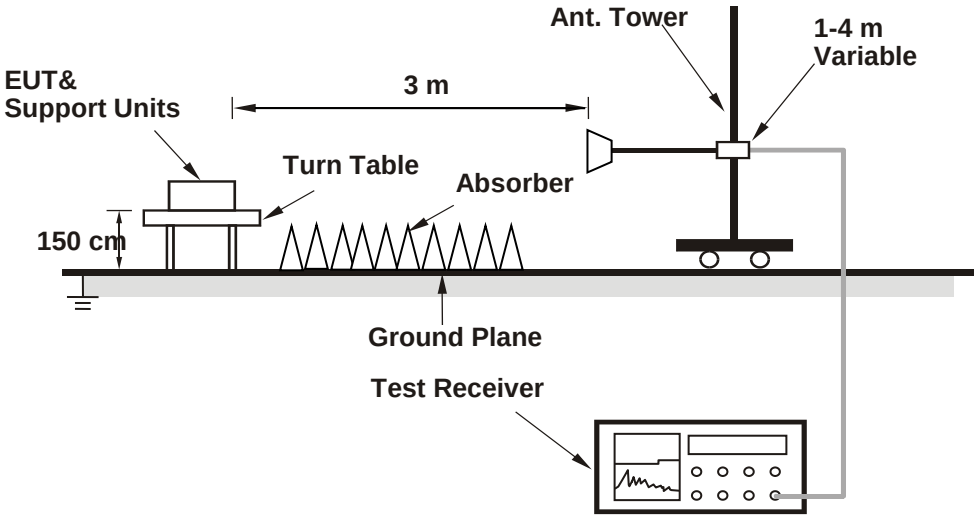
<Radiated Emission below 30 MHz>



<Radiated Emission 30 MHz to 1 GHz>



<Radiated Emission above 1 GHz>



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

4.1.6 EUT Operating Conditions

a. Placed the EUT on a testing table.
b. Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1 GHz Data：

802.11b

EUT Test Condition		Measurement Detail	
Channel	Channel 1	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Han Wu

Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
2390.00	55.5 PK	74.0	-18.5	1.87 H	267	23.6	31.9
2390.00	42.2 AV	54.0	-11.8	1.87 H	267	10.3	31.9
*2412.00	97.8 PK			1.90 H	261	65.9	31.9
*2412.00	94.0 AV			1.90 H	261	62.1	31.9
4824.00	50.6 PK	74.0	-23.4	1.90 H	221	46.8	3.8
4824.00	46.8 AV	54.0	-7.2	1.90 H	221	43.0	3.8
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
2390.00	56.0 PK	74.0	-18.0	3.09 V	124	24.1	31.9
2390.00	44.0 AV	54.0	-10.0	3.09 V	124	12.1	31.9
*2412.00	106.2 PK			2.07 V	123	74.3	31.9
*2412.00	103.1 AV			2.07 V	123	71.2	31.9
4824.00	54.4 PK	74.0	-19.6	3.18 V	187	50.6	3.8
4824.00	51.6 AV	54.0	-2.4	3.18 V	187	47.8	3.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Han Wu

Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2437.00	98.2 PK			1.80 H	266	66.3	31.9
*2437.00	94.4 AV			1.80 H	266	62.5	31.9
4874.00	49.8 PK	74.0	-24.2	1.84 H	226	46.0	3.8
4874.00	46.9 AV	54.0	-7.1	1.84 H	226	43.1	3.8
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2437.00	106.9 PK			2.84 V	121	75.0	31.9
*2437.00	103.2 AV			2.84 V	121	71.3	31.9
4874.00	53.9 PK	74.0	-20.1	3.25 V	187	50.1	3.8
4874.00	51.5 AV	54.0	-2.5	3.25 V	187	47.7	3.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Han Wu

Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2462.00	97.1 PK			1.84 H	263	65.2	31.9
*2462.00	92.9 AV			1.84 H	263	61.0	31.9
2483.50	55.0 PK	74.0	-19.0	1.89 H	264	23.0	32.0
2483.50	42.4 AV	54.0	-11.6	1.89 H	264	10.4	32.0
4924.00	50.1 PK	74.0	-23.9	1.83 H	228	46.3	3.8
4924.00	46.9 AV	54.0	-7.1	1.83 H	228	43.1	3.8
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2462.00	105.8 PK			2.77 V	119	73.9	31.9
*2462.00	102.1 AV			2.77 V	119	70.2	31.9
2483.50	57.9 PK	74.0	-16.1	2.78 V	120	25.9	32.0
2483.50	47.7 AV	54.0	-6.3	2.78 V	120	15.7	32.0
4924.00	54.4 PK	74.0	-19.6	3.18 V	186	50.6	3.8
4924.00	51.4 AV	54.0	-2.6	3.18 V	186	47.6	3.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

802.11g

EUT Test Condition		Measurement Detail	
Channel	Channel 1	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Han Wu

Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
2390.00	55.4 PK	74.0	-18.6	1.80 H	261	23.5	31.9
2390.00	42.9 AV	54.0	-11.1	1.80 H	261	11.0	31.9
*2412.00	97.3 PK			1.80 H	261	65.4	31.9
*2412.00	87.4 AV			1.80 H	261	55.5	31.9
4824.00	50.4 PK	74.0	-23.6	1.85 H	215	46.6	3.8
4824.00	35.7 AV	54.0	-18.3	1.85 H	215	31.9	3.8
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
2390.00	66.2 PK	74.0	-7.8	2.80 V	120	34.3	31.9
2390.00	51.8 AV	54.0	-2.2	2.80 V	120	19.9	31.9
*2412.00	106.0 PK			2.80 V	124	74.1	31.9
*2412.00	96.5 AV			2.80 V	124	64.6	31.9
4824.00	53.4 PK	74.0	-20.6	3.14 V	182	49.6	3.8
4824.00	39.9 AV	54.0	-14.1	3.14 V	182	36.1	3.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Han Wu

Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2437.00	96.9 PK			1.98 H	263	65.0	31.9
*2437.00	86.9 AV			1.98 H	263	55.0	31.9
4874.00	49.8 PK	74.0	-24.2	1.83 H	226	46.0	3.8
4874.00	35.7 AV	54.0	-18.3	1.83 H	226	31.9	3.8
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2437.00	106.0 PK			2.91 V	197	74.1	31.9
*2437.00	96.0 AV			2.91 V	197	64.1	31.9
4874.00	54.3 PK	74.0	-19.7	3.28 V	189	50.5	3.8
4874.00	40.2 AV	54.0	-13.8	3.28 V	189	36.4	3.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Han Wu

Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2462.00	97.3 PK			1.94 H	260	65.4	31.9
*2462.00	87.2 AV			1.94 H	260	55.3	31.9
2483.50	60.3 PK	74.0	-13.7	1.93 H	260	28.3	32.0
2483.50	44.4 AV	54.0	-9.6	1.93 H	260	12.4	32.0
4924.00	50.2 PK	74.0	-23.8	1.95 H	231	46.4	3.8
4924.00	36.1 AV	54.0	-17.9	1.95 H	231	32.3	3.8
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2462.00	106.1 PK			2.98 V	181	74.2	31.9
*2462.00	96.3 AV			2.98 V	181	64.4	31.9
2483.50	69.2 PK	74.0	-4.8	2.93 V	189	37.2	32.0
2483.50	**53.5 AV**	**54.0**	**-0.5**	**2.93 V**	**189**	**21.5**	**32.0**
4924.00	53.8 PK	74.0	-20.2	3.11 V	192	50.0	3.8
4924.00	40.3 AV	54.0	-13.7	3.11 V	192	36.5	3.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

802.11n (HT20)

EUT Test Condition		Measurement Detail	
Channel	Channel 1	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Han Wu

Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
2390.00	54.9 PK	74.0	-19.1	1.86 H	260	23.0	31.9
2390.00	42.6 AV	54.0	-11.4	1.86 H	260	10.7	31.9
*2412.00	97.1 PK			1.91 H	259	65.2	31.9
*2412.00	86.5 AV			1.91 H	259	54.6	31.9
4824.00	50.0 PK	74.0	-24.0	1.94 H	221	46.2	3.8
4824.00	36.0 AV	54.0	-18.0	1.94 H	221	32.2	3.8
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
2390.00	63.7 PK	74.0	-10.3	2.78 V	160	31.8	31.9
2390.00	50.7 AV	54.0	-3.3	2.78 V	160	18.8	31.9
*2412.00	106.3 PK			2.78 V	175	74.4	31.9
*2412.00	95.5 AV			2.78 V	175	63.6	31.9
4824.00	54.4 PK	74.0	-19.6	3.23 V	192	50.6	3.8
4824.00	40.5 AV	54.0	-13.5	3.23 V	192	36.7	3.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Han Wu

Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2437.00	97.1 PK			1.99 H	262	65.2	31.9
*2437.00	87.0 AV			1.99 H	262	55.1	31.9
4874.00	49.9 PK	74.0	-24.1	1.91 H	215	46.1	3.8
4874.00	36.1 AV	54.0	-17.9	1.91 H	215	32.3	3.8
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2437.00	106.0 PK			2.87 V	197	74.1	31.9
*2437.00	96.3 AV			2.87 V	197	64.4	31.9
4874.00	53.8 PK	74.0	-20.2	3.21 V	183	50.0	3.8
4874.00	40.6 AV	54.0	-13.4	3.21 V	183	36.8	3.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Han Wu

Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2462.00	95.6 PK			1.81 H	262	63.7	31.9
*2462.00	85.9 AV			1.81 H	262	54.0	31.9
2483.50	55.9 PK	74.0	-18.1	1.98 H	259	23.9	32.0
2483.50	44.9 AV	54.0	-9.1	1.98 H	259	12.9	32.0
4924.00	48.9 PK	74.0	-25.1	1.86 H	227	45.1	3.8
4924.00	35.0 AV	54.0	-19.0	1.86 H	227	31.2	3.8
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2462.00	104.8 PK			2.71 V	180	72.9	31.9
*2462.00	95.0 AV			2.71 V	180	63.1	31.9
2483.50	67.1 PK	74.0	-6.9	2.80 V	195	35.1	32.0
2483.50	53.1 AV	54.0	-0.9	2.80 V	195	21.1	32.0
4924.00	53.5 PK	74.0	-20.5	3.13 V	186	49.7	3.8
4924.00	39.3 AV	54.0	-14.7	3.13 V	186	35.5	3.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

9 kHz ~ 30 MHz Data:

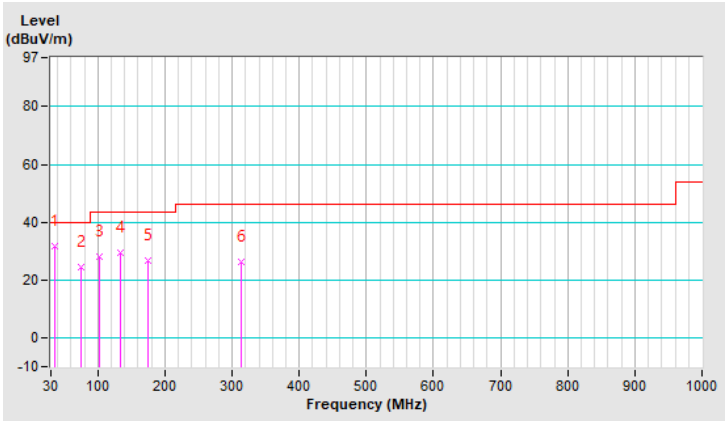
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Worst-Case Data:

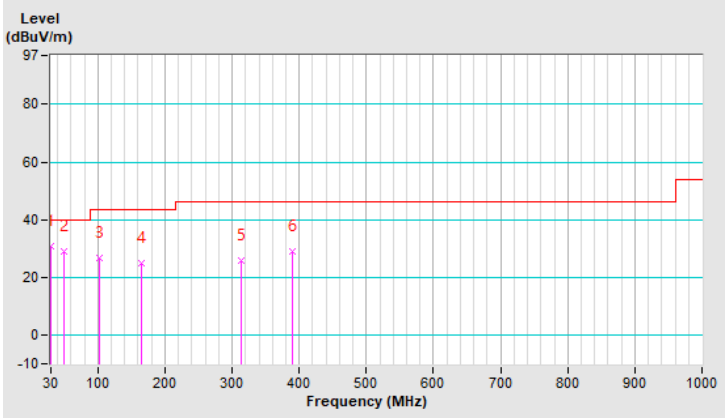
802.11g

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**Frequency Range**	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Han Wu

Horizontal



Vertical



a. Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
36.79	**31.8 QP**	**40.0**	**-8.2**	**1.00 H**	**213**	**42.7**	**-10.9**
75.59	24.3 QP	40.0	-15.7	1.00 H	206	37.1	-12.8
101.78	27.9 QP	43.5	-15.6	1.00 H	220	41.5	-13.6
133.79	29.6 QP	43.5	-13.9	1.00 H	163	39.9	-10.3
175.50	26.7 QP	43.5	-16.8	1.00 H	176	36.7	-10.0
314.21	26.4 QP	46.0	-19.6	1.00 H	203	34.1	-7.7
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
30.00	30.6 QP	40.0	-9.4	1.00 V	211	41.9	-11.3
50.37	28.8 QP	40.0	-11.2	1.00 V	228	38.5	-9.7
101.78	26.8 QP	43.5	-16.7	1.00 V	202	40.4	-13.6
165.80	24.8 QP	43.5	-18.7	1.00 V	195	34.0	-9.2
314.21	26.0 QP	46.0	-20.0	1.00 V	209	33.7	-7.7
389.87	29.0 QP	46.0	-17.0	1.00 V	156	35.0	-6.0

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	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 0.50 MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Dec. 11, 2019	Dec. 10, 2020
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Sep. 05, 2019	Sep. 04, 2020
LISN/AMN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 17, 2019	Mar. 16, 2020
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ENV216	101196	Apr. 16, 2019	Apr. 15, 2020
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 1.
3. The VCCI Site Registration No. is C-12040.

4.2.3 Test Procedures

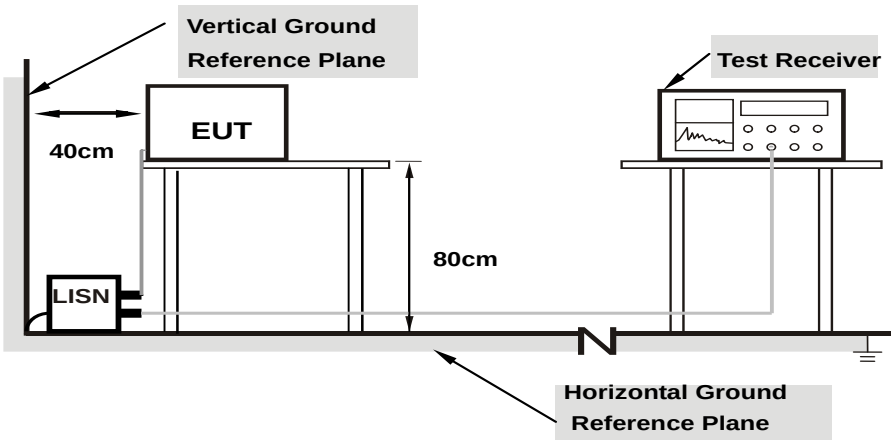
a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling 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 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

Note: The resolution bandwidth and video bandwidth of test receiver is 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15 MHz – 30 MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

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

4.2.6 EUT Operating Conditions

a. Placed the EUT on a testing table.
b. Use the software to control the EUT under transmission condition continuously at specific channel frequency.

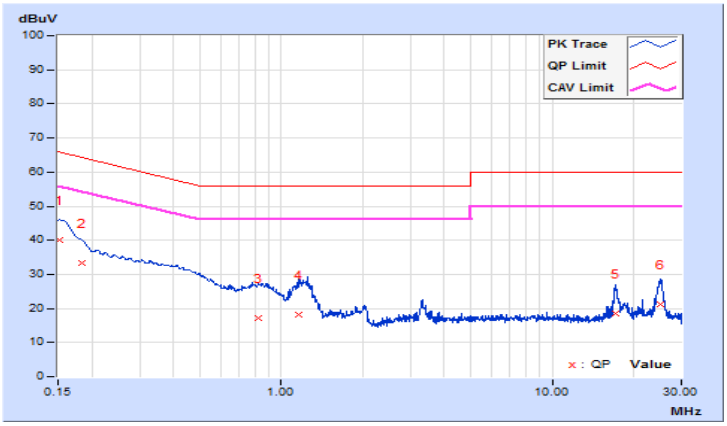
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Frequency	Correction Factor	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
	(MHz)	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15225	10.15	29.99	6.20	40.14	16.35	65.88	55.88	-25.74	-39.53
2	0.18375	10.16	23.34	2.61	33.50	12.77	64.31	54.31	-30.81	-41.54
3	0.82062	10.24	6.81	0.79	17.05	11.03	56.00	46.00	-38.95	-34.97
4	1.16250	10.27	7.88	1.43	18.15	11.70	56.00	46.00	-37.85	-34.30
5	17.08125	10.56	7.93	2.96	18.49	13.52	60.00	50.00	-41.51	-36.48
6	25.14750	10.48	10.69	2.47	21.17	12.95	60.00	50.00	-38.83	-37.05

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

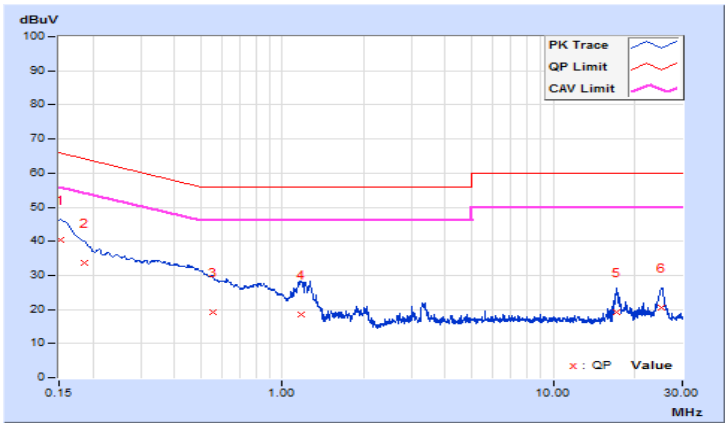


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Neutral (N)										
No	Frequency	Correction Factor	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
	(MHz)	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15225	10.12	30.30	7.09	40.42	17.21	65.88	55.88	-25.46	-38.67
2	0.18600	10.13	23.40	2.53	33.53	12.66	64.21	54.21	-30.68	-41.55
3	0.55225	10.20	9.04	3.99	19.24	14.19	56.00	46.00	-36.76	-31.81
4	1.17600	10.25	8.20	1.38	18.45	11.63	56.00	46.00	-37.55	-34.37
5	17.17575	10.74	8.39	4.33	19.13	15.07	60.00	50.00	-40.87	-34.93
6	25.06644	10.65	9.79	2.05	20.44	12.70	60.00	50.00	-39.56	-37.30

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

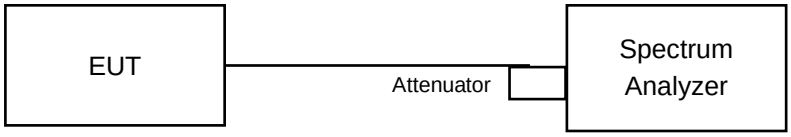


4.3 6 dB Bandwidth Measurement

4.3.1 Limits of 6 dB Bandwidth Measurement

The minimum of 6 dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

a. Set resolution bandwidth (RBW) = 100 kHz
b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Sweep = auto couple.
e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.3.5 Deviation from Test Standard

No deviation.

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	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	8.08	0.5	Pass
6	2437	8.58	0.5	Pass
11	2462	9.02	0.5	Pass

802.11g

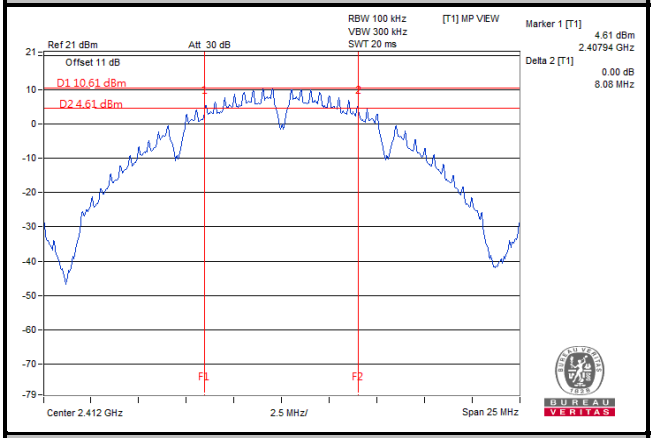
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.36	0.5	Pass
6	2437	16.08	0.5	Pass
11	2462	16.10	0.5	Pass

802.11n (HT20)

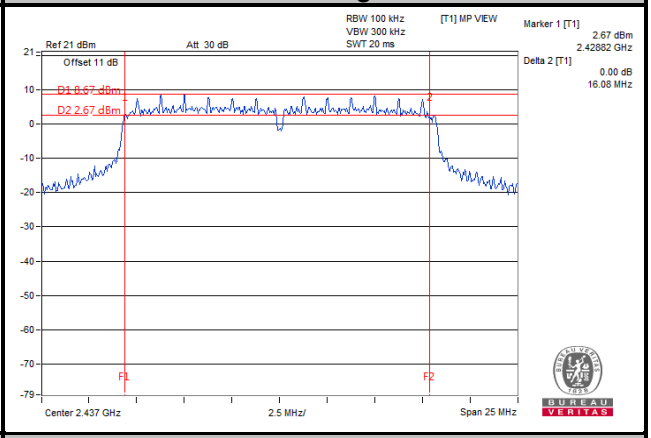
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.92	0.5	Pass
6	2437	16.92	0.5	Pass
11	2462	16.66	0.5	Pass

Spectrum Plot of Worst Value

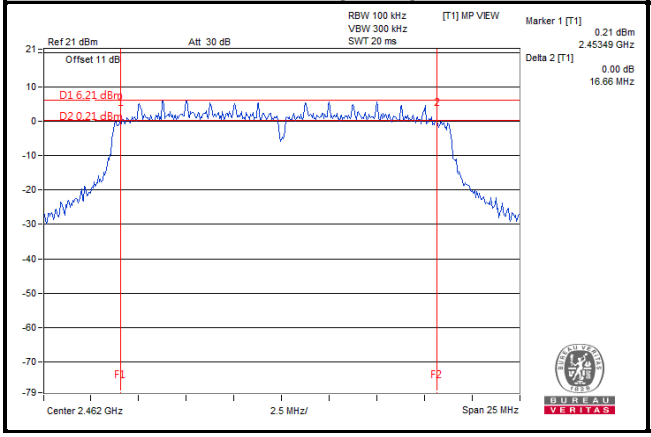
802.11b



802.11g

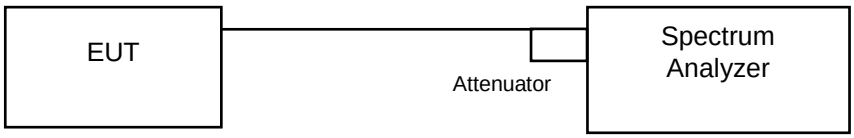


802.11n (HT20)



4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1 % to 5 % of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to sampling. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

4.4.4 Deviation from Test Standard

No deviation.

4.4.5 EUT Operating Conditions

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

4.4.6 Test Results

802.11b

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	Pass / Fail
1	2412	13.92	Pass
6	2437	14.40	Pass
11	2462	14.28	Pass

802.11g

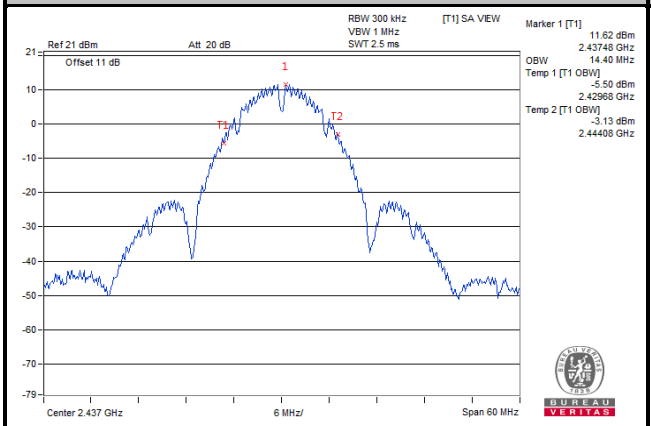
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	Pass / Fail
1	2412	16.68	Pass
6	2437	16.92	Pass
11	2462	16.68	Pass

802.11n (HT20)

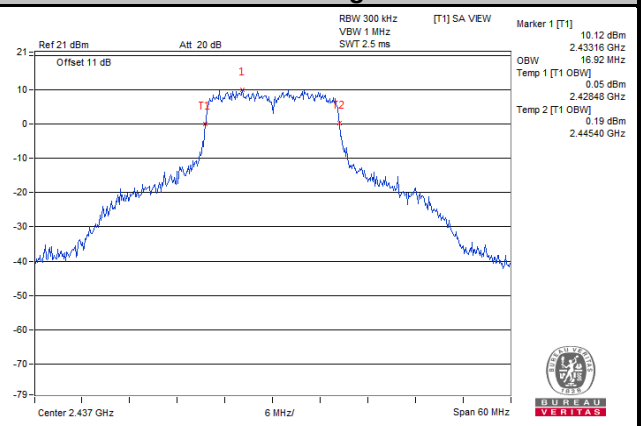
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	Pass / Fail
1	2412	17.76	Pass
6	2437	17.88	Pass
11	2462	17.64	Pass

Spectrum Plot of Worst Value

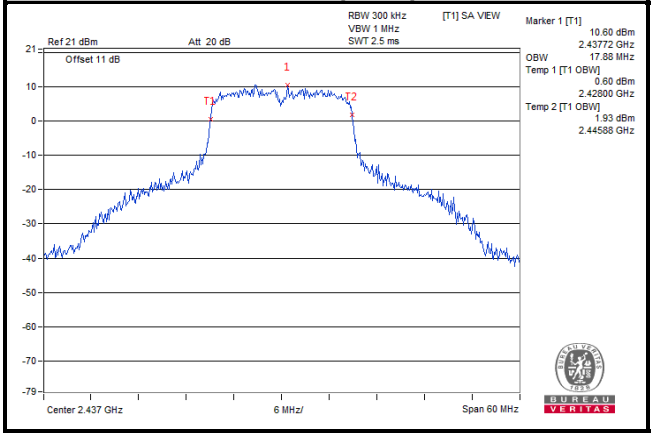
802.11b



802.11g



802.11n (HT20)

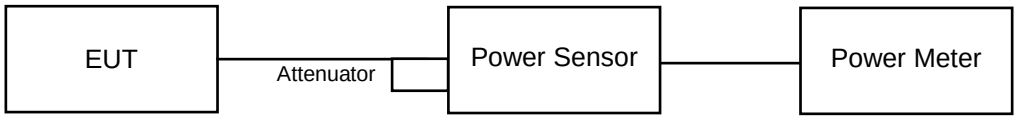


4.5 Conducted Output Power Measurement

4.5.1 Limits of Conducted Output Power Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedures

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Conditions

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

4.5.7 Test Results

802.11b

Channel	Frequency (MHz)	Average Power (mW)	Average Power (mW)	Limit (dBm)	Pass / Fail
1	2412	70.146	18.46	30	Pass
6	2437	88.716	19.48	30	Pass
11	2462	81.47	19.11	30	Pass

802.11g

Channel	Frequency (MHz)	Average Power (mW)	Average Power (mW)	Limit (dBm)	Pass / Fail
1	2412	64.417	18.09	30	Pass
6	2437	79.799	19.02	30	Pass
11	2462	57.677	17.61	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Average Power (mW)	Average Power (mW)	Limit (dBm)	Pass / Fail
1	2412	60.395	17.81	30	Pass
6	2437	75.683	18.79	30	Pass
11	2462	44.771	16.51	30	Pass

4.6 Power Spectral Density Measurement

4.6.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8 dBm in any 3 kHz band during any time interval of continuous transmission.

4.6.2 Test Setup

4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

a. Set analyzer center frequency to DTS channel center frequency.
b. Set the span to 1.5 times the DTS bandwidth.
c. Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d. Set the VBW ≥ 3 × RBW.
e. Detector = peak.
f. Sweep time = auto couple.
g. Trace mode = max hold.
h. Allow trace to fully stabilize.
i. Use the peak marker function to determine the maximum amplitude level within the RBW.

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

802.11b

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-9.35	8	Pass
6	2437	-8.13	8	Pass
11	2462	-8.96	8	Pass

802.11g

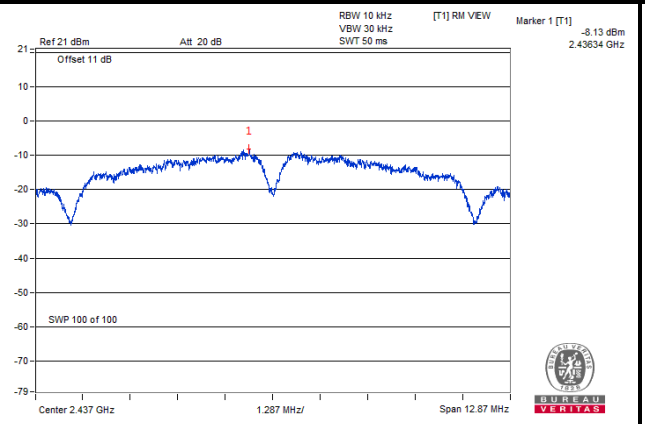
Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-13.59	8	Pass
6	2437	-11.61	8	Pass
11	2462	-14.08	8	Pass

802.11n (HT20)

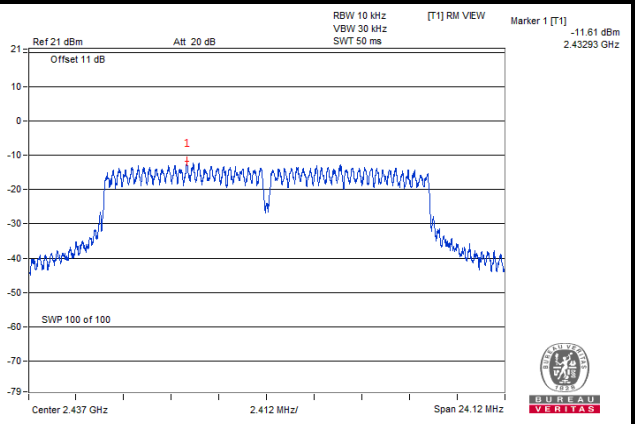
Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-13.94	8	Pass
6	2437	-12.74	8	Pass
11	2462	-15.43	8	Pass

Spectrum Plot of Worst Value

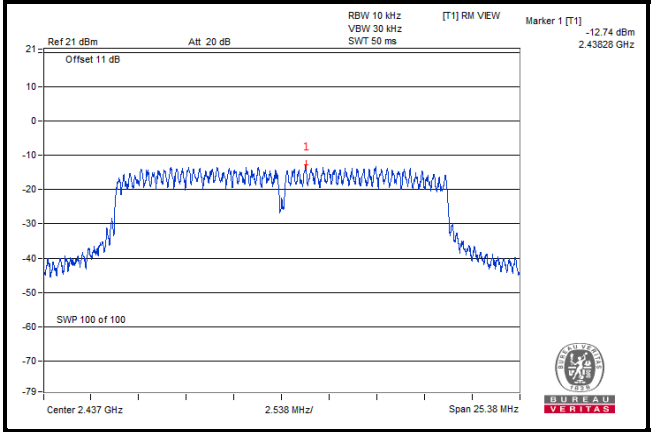
802.11b



802.11g



802.11n (HT20)

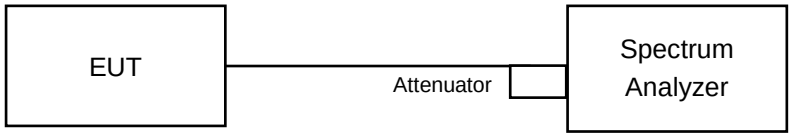


4.7 Conducted Out of Band Emission Measurement

4.7.1 Limits of Conducted Out of Band Emission Measurement

Below -30 dB of the highest emission level of operating band (in 100 kHz Resolution Bandwidth).

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 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. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

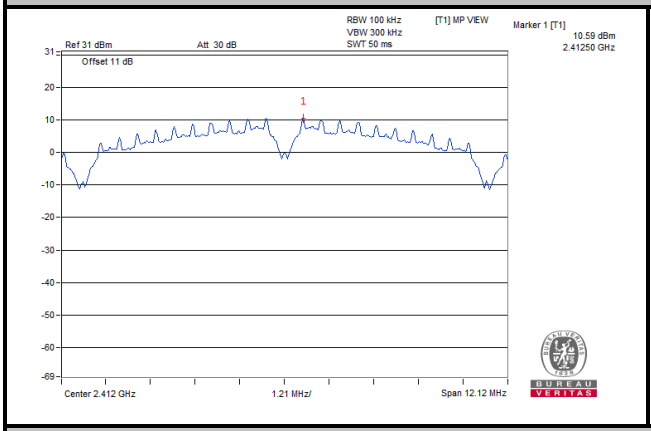
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

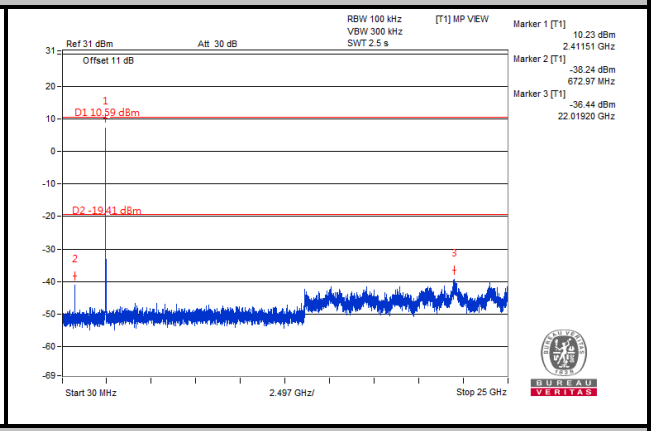
4.7.7 Test Results

The spectrum plots are attached on the following images. D1 line indicates the highest level, and D2 line indicates the 30 dB offset below D1. It shows compliance with the requirement.

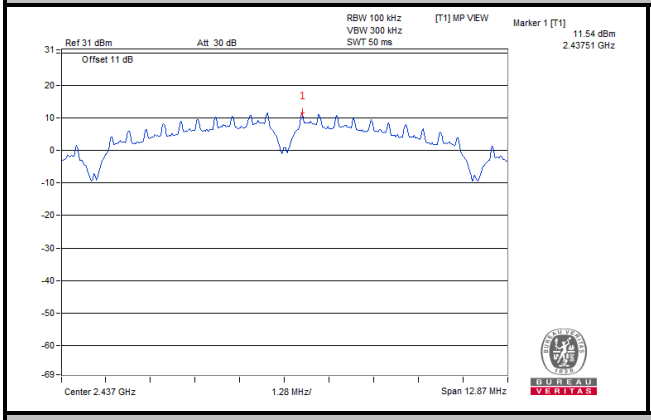
802.11b

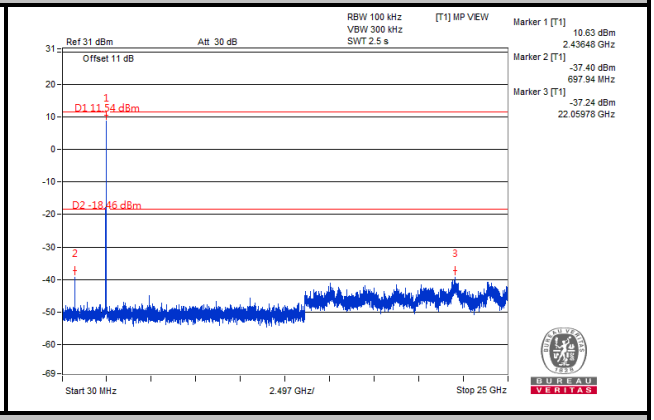
Ch 1



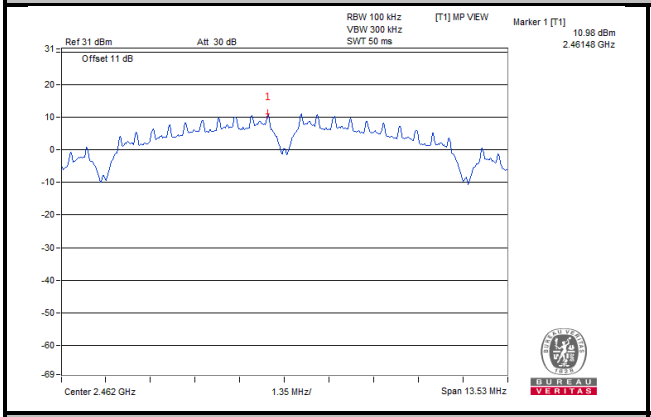


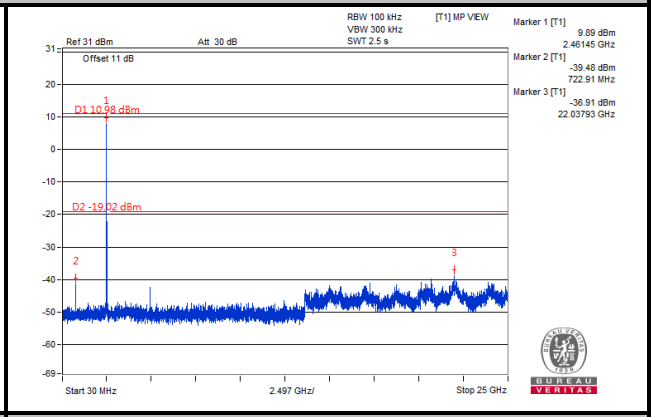
Ch 6



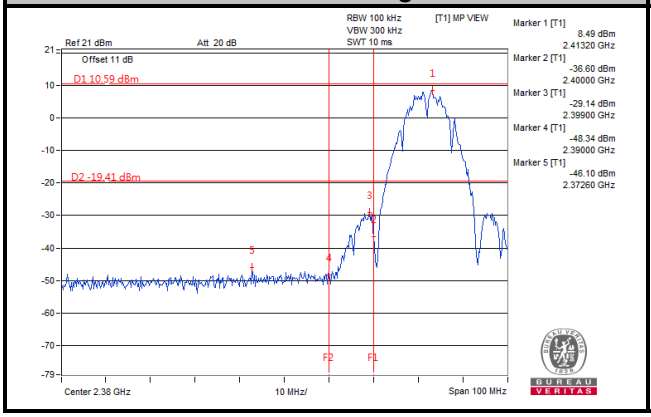


Ch 11

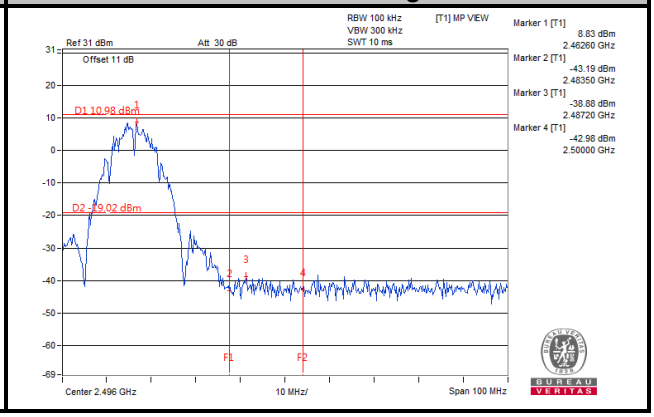




Ch 1 Band Edge

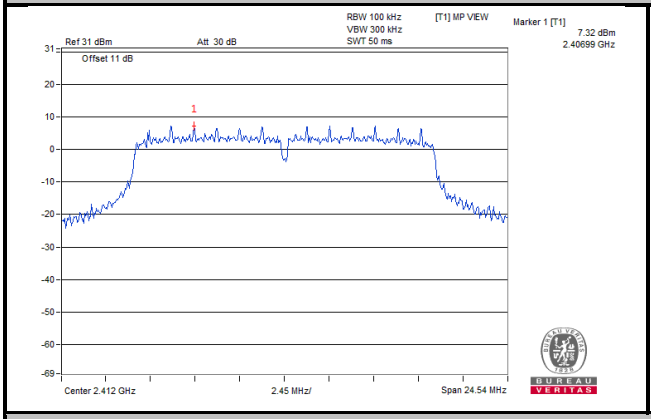


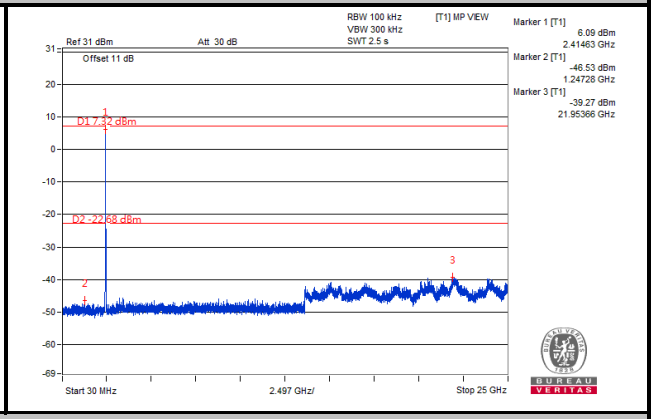
Ch 11 Band Edge



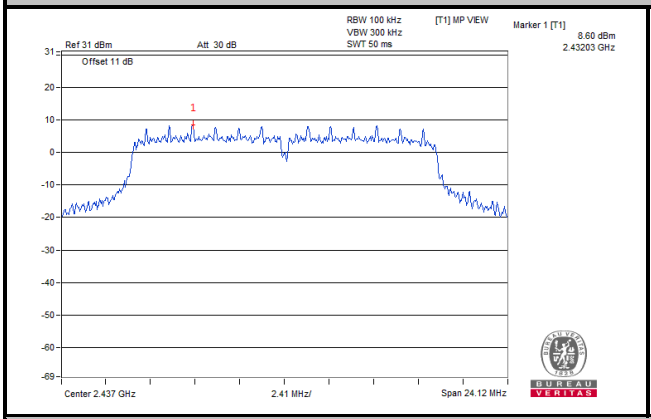
802.11g

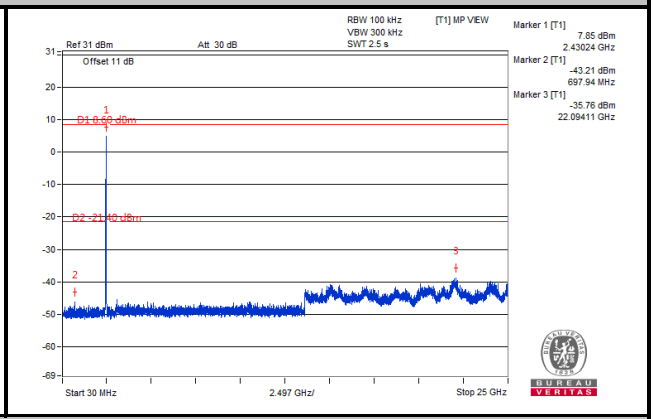
Ch 1



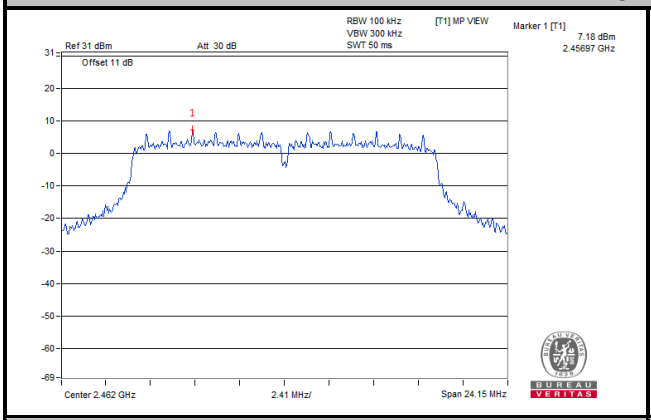


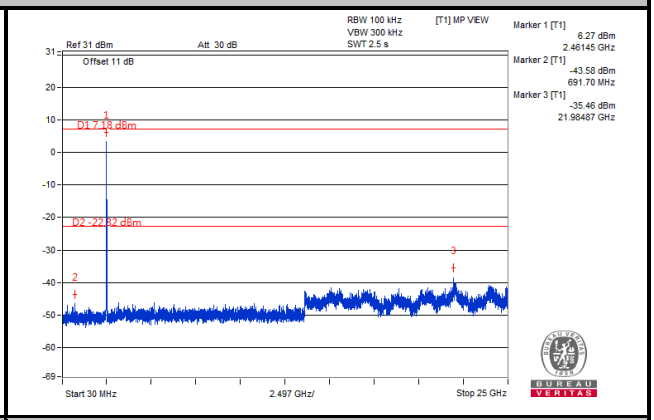
Ch 6



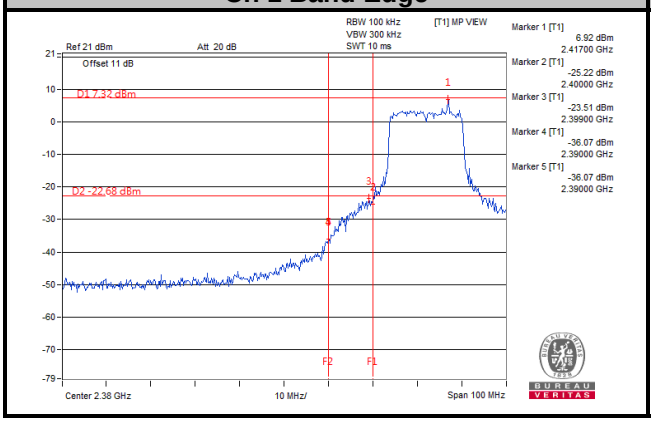


Ch 11

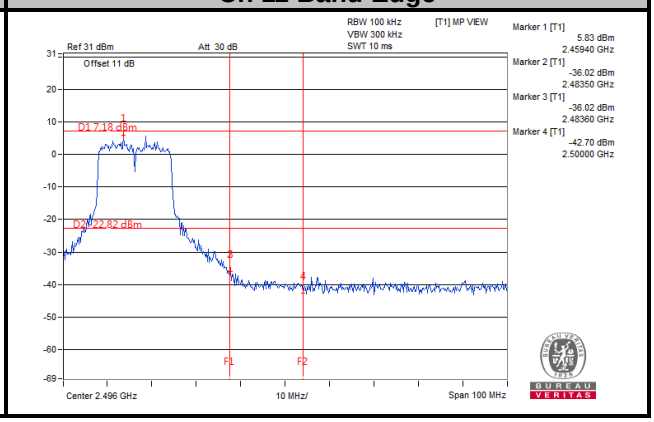




Ch 1 Band Edge

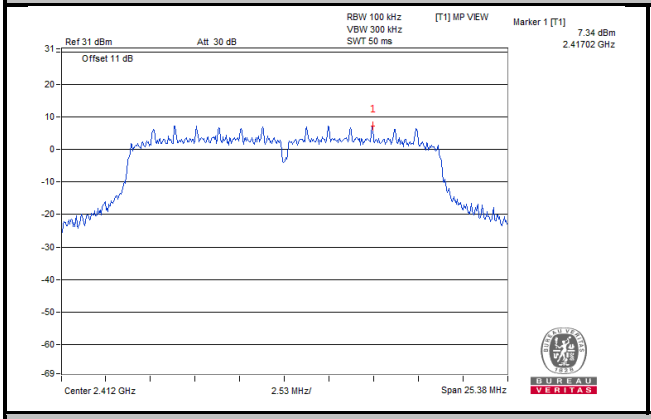


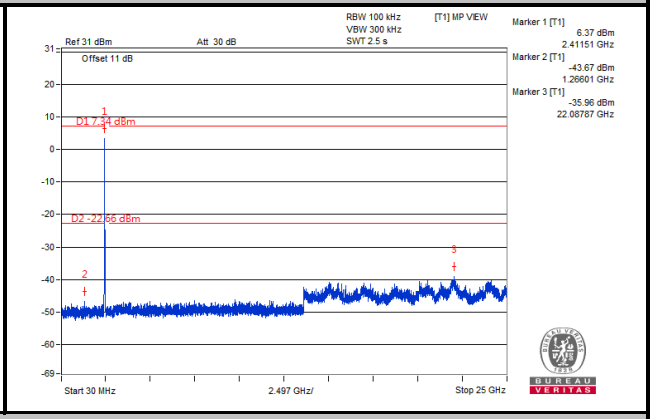
Ch 11 Band Edge



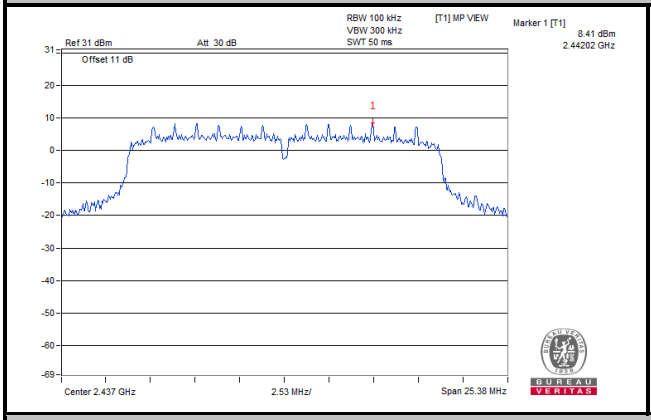
802.11n (HT20)

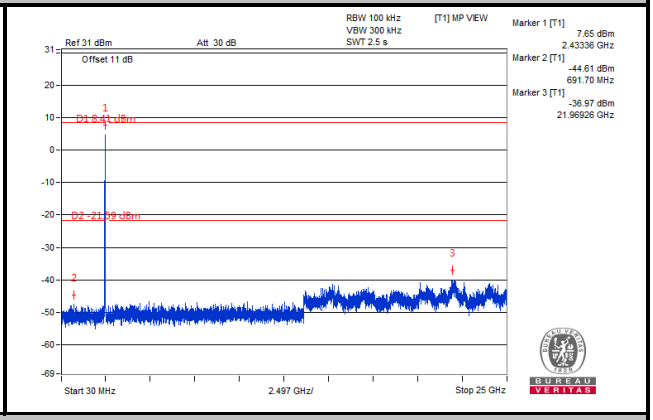
Ch 1



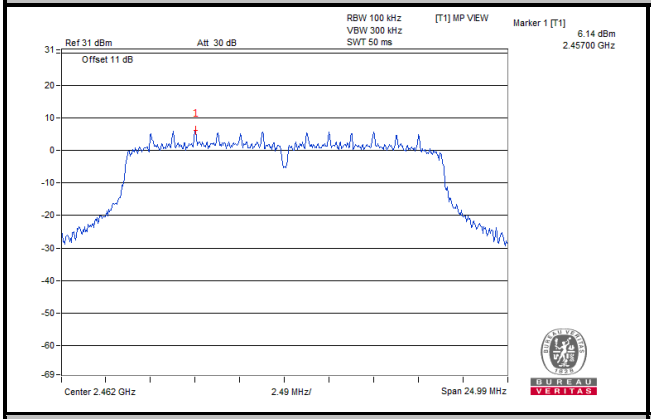


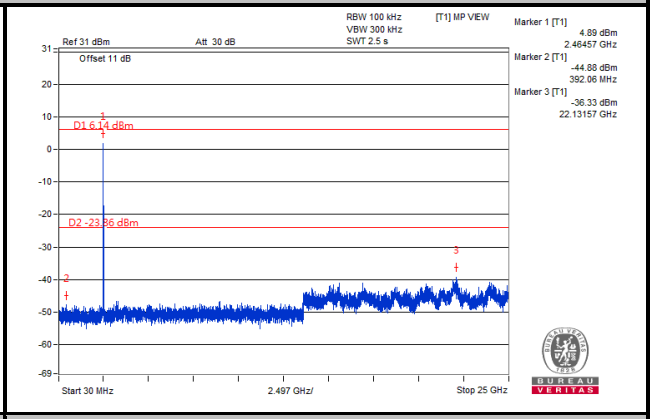
Ch 6



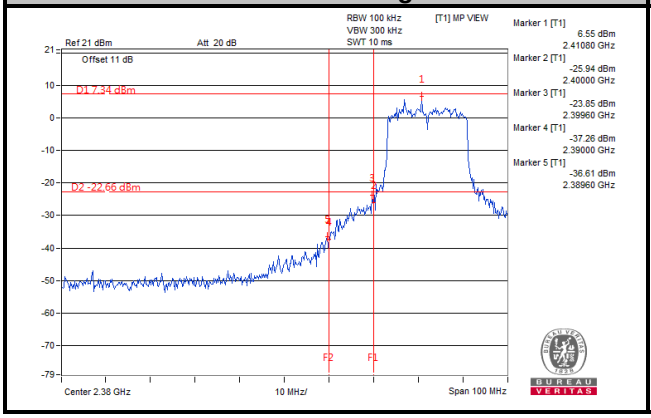


Ch 11

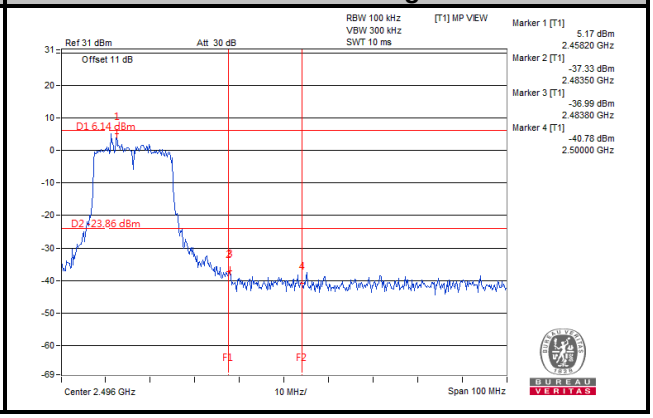




Ch 1 Band Edge



Ch 11 Band Edge



5 Pictures of Test Arrangements

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

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.

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