FCC Test Report (WLAN-15.247)

Report No.: RF150508E01

FCC ID: JNZVR0005

Test Model: V-R0005

Received Date: May 08, 2015

Test Date: June 04 to 11, 2015

Issued Date: July 13, 2015

Applicant: LOGITECH FAR EAST LTD.

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

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Test Location (2): No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.

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Release Control Record

Issue No.	Description	Date Issued
RF150508E01	Original release.	July 13, 2015

1 Certificate of Conformity

Product: Webcam

Brand: Logitech

Test Model: V-R0005

Sample Status: ENGINEERING SAMPLE

Applicant: LOGITECH FAR EAST LTD.

Test Date: June 04 to 11, 2015

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10: 2009

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

Prepared by : _____ , **Date:** July 13, 2015
Lori Chung / Specialist

Approved by : _____ , **Date:** July 13, 2015
May Chen / Manager

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 -15.51dB at 0.59141MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -3.0dB at 264.01MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	Pass	Meet the requirement of limit.
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: The EUT was operating in 2400 ~ 2483.5MHz, 5150~5250MHz and 5725~5850MHz frequencies band. This report was recorded the RF parameters including 2400 ~ 2483.5MHz. For the 5150~5250MHz and 5725~5850MHz RF parameters was recorded in another test report.

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	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.86 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.43 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.72 dB
	6GHz ~ 18GHz	4.00 dB
	18GHz ~ 40GHz	4.11 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT (WLAN)

Product	Webcam
Brand	Logitech
Test Model	V-R0005
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	5.1Vdc from power adapter or 3.7Vdc from battery
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 72.2Mbps
Operating Frequency	**For 15.407** 5.18 ~ 5.24GHz, 5.745 ~ 5.825GHz
	For 15.247 2.412 ~ 2.462GHz
Number of Channel	**For 15.407** 9 for 802.11a, 802.11n (HT20)
	For 15.247 11 for 802.11b, 802.11g, 802.11n (HT20)
Output Power	**For 15.407** 802.11a: 65.163mW 802.11n (HT20): 64.565mW
	For 15.247 802.11b: 191.867mW 802.11g: 224.388mW 802.11n (HT20): 231.206mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Data Cable Supplied	Charging ring (Unshielded, 3m)

Note:

1. The EUT may have a lot of colors for marketing requirement.
2. 2.4GHz WLAN, 5GHz WLAN and Bluetooth technology cannot transmit at same time.
3. The EUT incorporates a SISO function.

MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11a	6 ~ 54Mbps	1TX	1RX
802.11b	1 ~ 11Mbps	1TX	1RX
802.11g	6 ~ 54Mbps	1TX	1RX
802.11n (HT20)	MCS 0~7	1TX	1RX

4. The EUT must be supplied with a power adapter as following table:

Brand	Model No.	Spec.
logi	AD2063320	AC Input: 100-240V, 0.3A, 50/60Hz DC Output: 5.1V, 2.0A

5. The antennas provided to the EUT, please refer to the following table:

Antenna No.	Antenna Type	Antenna Gain (dBi)	Frequency range (GHz to GHz)	Connecter Type
1	PIFA	-0.26	2.4~2.4835	NA
		2.62	5.15~5.25	
		2.62	5.25~5.35	
		0.18	5.47~5.725	
		-2.98	5.725~5.85	

6. The EUT was pre-tested under following test modes :

Pre-test Mode	Power
Mode A	Power from Battery
Mode B	**Power from Power adapter**

From the above modes, the worst emission was found in **Mode B**. Therefore only the test data of the modes were recorded in this report.

7. The above EUT information is declared by manufacturer and for more detailed features description, please refer 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	Channel	Frequency
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz		

3.2.1 Test Mode Applicability and Tested Channel Detail

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

Where RE≥1G: Radiated Emission above 1GHz & Bandedge Measurement **RE<1G:** Radiated Emission below 1GHz

PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

Radiated Emission Test (Above 1GHz):

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

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5

Radiated Emission Test (Below 1GHz):

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

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5

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 and antenna ports (if EUT with antenna diversity architecture).

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n (HT20)	1 to 11	6	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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5

Test Condition:

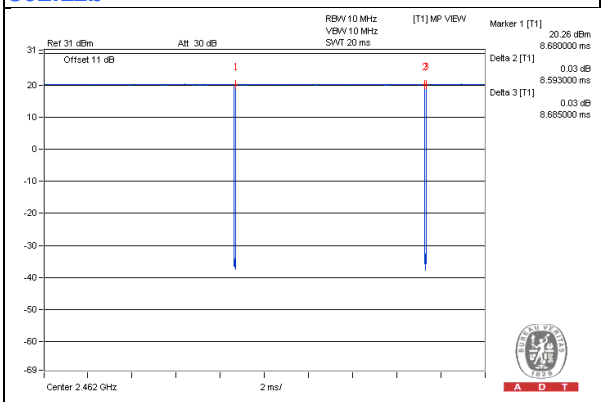
APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	22deg. C, 65%RH	120Vac, 60Hz	Robert Cheng
RE<1G	28deg. C, 73%RH	120Vac, 60Hz	Jason Huang
PLC	25deg. C, 54%RH	120Vac, 60Hz	Jyunchun Lin
APCM	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng

3.3 Duty Cycle of Test Signal

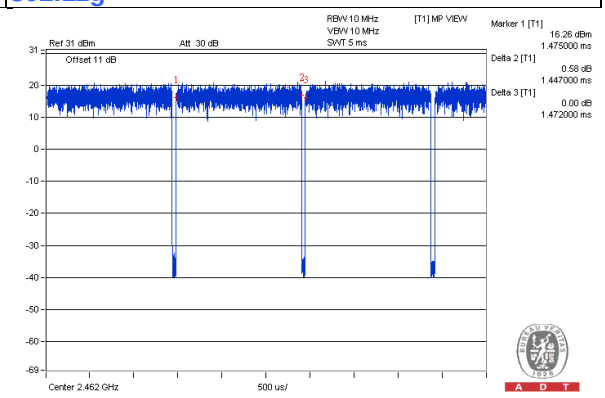
Duty cycle of test signal is ≥ 98 %, duty factor is not required.

802.11b: Duty cycle = 8.593 ms/8.685 ms = 0.989
802.11g: Duty cycle = 1.447 ms/1.472 ms = 0.983
802.11n (HT20): Duty cycle = 1.448 ms/1.474 ms = 0.982

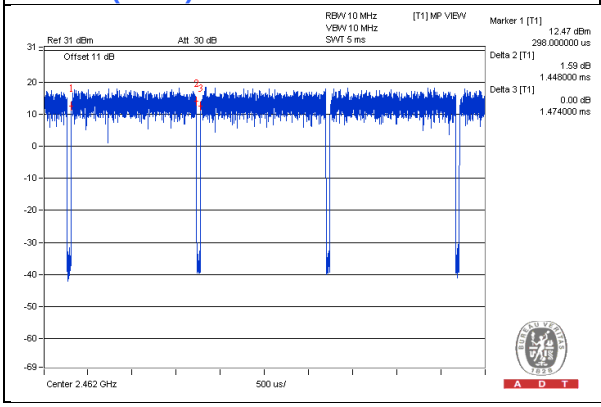
802.11b



802.11g



802.11n (HT20)

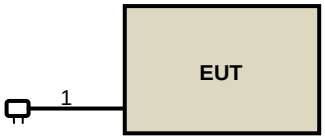


3.4 Description of Support Units

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.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
1	Charging ring	1	3	Yes	0	Supplied by Client

3.4.1 Configuration of System under Test



3.5 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 (15.247)
558074 D01 DTS Meas Guidance v03r02
ANSI C63.10-2009

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

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

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 20dB 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 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.

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	Aug. 11, 2014	Aug. 10, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-04	Nov. 12, 2014	Nov. 11, 2015
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Feb. 09, 2015	Feb. 08, 2016
RF Cable	8D-FB	CHHCAB-001-1 CHHCAB-001-2	Oct. 05, 2014	Oct. 04, 2015
	RF-141	CHHCAB-004	Oct. 05, 2014	Oct. 04, 2015
Horn_Antenna AISI	AIH.8018	0000220091110	Feb. 06, 2015	Feb. 05, 2016
Pre-Amplifier Agilent	8449B	3008A01923	Oct. 28, 2014	Oct. 27, 2015
RF Cable	NA	131206 131213 131215 SNMY23685/4	Jan. 16, 2015	Jan. 15, 2016
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Dec. 12, 2014	Dec. 11, 2015
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Feb. 05, 2015	Feb. 04, 2016
RF Cable	NA	329751/4 RF104-204	Dec. 11, 2014	Dec. 10, 2015
Software	ADT_Radiated_V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA
Power Meter Anritsu	ML2495A	1014008	Apr. 28, 2015	Apr. 27, 2016
Power Sensor Anritsu	MA2411B	0917122	Apr. 28, 2015	Apr. 27, 2016
SPECTRUM ANALYZER R&S	FSP 40	100060	May 08, 2015	May 07, 2016

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 966 Chamber No. H.
3. The FCC Site Registration No. is 797305.
4. The CANADA Site Registration No. is IC 7450H-3.
5. Tested Date: June 04 to 11, 2015

4.1.3 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 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 detect 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:

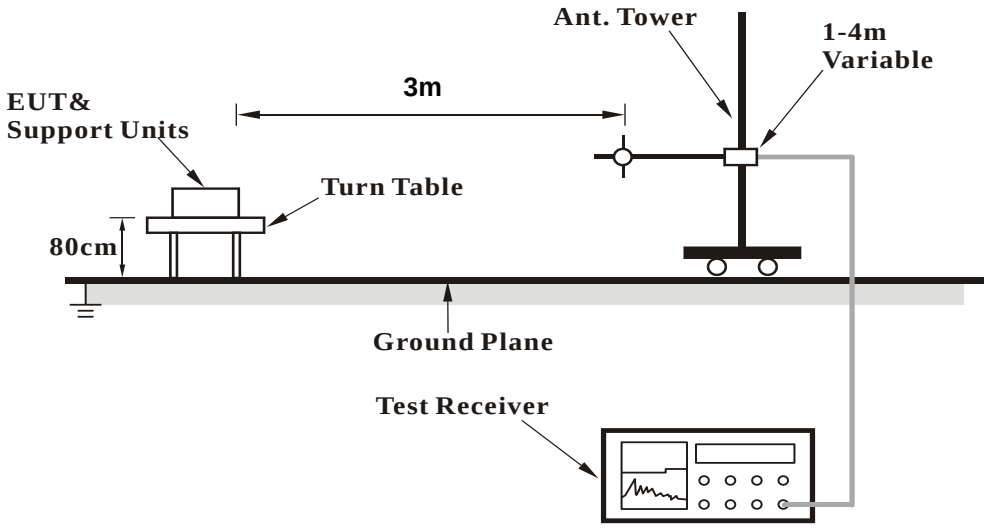
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (10 log(1/duty cycle)).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

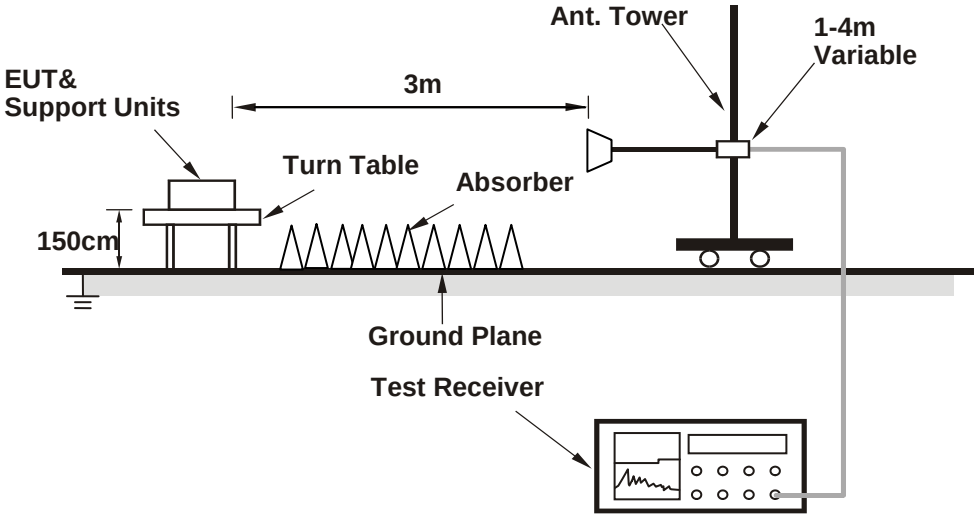
No deviation.

4.1.5 Test Setup

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

4.1.6 EUT Operating Conditions

1. Placed the EUT on testing table.
2. Controlling software (Console [paste11abgn Tx command.txt]) has been activated to set the EUT under transmission/receiving condition continuously.

4.1.7 Test Results

Above 1GHz 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								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2390.00	61.2 PK	74.0	-12.8	1.56 H	47	64.39	-3.19
2	2390.00	50.5 AV	54.0	-3.5	1.56 H	47	53.69	-3.19
3	*2412.00	107.6 PK			1.56 H	48	110.73	-3.13
4	*2412.00	104.7 AV			1.56 H	48	107.83	-3.13
5	4824.00	51.2 PK	74.0	-22.8	1.96 H	64	45.23	5.97
6	4824.00	43.3 AV	54.0	-10.7	1.96 H	64	37.33	5.97
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2390.00	59.6 PK	74.0	-14.4	1.60 V	163	62.79	-3.19
2	2390.00	48.3 AV	54.0	-5.7	1.60 V	163	51.49	-3.19
3	*2412.00	106.1 PK			1.60 V	163	109.23	-3.13
4	*2412.00	103.1 AV			1.60 V	163	106.23	-3.13
5	4824.00	51.4 PK	74.0	-22.6	1.06 V	293	45.43	5.97
6	4824.00	43.8 AV	54.0	-10.2	1.06 V	293	37.83	5.97

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	107.9 PK			1.49 H	47	110.94	-3.04
2	*2437.00	105.6 AV			1.49 H	47	108.64	-3.04
3	2483.50	56.2 PK	74.0	-17.8	1.49 H	47	59.07	-2.87
4	2483.50	46.5 AV	54.0	-7.5	1.49 H	47	49.37	-2.87
5	4874.00	51.2 PK	74.0	-22.8	1.98 H	80	45.15	6.05
6	4874.00	43.5 AV	54.0	-10.5	1.98 H	80	37.45	6.05
7	7311.00	51.9 PK	74.0	-22.1	1.55 H	96	40.96	10.94
8	7311.00	43.6 AV	54.0	-10.4	1.55 H	96	32.66	10.94
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	106.3 PK			1.60 V	163	109.34	-3.04
2	*2437.00	104.3 AV			1.60 V	163	107.34	-3.04
3	2483.50	54.1 PK	74.0	-19.9	1.60 V	163	56.97	-2.87
4	2483.50	44.3 AV	54.0	-9.7	1.60 V	163	47.17	-2.87
5	4874.00	51.4 PK	74.0	-22.6	1.06 V	301	45.35	6.05
6	4874.00	44.0 AV	54.0	-10.0	1.06 V	301	37.95	6.05
7	7311.00	54.3 PK	74.0	-19.7	1.00 V	266	43.36	10.94
8	7311.00	41.3 AV	54.0	-12.7	1.00 V	266	30.36	10.94

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	106.1 PK			1.56 H	48	109.04	-2.94
2	*2462.00	103.5 AV			1.56 H	48	106.44	-2.94
3	2483.50	60.1 PK	74.0	-13.9	1.56 H	48	62.97	-2.87
4	2483.50	50.9 AV	54.0	-3.1	1.56 H	48	53.77	-2.87
5	4924.00	51.3 PK	74.0	-22.7	1.99 H	85	45.23	6.07
6	4924.00	43.4 AV	54.0	-10.6	1.99 H	85	37.33	6.07
7	7386.00	51.5 PK	74.0	-22.5	1.57 H	87	40.08	11.42
8	7386.00	43.2 AV	54.0	-10.8	1.57 H	87	31.78	11.42
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	104.4 PK			1.60 V	163	107.34	-2.94
2	*2462.00	102.1 AV			1.60 V	163	105.04	-2.94
3	2483.50	58.4 PK	74.0	-15.6	1.60 V	163	61.27	-2.87
4	2483.50	48.7 AV	54.0	-5.3	1.60 V	163	51.57	-2.87
5	4924.00	51.8 PK	74.0	-22.2	1.00 V	316	45.73	6.07
6	4924.00	44.2 AV	54.0	-9.8	1.00 V	316	38.13	6.07
7	7386.00	54.1 PK	74.0	-19.9	1.00 V	254	42.68	11.42
8	7386.00	41.4 AV	54.0	-12.6	1.00 V	254	29.98	11.42

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	67.9 PK	74.0	-6.1	1.57 H	47	71.09	-3.19
2	2390.00	50.8 AV	54.0	-3.2	1.57 H	47	53.99	-3.19
3	*2412.00	108.2 PK			1.57 H	47	111.33	-3.13
4	*2412.00	95.5 AV			1.57 H	47	98.63	-3.13
5	4824.00	48.1 PK	74.0	-25.9	1.02 H	220	42.13	5.97
6	4824.00	37.7 AV	54.0	-16.3	1.02 H	220	31.73	5.97
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	65.7 PK	74.0	-8.3	1.62 V	150	68.89	-3.19
2	2390.00	48.8 AV	54.0	-5.2	1.62 V	150	51.99	-3.19
3	*2412.00	105.1 PK			1.62 V	150	108.23	-3.13
4	*2412.00	94.0 AV			1.62 V	150	97.13	-3.13
5	4824.00	48.8 PK	74.0	-25.2	1.03 V	316	42.83	5.97
6	4824.00	37.2 AV	54.0	-16.8	1.03 V	316	31.23	5.97

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.8 PK	74.0	-10.2	1.61 H	50	66.99	-3.19
2	2390.00	47.5 AV	54.0	-6.5	1.61 H	50	50.69	-3.19
3	*2437.00	110.6 PK			1.61 H	50	113.64	-3.04
4	*2437.00	99.2 AV			1.61 H	50	102.24	-3.04
5	2483.50	64.1 PK	74.0	-9.9	1.61 H	50	66.97	-2.87
6	2483.50	48.5 AV	54.0	-5.5	1.61 H	50	51.37	-2.87
7	4874.00	48.1 PK	74.0	-25.9	1.02 H	220	42.05	6.05
8	4874.00	37.7 AV	54.0	-16.3	1.02 H	220	31.65	6.05
9	7311.00	54.2 PK	74.0	-19.8	1.26 H	77	43.26	10.94
10	7311.00	43.9 AV	54.0	-10.1	1.26 H	77	32.96	10.94
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	61.4 PK	74.0	-12.6	1.60 V	163	64.59	-3.19
2	2390.00	45.6 AV	54.0	-8.4	1.60 V	163	48.79	-3.19
3	*2437.00	108.9 PK			1.60 V	163	111.94	-3.04
4	*2437.00	97.7 AV			1.60 V	163	100.74	-3.04
5	2483.50	62.4 PK	74.0	-11.6	1.60 V	163	65.27	-2.87
6	2483.50	46.7 AV	54.0	-7.3	1.60 V	163	49.57	-2.87
7	4874.00	48.8 PK	74.0	-25.2	1.03 V	316	42.75	6.05
8	4874.00	37.2 AV	54.0	-16.8	1.03 V	316	31.15	6.05
9	7311.00	54.6 PK	74.0	-19.4	1.01 V	91	43.66	10.94
10	7311.00	42.6 AV	54.0	-11.4	1.01 V	91	31.66	10.94

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	106.1 PK			1.56 H	55	109.04	-2.94
2	*2462.00	95.1 AV			1.56 H	55	98.04	-2.94
3	2483.50	68.7 PK	74.0	-5.3	1.56 H	55	71.57	-2.87
4	2483.50	50.6 AV	54.0	-3.4	1.56 H	55	53.47	-2.87
5	4924.00	48.1 PK	74.0	-25.9	1.02 H	220	42.03	6.07
6	4924.00	37.7 AV	54.0	-16.3	1.02 H	220	31.63	6.07
7	7386.00	54.2 PK	74.0	-19.8	1.26 H	77	42.78	11.42
8	7386.00	43.9 AV	54.0	-10.1	1.26 H	77	32.48	11.42
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	104.6 PK			1.60 V	163	107.54	-2.94
2	*2462.00	93.7 AV			1.60 V	163	96.64	-2.94
3	2483.50	58.8 PK	74.0	-15.2	1.60 V	163	61.67	-2.87
4	2483.50	48.9 AV	54.0	-5.1	1.60 V	163	51.77	-2.87
5	4924.00	48.8 PK	74.0	-25.2	1.03 V	316	42.73	6.07
6	4924.00	37.2 AV	54.0	-16.8	1.03 V	316	31.13	6.07
7	7386.00	54.6 PK	74.0	-19.4	1.01 V	91	43.18	11.42
8	7386.00	42.6 AV	54.0	-11.4	1.01 V	91	31.18	11.42

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	70.1 PK	74.0	-3.9	1.51 H	52	73.29	-3.19
2	2390.00	49.7 AV	54.0	-4.3	1.51 H	52	52.89	-3.19
3	*2412.00	105.1 PK			1.51 H	52	108.23	-3.13
4	*2412.00	93.8 AV			1.51 H	52	96.93	-3.13
5	4824.00	48.1 PK	74.0	-25.9	1.02 H	220	42.13	5.97
6	4824.00	37.7 AV	54.0	-16.3	1.02 H	220	31.73	5.97
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	68.2 PK	74.0	-5.8	1.60 V	163	71.39	-3.19
2	2390.00	48.3 AV	54.0	-5.7	1.60 V	163	51.49	-3.19
3	*2412.00	103.5 PK			1.60 V	163	106.63	-3.13
4	*2412.00	92.3 AV			1.60 V	163	95.43	-3.13
5	4824.00	48.8 PK	74.0	-25.2	1.03 V	316	42.83	5.97
6	4824.00	37.2 AV	54.0	-16.8	1.03 V	316	31.23	5.97

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.4 PK	74.0	-10.6	1.57 H	41	66.59	-3.19
2	2390.00	47.2 AV	54.0	-6.8	1.57 H	41	50.39	-3.19
3	*2437.00	109.8 PK			1.61 H	52	112.84	-3.04
4	*2437.00	99.4 AV			1.61 H	52	102.44	-3.04
5	2483.50	64.0 PK	74.0	-10.0	1.60 H	51	66.87	-2.87
6	2483.50	48.6 AV	54.0	-5.4	1.60 H	51	51.47	-2.87
7	4874.00	48.1 PK	74.0	-25.9	1.02 H	220	42.05	6.05
8	4874.00	37.7 AV	54.0	-16.3	1.02 H	220	31.65	6.05
9	7311.00	54.2 PK	74.0	-19.8	1.26 H	77	43.26	10.94
10	7311.00	43.9 AV	54.0	-10.1	1.26 H	77	32.96	10.94
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	61.4 PK	74.0	-12.6	1.60 V	163	64.59	-3.19
2	2390.00	46.1 AV	54.0	-7.9	1.60 V	163	49.29	-3.19
3	*2437.00	108.1 PK			1.60 V	163	111.14	-3.04
4	*2437.00	97.8 AV			1.60 V	163	100.84	-3.04
5	2483.50	63.1 PK	74.0	-10.9	1.60 V	163	65.97	-2.87
6	2483.50	47.5 AV	54.0	-6.5	1.60 V	163	50.37	-2.87
7	4874.00	48.8 PK	74.0	-25.2	1.03 V	316	42.75	6.05
8	4874.00	37.2 AV	54.0	-16.8	1.03 V	316	31.15	6.05
9	7311.00	54.6 PK	74.0	-19.4	1.01 V	91	43.66	10.94
10	7311.00	42.6 AV	54.0	-11.4	1.01 V	91	31.66	10.94

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	105.8 PK			1.56 H	53	108.74	-2.94
2	*2462.00	94.3 AV			1.56 H	53	97.24	-2.94
3	2483.50	70.4 PK	74.0	-3.6	1.56 H	53	73.27	-2.87
4	2483.50	50.2 AV	54.0	-3.8	1.56 H	53	53.07	-2.87
5	4924.00	48.1 PK	74.0	-25.9	1.02 H	220	42.03	6.07
6	4924.00	37.7 AV	54.0	-16.3	1.02 H	220	31.63	6.07
7	7386.00	54.2 PK	74.0	-19.8	1.26 H	77	42.78	11.42
8	7386.00	43.9 AV	54.0	-10.1	1.26 H	77	32.48	11.42
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	104.1 PK			1.60 V	163	107.04	-2.94
2	*2462.00	92.7 AV			1.60 V	163	95.64	-2.94
3	2483.50	58.1 PK	74.0	-15.9	1.60 V	163	60.97	-2.87
4	2483.50	48.5 AV	54.0	-5.5	1.60 V	163	51.37	-2.87
5	4924.00	48.8 PK	74.0	-25.2	1.03 V	316	42.73	6.07
6	4924.00	37.2 AV	54.0	-16.8	1.03 V	316	31.13	6.07
7	7386.00	54.6 PK	74.0	-19.4	1.01 V	91	43.18	11.42
8	7386.00	42.6 AV	54.0	-11.4	1.01 V	91	31.18	11.42

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

Below 1GHz Data:

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CHANNEL	TX Channel 6	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	Below 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	143.98	31.6 QP	43.5	-11.9	1.50 H	193	44.59	-12.98
2	166.29	33.8 QP	43.5	-9.7	1.50 H	266	47.05	-13.23
3	198.00	36.1 QP	43.5	-7.4	1.00 H	93	52.11	-16.03
4	240.01	38.9 QP	46.0	-7.1	1.50 H	70	52.99	-14.06
5	**264.01**	**43.0 QP**	**46.0**	**-3.0**	**1.00 H**	**360**	**56.45**	**-13.45**
6	770.01	41.1 QP	46.0	-4.9	1.00 H	360	43.01	-1.95
7	898.49	40.4 QP	46.0	-5.6	1.50 H	209	40.23	0.14
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	61.38	34.0 QP	40.0	-6.0	1.00 V	312	48.18	-14.21
2	240.01	41.7 QP	46.0	-4.3	1.00 V	108	55.80	-14.06
3	264.01	37.2 QP	46.0	-8.8	1.00 V	269	50.65	-13.45
4	330.02	40.6 QP	46.0	-5.4	1.50 V	310	51.41	-10.79
5	432.02	33.6 QP	46.0	-12.5	1.00 V	357	41.95	-8.40
6	857.99	38.5 QP	46.0	-7.5	1.00 V	297	39.16	-0.62

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

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 0.50MHz.

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	100375	May 06, 2015	May 05, 2016
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Sep. 15, 2014	Sep. 14, 2015
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100071	Nov. 10, 2014	Nov. 09, 2015
RF Cable	5D-FB	COCCAB-001	Mar. 09, 2015	Mar. 08, 2016
50 ohms Terminator	N/A	EMC-03	Sep. 22, 2014	Sep. 21, 2015
50 ohms Terminator	N/A	EMC-02	Sep. 30, 2014	Sep. 29, 2015
Software BVADT	BVADT_Cond_ V7.3.7.3	NA	NA	NA

Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3 The VCCI Con C Registration No. is C-3611.
4 Tested Date: June 08, 2015

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/ 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.

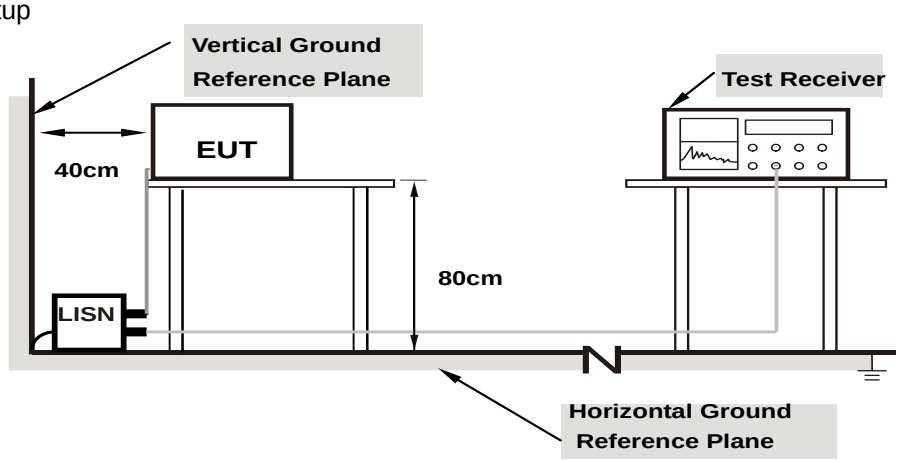
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

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

Same as 4.1.6.

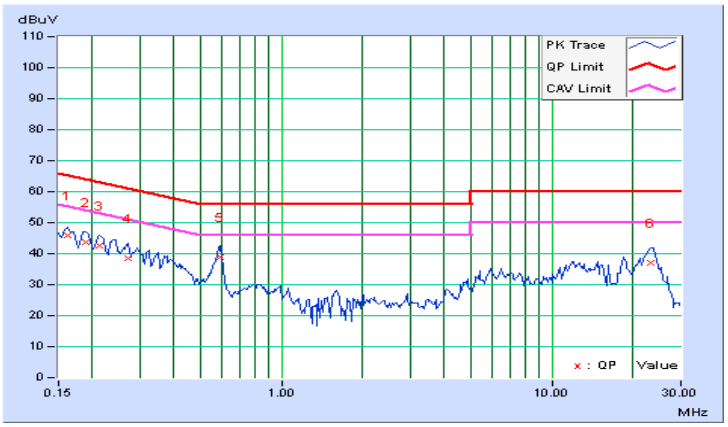
4.2.7 Test Results

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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	0.14	45.86	32.35	46.00	32.49	65.38	55.38	-19.37	-22.88
2	0.18906	0.15	43.69	31.68	43.84	31.83	64.08	54.08	-20.24	-22.25
3	0.21250	0.15	42.55	30.56	42.70	30.71	63.11	53.11	-20.41	-22.40
4	0.27109	0.16	38.32	27.59	38.48	27.75	61.08	51.08	-22.61	-23.34
5	**0.59141**	**0.18**	**38.57**	**30.31**	**38.75**	**30.49**	**56.00**	**46.00**	**-17.25**	**-15.51**
6	23.23047	1.23	35.70	28.01	36.93	29.24	60.00	50.00	-23.07	-20.76

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

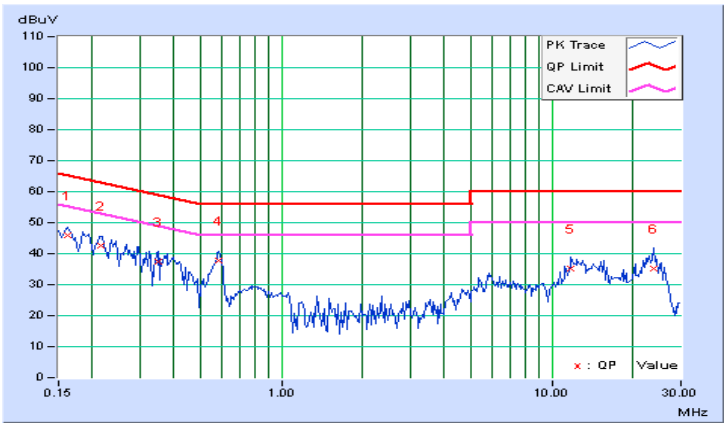


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	0.14	45.92	31.86	46.06	32.00	65.38	55.38	-19.31	-23.37
2	0.21453	0.15	42.45	29.85	42.60	30.00	63.03	53.03	-20.43	-23.03
3	0.34922	0.18	37.16	24.53	37.34	24.71	58.98	48.98	-21.64	-24.27
4	0.58750	0.21	37.62	28.74	37.83	28.95	56.00	46.00	-18.17	-17.05
5	11.75000	0.87	34.16	24.11	35.03	24.98	60.00	50.00	-24.97	-25.02
6	23.70313	1.34	33.76	24.15	35.10	25.49	60.00	50.00	-24.90	-24.51

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

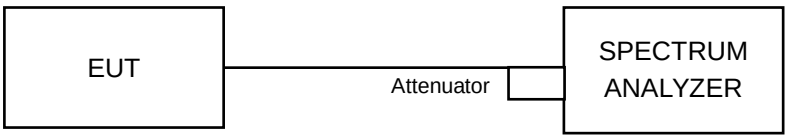


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB 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) = 100kHz
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 fromTest 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 Result

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	7.60	0.5	Pass
6	2437	8.54	0.5	Pass
11	2462	8.06	0.5	Pass

802.11g

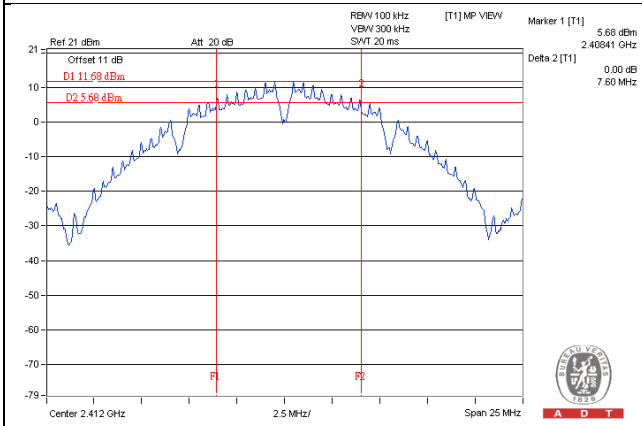
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	15.18	0.5	Pass
6	2437	15.19	0.5	Pass
11	2462	15.14	0.5	Pass

802.11n (HT20)

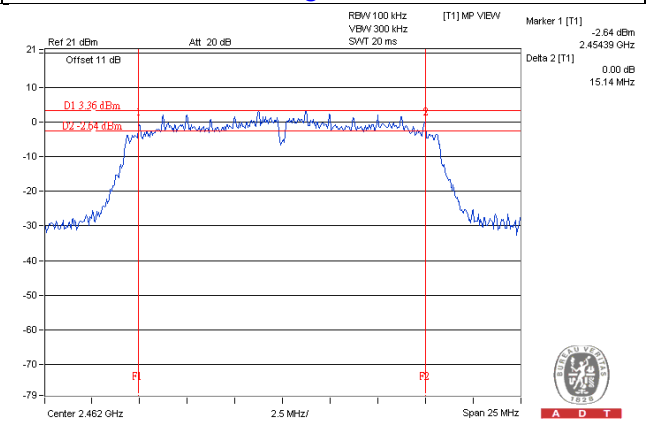
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	15.17	0.5	Pass
6	2437	15.17	0.5	Pass
11	2462	15.18	0.5	Pass

Spectrum Plot of Worst Value

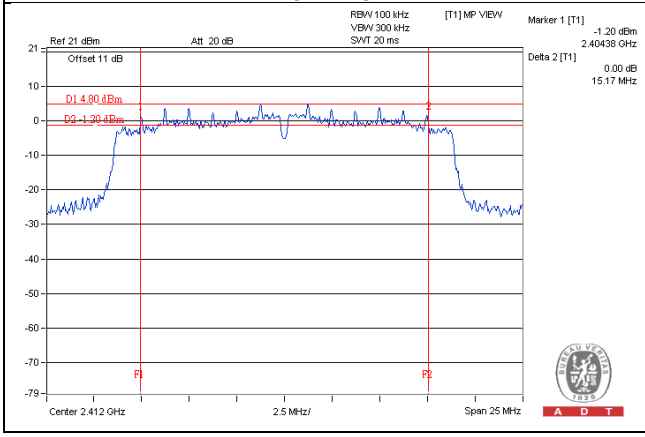
802.11b – CH 1



802.11g – CH 11



802.11n (HT20) – CH 1

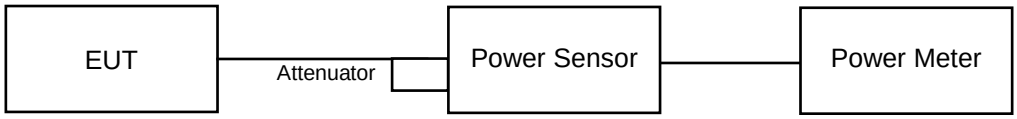


4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

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

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

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

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

For Peak Power

802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	180.302	22.56	30	Pass
6	2437	191.867	22.83	30	Pass
11	2462	131.22	21.18	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	175.388	22.44	30	Pass
6	2437	224.388	23.51	30	Pass
11	2462	142.233	21.53	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	167.109	22.23	30	Pass
6	2437	231.206	23.64	30	Pass
11	2462	144.877	21.61	30	Pass

For Average Power

802.11b

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	106.170	20.26
6	2437	113.501	20.55
11	2462	69.984	18.45

802.11g

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	41.210	16.15
6	2437	97.949	19.91
11	2462	29.992	14.77

802.11n (HT20)

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	36.224	15.59
6	2437	97.724	19.90
11	2462	23.335	13.68

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

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 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.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

802.11b

Channel	Freq. (MHz)	PSD (dBm)	Limit (dBm)	Pass /Fail
1	2412	-2.54	8	Pass
6	2437	-2.56	8	Pass
11	2462	-3.35	8	Pass

802.11g

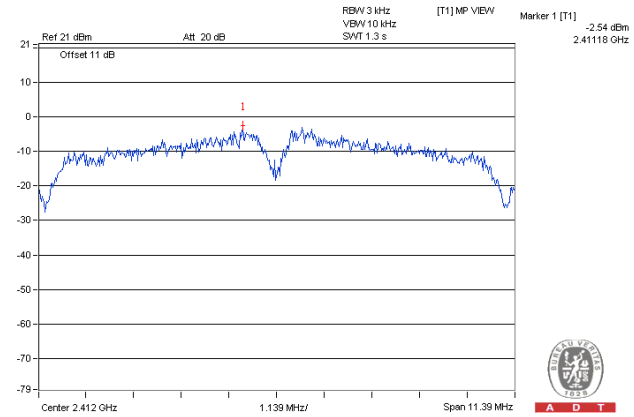
Channel	Freq. (MHz)	PSD (dBm)	Limit (dBm)	Pass /Fail
1	2412	-8.99	8	Pass
6	2437	-5.08	8	Pass
11	2462	-11.29	8	Pass

802.11n (HT20)

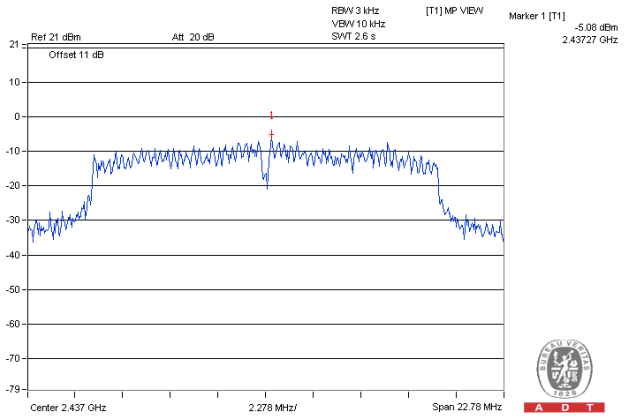
Channel	Freq. (MHz)	PSD (dBm)	Limit (dBm)	Pass /Fail
1	2412	-10.03	8	Pass
6	2437	-5.90	8	Pass
11	2462	-12.97	8	Pass

Spectrum Plot of Worst Value

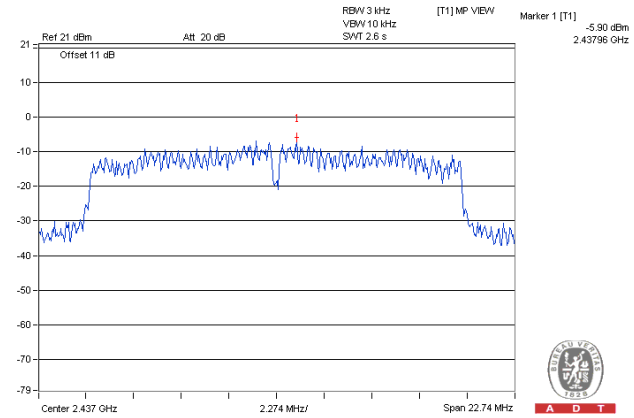
802.11b – CH 1



802.11g – CH 6



802.11n (HT20) - 6

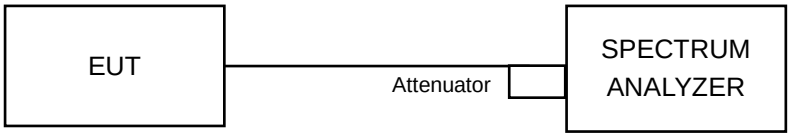


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted 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 4.1.2 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. 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.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

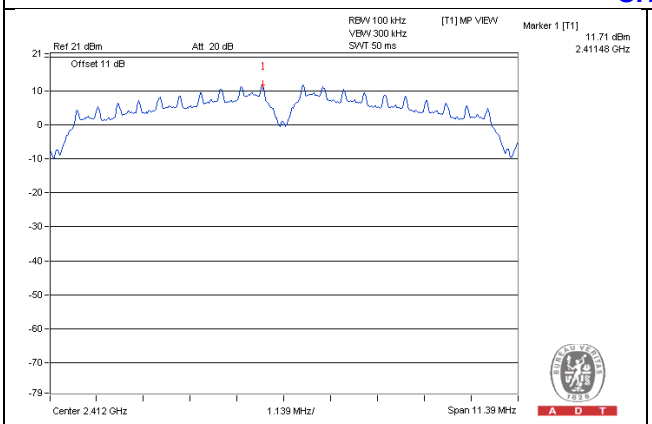
Same as Item 4.3.6

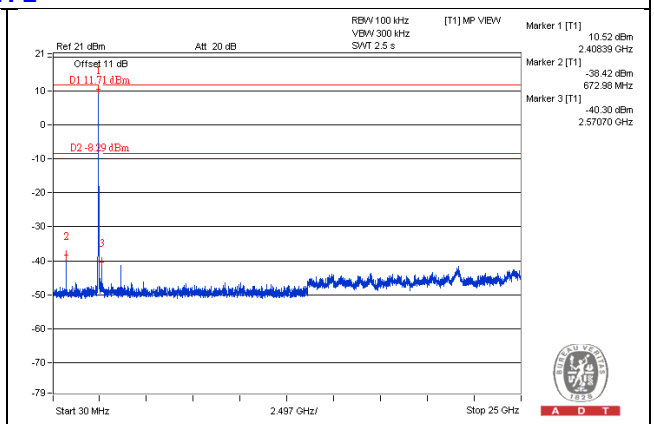
4.6.7 Test Results

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

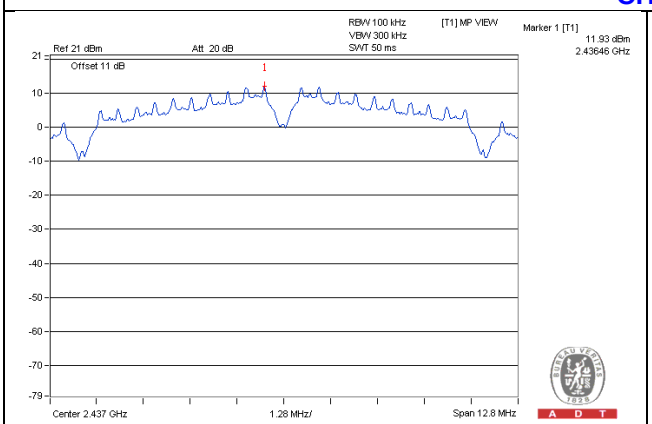
802.11b

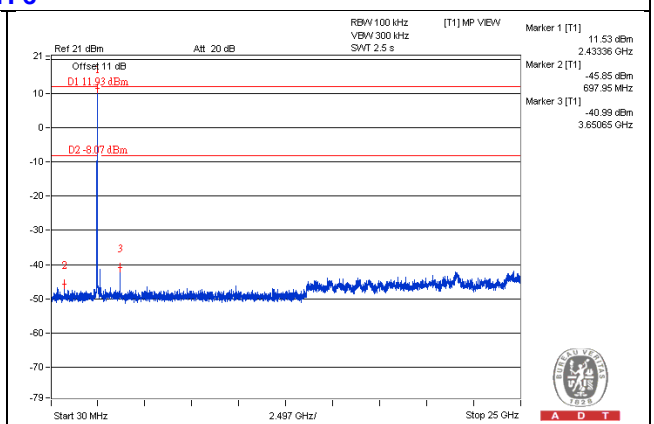
CH 1



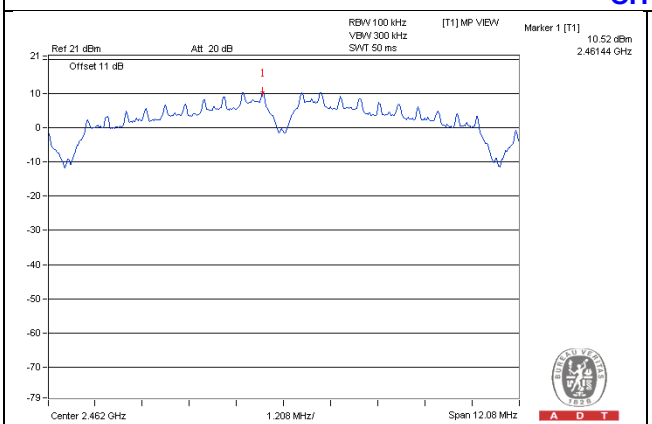


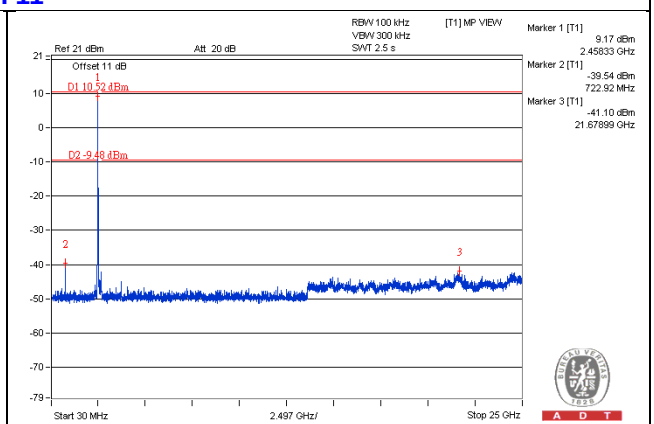
CH 6



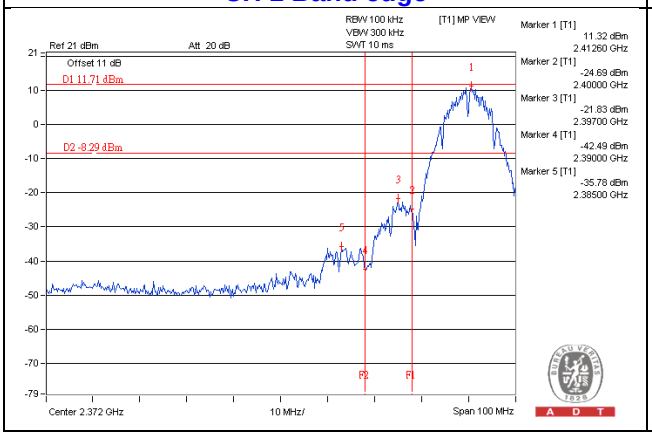


CH 11

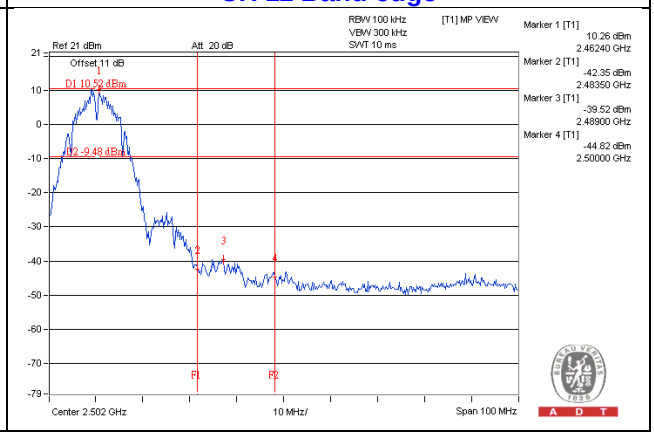




CH 1 Band edge

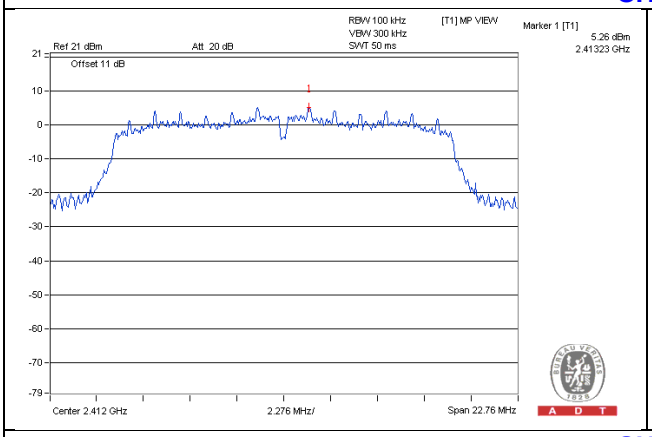


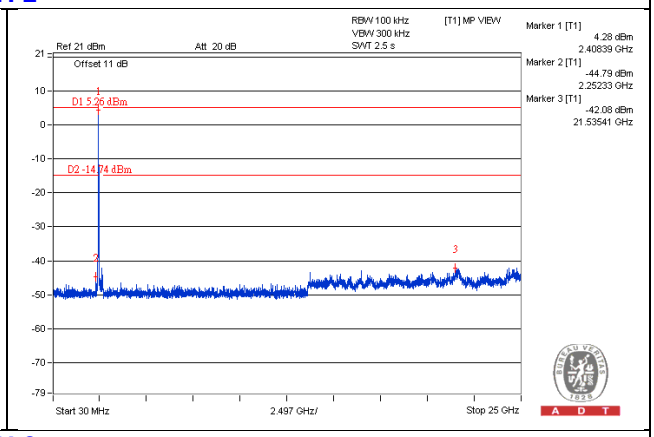
CH 11 Band edge



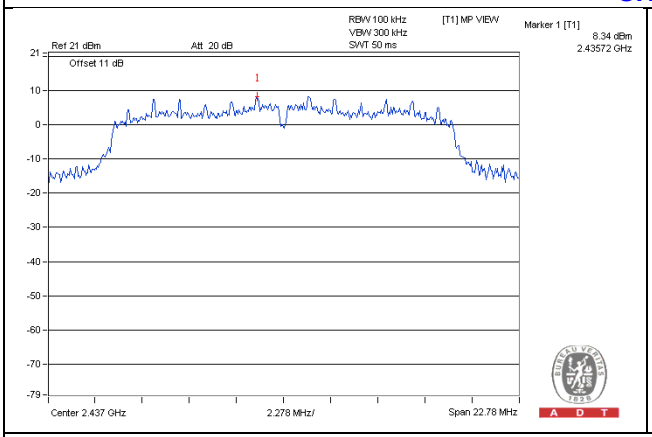
802.11g

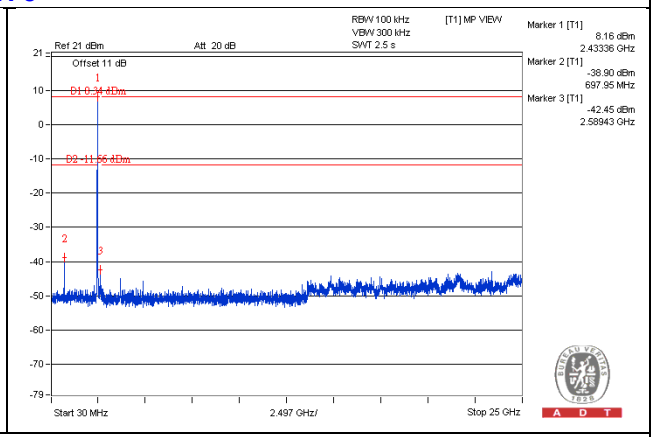
CH 1



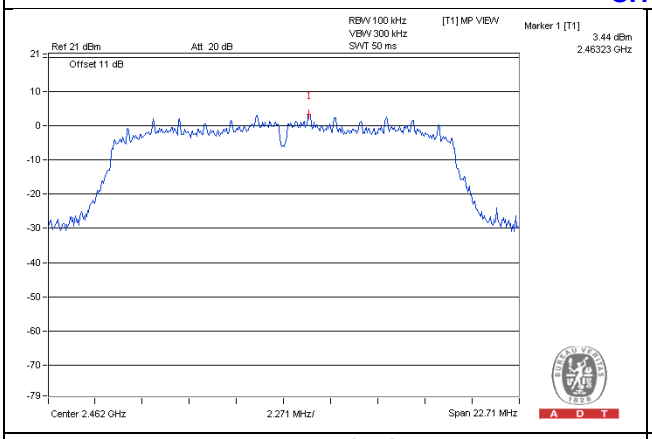


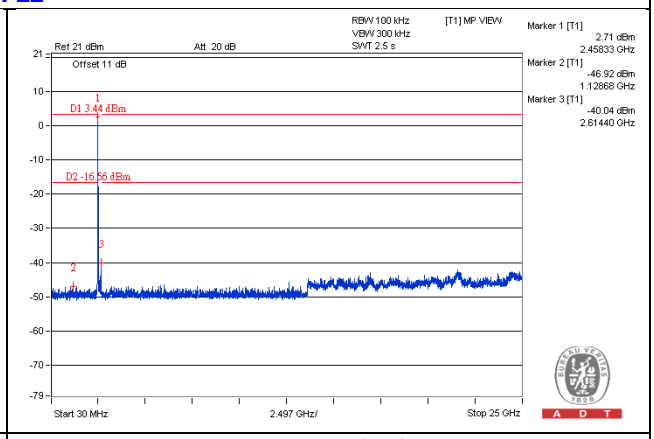
CH 6



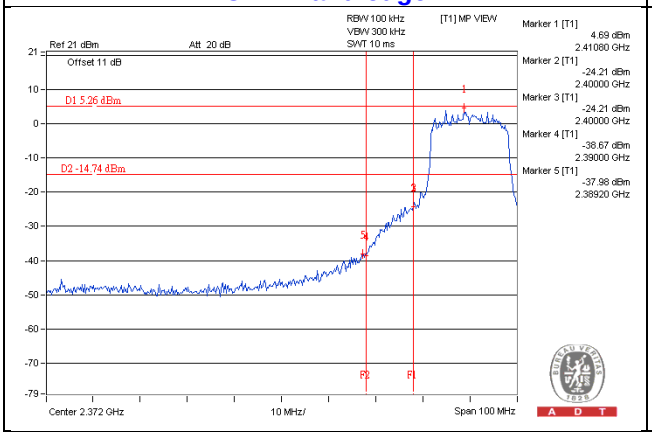


CH 11

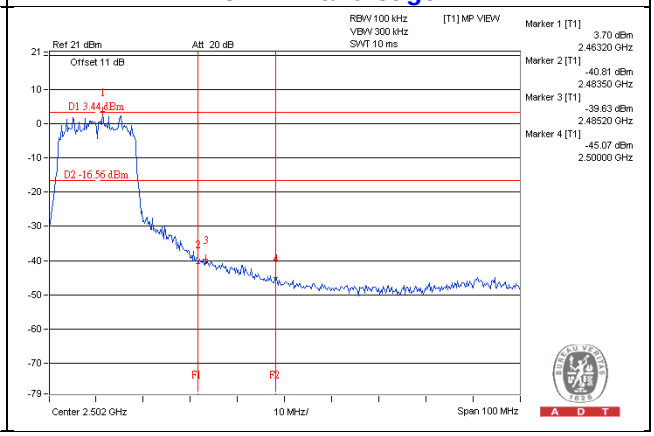




CH 1 Band edge

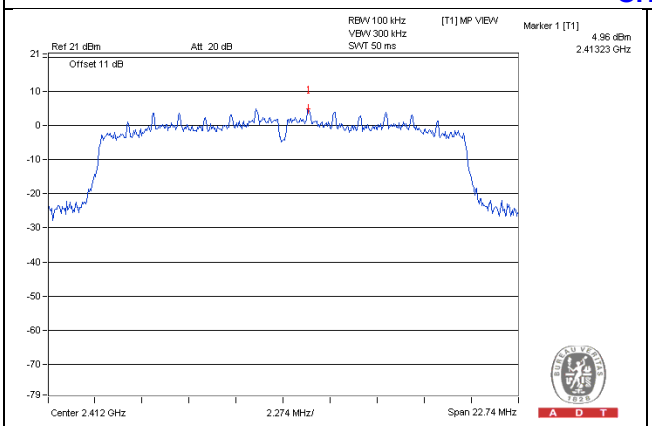


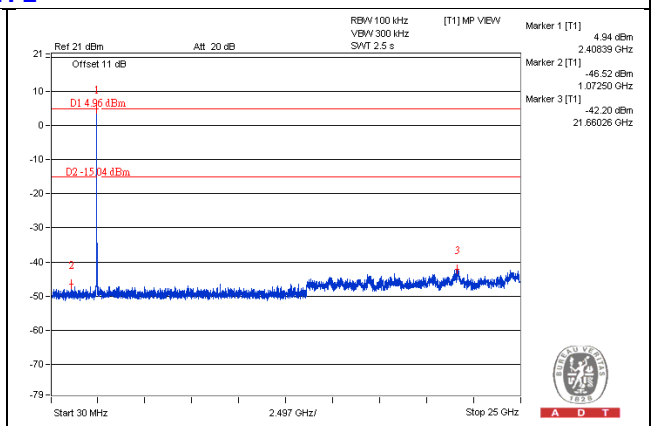
CH 11 Band edge



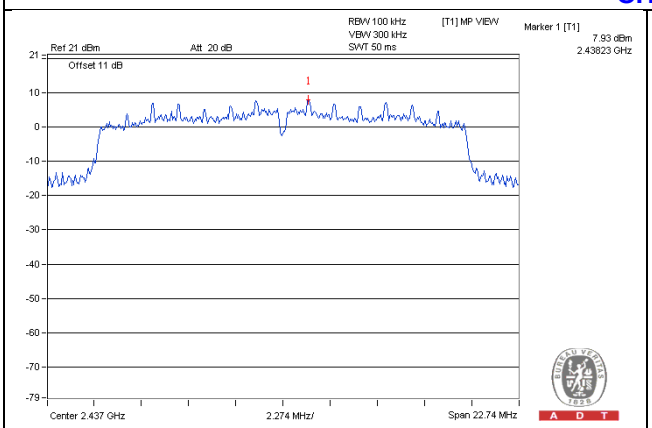
802.11n (HT20)

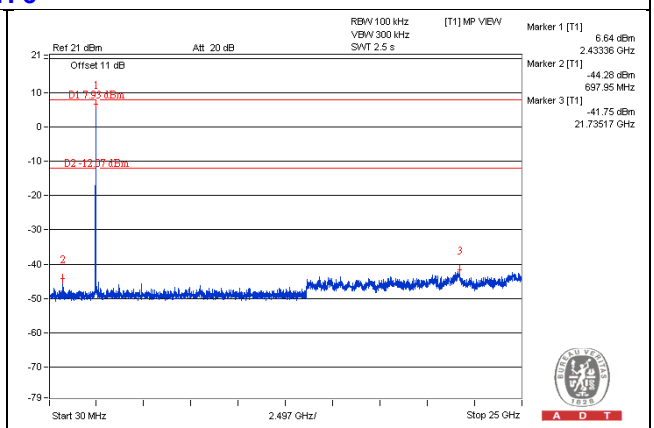
CH 1



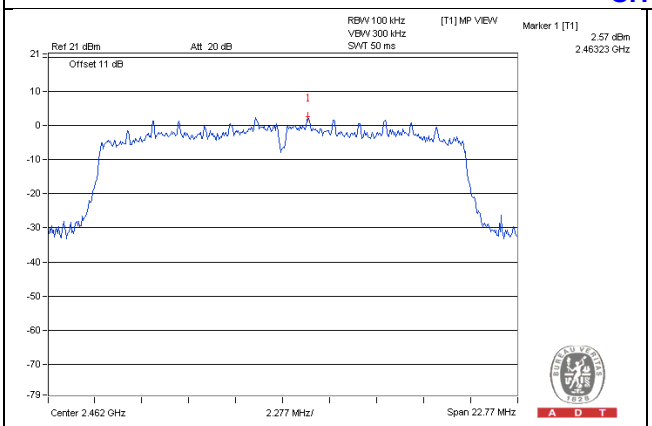


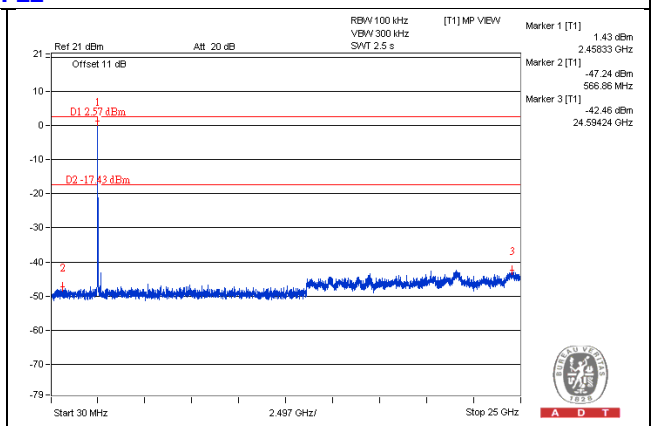
CH 6



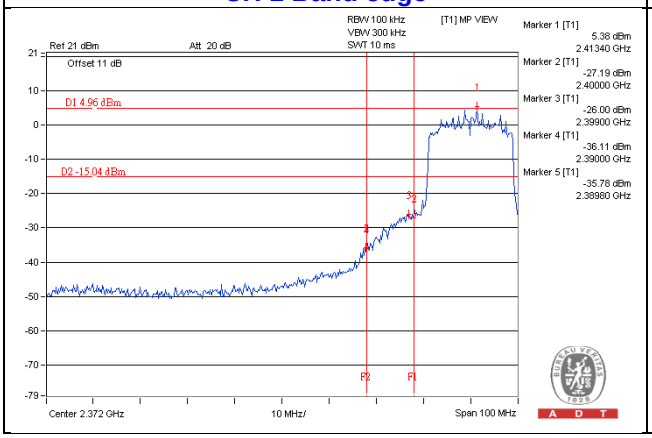


CH 11

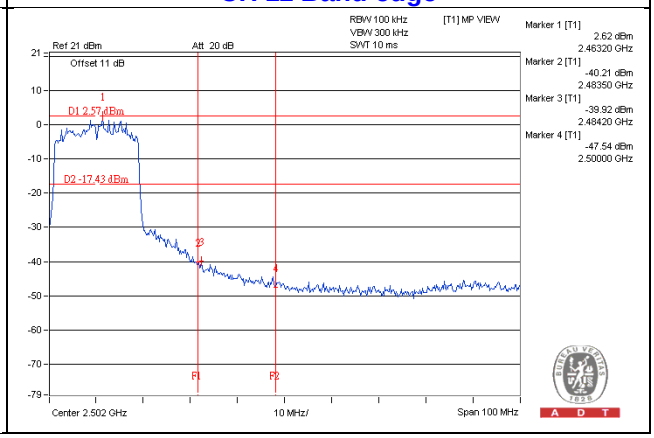




CH 1 Band edge



CH 11 Band edge



5 Pictures of Test Arrangements

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

Appendix – Information on 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 accredited and approved according to ISO/IEC 17025.

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

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Web Site: www.bureauveritas-adt.com

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

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