

FCC Test Report

Report No.: RF190627E03 R1

FCC ID: 2APLE18300400

Test Model: VMC4040P

PCBA Rev: Main BD: v105 version
Sensor BD: v045 version

Received Date: June 27, 2019

Test Date: July 12 to Aug. 06, 2019

Issued Date: Aug. 23, 2019

Applicant: Arlo Technologies, Inc.

Address: 2200 Faraday Ave. Suite 150, Carlsbad, CA 92008

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

Lab Address: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan R.O.C.

Test Location: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan R.O.C.

**FCC Registration /
Designation Number:** 723255 / TW2022



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Release Control Record

Issue No.	Description	Date Issued
RF190627E03	Original release.	Aug. 16, 2019
RF190627E03 R1	Revised PCBA version.	Aug. 23, 2019

1 Certificate of Conformity

Product: arlo Pro 3
Brand: Arlo
Test Model: VMC4040P
PCBA Rev: Main BD: v105 version
Sensor BD: v045 version
Sample Status: Pre Production units
Applicant: Arlo Technologies, Inc.
Test Date: July 12 to Aug. 06, 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 EMC characteristics under the conditions specified in this report.

Prepared by : Wendy Wu , **Date:** Aug. 23, 2019
Wendy Wu / Specialist

Approved by : May Chen , **Date:** Aug. 23, 2019
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 -14.03dB at 0.54844MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 2390.00MHz.
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:

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	150kHz ~ 30MHz	1.8 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	4.9 dB
	1GHz ~6GHz	5.1 dB
Radiated Emissions above 1 GHz	6GHz ~ 18GHz	4.9 dB
	18GHz ~ 40GHz	5.2 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	arlo Pro 3
Brand	Arlo
Test Model	VMC4040P
PCBA Rev	Main BD: v105 version Sensor BD: v045 version
S/N	A091957TA013F
Status of EUT	Pre Production units
Power Supply Rating	5Vdc or 9Vdc from power adapter or 3.85V 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 802.11g: up to 54Mbps 802.11n: up to 72.2Mbps
Operating Frequency	2.412 ~ 2.462GHz
Number of Channel	802.11b, 802.11g, 802.11n (HT20): 11
Output Power	304.089mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1 Wall Mount (Brand: arlo, Black or White) x 1
Cable Supplied	3ft indoor white cable (Unshielded, 0.85m) x 1 8ft indoor white cable (Unshielded, 2.45m) x 1

Note:

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

Transmitter Circuit	Antenna Net Gain(dBi)	Frequency range (GHz to GHz)	Antenna Type	Connector Type
Chain (0) Main	2.0	2.4~2.4835	Monopole	NA
Chain (1) Secondary	3.0	2.4~2.4835	Monopole	NA

Note: Max. gain was selected for the final test.

2. The EUT must be supplied with a power adapter or battery and following different models could be chosen as following table:

Adapter			
No	Brand Name	Model No.	Spec.
1	Arlo	AD2037320	Input: 100-240Vac, 50/60Hz, 0.3A Output: 5Vdc, 2.0A
2	Arlo	2ADB010B NJ	Input: 100-240Vac, 50/60Hz, 0.3A Output: 5Vdc, 2.0A
3	Arlo	AD2151320	Input: 100-240Vac, 50/60Hz, 0.3A Output: 9Vdc, 2.0A DC Output cable: 7.6m
Battery			
No	Brand Name	Model No.	Rating
1	Arlo	A-4a	3.85V, 4800mAh, 18.48Wh

3. For AC power conducted emissions, the EUT was pre-tested under the following modes:

Test Mode	Description
Mode A	Power from adapter 1 with 3ft cable
Mode B	Power from adapter 1 with 8ft cable
Mode C	Power from adapter 2 with 8ft cable
Mode D	Power from adapter 3 with fixed cable: 7.6m
Note: From the above modes, the worst case was found in Mode B . Therefore only the test data of the mode was recorded in this report.	

4. For radiated emissions, the EUT was pre-tested under the following modes:

Test Mode	Description
Mode A	Power from adapter 1 with 3ft cable
Mode B	Power from adapter 1 with 8ft cable
Mode C	Power from adapter 2 with 8ft cable
Mode D	Power from adapter 3 with fixed cable: 7.6m
Mode E	Power from Battery
Note: From the above modes, the worst case was found in Mode B . Therefore only the test data of the mode was recorded in this report.	

5. The EUT incorporates a SISO function.

Modulation Mode	TX & RX CONFIGURATION	
802.11b	1TX diversity	1RX
802.11g	1TX diversity	1RX
802.11n (HT20)	1TX diversity	1RX

6. 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	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 $\geq$ 1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE $\geq$ 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 on Y-plane (for below 1GHz) and X-plane (for above 1GHz).

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)
802.11b	1 to 11	6	DSSS	DBPSK	1

Power Line Conducted Emission Test:

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	6	DSSS	DBPSK	1

Antenna Port Conducted Measurement:

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	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 $\geq$ 1G	23deg. C, 72%RH	120Vac, 60Hz	Robert Cheng
RE<1G	23deg. C, 70%RH	120Vac, 60Hz	Andy Ho
PLC	25deg. C, 75%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Jaime Lu

3.3 Duty Cycle of Test Signal

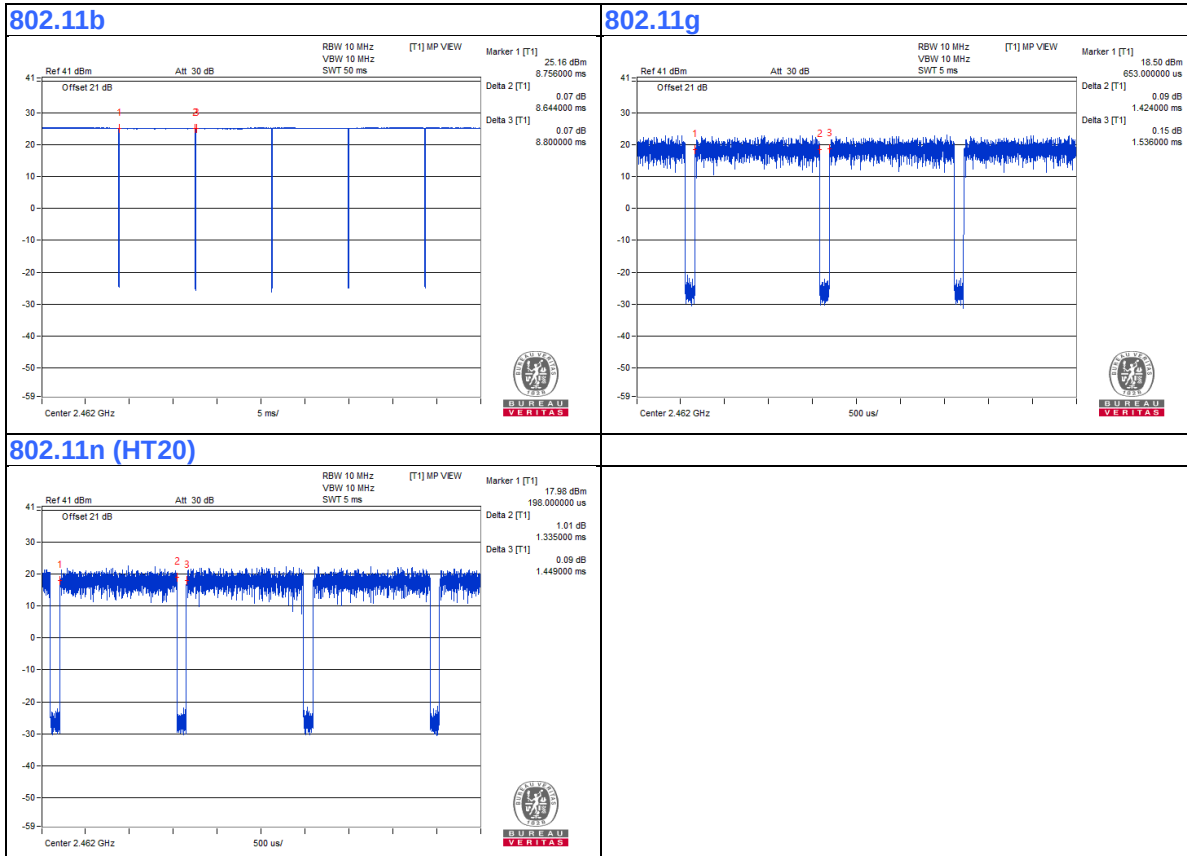
If duty cycle of test signal is $\geq 98\%$, duty factor is not required.

If duty cycle of test signal is $< 98\%$, duty factor shall be considered.

802.11b: Duty cycle = $8.644 \text{ ms} / 8.8 \text{ ms} = 0.982$

802.11g: Duty cycle = $1.424 \text{ ms} / 1.536 \text{ ms} = 0.927$, Duty factor = $10 * \log (1/\text{Duty cycle}) = 0.33$

802.11n (HT20): Duty cycle = $1.335 \text{ ms} / 1.449 \text{ ms} = 0.921$, Duty factor = $10 * \log (1/\text{Duty cycle}) = 0.36$

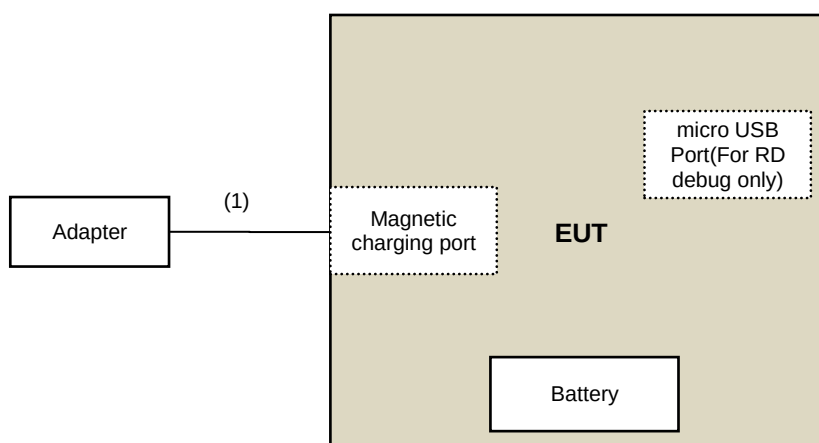


3.4 Description of Support Units

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.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC Cable	1	2.45	No	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)

KDB 558074 D01 15.247 Meas Guidance v05r02

ANSI C63.10-2013

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

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 30dB 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

For Radiated Emission test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 03, 2019	July 02, 2020
Pre-Amplifier EMC	EMC001340	980142	Jan. 25, 2019	Jan. 24, 2020
Loop Antenna Electro-Metrics	EM-6879	269	Sep. 07, 2018	Sep. 06, 2019
RF Cable	NA	LOOPCAB-001	Jan. 14, 2019	Jan. 13, 2020
RF Cable	NA	LOOPCAB-002	Jan. 14, 2019	Jan. 13, 2020
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Oct. 30, 2018	Oct. 29, 2019
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Nov. 22, 2018	Nov. 21, 2019
RF Cable	8D	966-4-1	Mar. 19, 2019	Mar. 18, 2020
RF Cable	8D	966-4-2	Mar. 19, 2019	Mar. 18, 2020
RF Cable	8D	966-4-3	Mar. 19, 2019	Mar. 18, 2020
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-4-01	Sep. 27, 2018	Sep. 26, 2019
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Nov. 25, 2018	Nov. 24, 2019
Pre-Amplifier EMC	EMC12630SE	980385	Aug. 16, 2018	Aug. 15, 2019
RF Cable	EMC104-SM-SM-1200	160923	Jan. 28, 2019	Jan. 27, 2020
RF Cable	104 RF cable	131215	Jan. 10, 2019	Jan. 09, 2020
RF Cable	EMC104-SM-SM-6000	180418	May 03, 2019	May 02, 2020
Pre-Amplifier EMC	EMC184045SE	980387	Jan. 28, 2019	Jan. 27, 2020
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 25, 2018	Nov. 24, 2019
RF Cable	EMC102-KM-KM-1200	160924	Jan. 28, 2019	Jan. 27, 2020
RF Cable	EMC102-KM-KM-1200	160925	Jan. 28, 2019	Jan. 27, 2020
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	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 966 Chamber No. 4.
3. Loop antenna was used for all emissions below 30 MHz.
4. Tested Date: July 12 to Aug. 06, 2019

For other test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	100964	June 04, 2019	June 03, 2020
Power meter Anritsu	ML2495A	1014008	May 13, 2019	May 12, 2020
Power sensor Anritsu	MA2411B	0917122	May 13, 2019	May 12, 2020
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 15, 2019	Apr. 14, 2020

- NOTE:**
1. The test was performed in Oven room 2.
 2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 3. Tested Date: July 18, 2019

4.1.3 Test Procedures

For Radiated emission below 30MHz

- 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 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 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 detects 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:

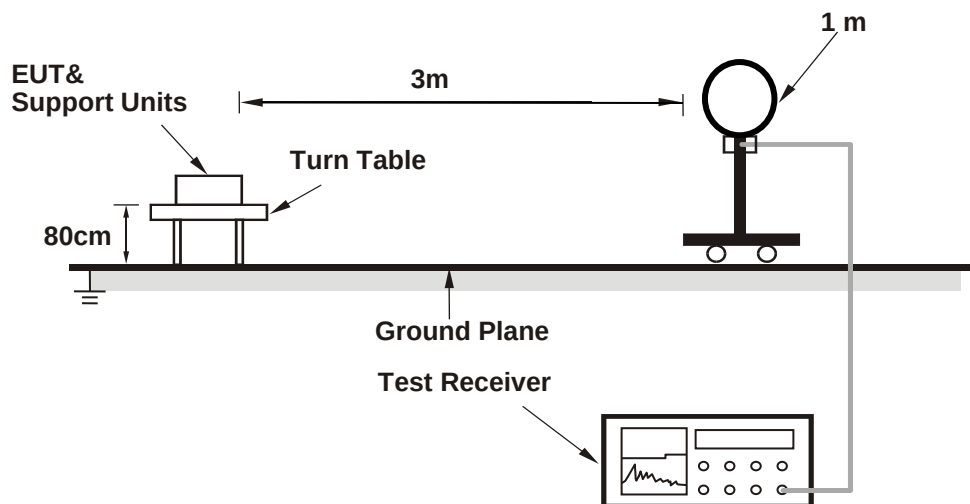
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle $< 98\%$) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

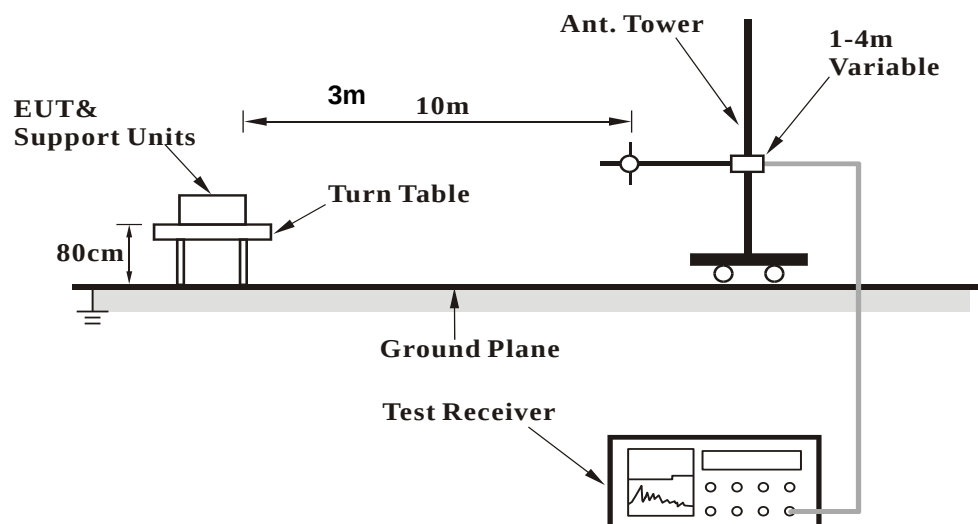
No deviation.

4.1.5 Test Setup

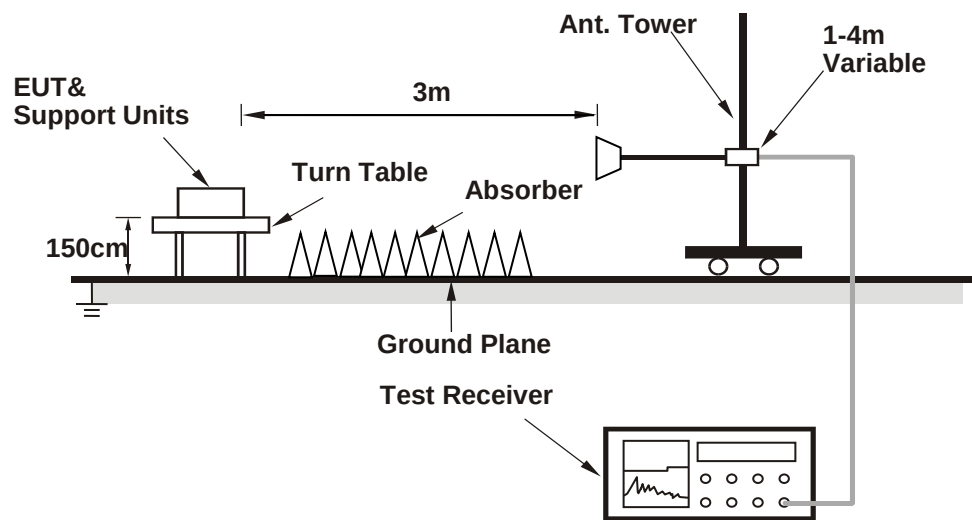
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

- Placed the EUT on the testing table.
- Controlling software (HyperTerminal paste Falcon camera CYW43012 wl commands.txt command) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Data :

802.11b

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

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	65.0 PK	74.0	-9.0	1.48 H	17	66.6	-1.6
2	2390.00	53.8 AV	54.0	-0.2	1.48 H	17	55.4	-1.6
3	*2412.00	112.3 PK			1.48 H	17	114.0	-1.7
4	*2412.00	110.2 AV			1.48 H	17	111.9	-1.7
5	4824.00	50.7 PK	74.0	-23.3	1.42 H	277	48.4	2.3
6	4824.00	48.0 AV	54.0	-6.0	1.42 H	277	45.7	2.3
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	63.6 PK	74.0	-10.4	1.00 V	45	65.2	-1.6
2	2390.00	50.5 AV	54.0	-3.5	1.00 V	45	52.1	-1.6
3	*2412.00	106.8 PK			1.00 V	45	108.5	-1.7
4	*2412.00	105.5 AV			1.00 V	45	107.2	-1.7
5	4824.00	52.1 PK	74.0	-21.9	1.18 V	337	49.8	2.3
6	4824.00	49.1 AV	54.0	-4.9	1.18 V	337	46.8	2.3

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.

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

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	64.2 PK	74.0	-9.8	1.26 H	18	65.8	-1.6
2	2390.00	52.6 AV	54.0	-1.4	1.26 H	18	54.2	-1.6
3	*2437.00	113.6 PK			1.26 H	18	115.4	-1.8
4	*2437.00	111.7 AV			1.26 H	18	113.5	-1.8
5	2483.50	61.1 PK	74.0	-12.9	1.26 H	18	62.8	-1.7
6	2483.50	51.2 AV	54.0	-2.8	1.26 H	18	52.9	-1.7
7	4874.00	50.7 PK	74.0	-23.3	1.42 H	277	48.3	2.4
8	4874.00	48.0 AV	54.0	-6.0	1.42 H	277	45.6	2.4
9	7311.00	52.5 PK	74.0	-21.5	1.21 H	125	43.3	9.2
10	7311.00	46.1 AV	54.0	-7.9	1.21 H	125	36.9	9.2

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	61.0 PK	74.0	-13.0	1.00 V	50	62.6	-1.6
2	2390.00	49.2 AV	54.0	-4.8	1.00 V	50	50.8	-1.6
3	*2437.00	108.8 PK			1.00 V	50	110.6	-1.8
4	*2437.00	107.0 AV			1.00 V	50	108.8	-1.8
5	2483.50	60.2 PK	74.0	-13.8	1.00 V	50	61.9	-1.7
6	2483.50	48.7 AV	54.0	-5.3	1.00 V	50	50.4	-1.7
7	4874.00	51.1 PK	74.0	-22.9	1.16 V	349	48.7	2.4
8	4874.00	48.6 AV	54.0	-5.4	1.16 V	349	46.2	2.4
9	7311.00	54.3 PK	74.0	-19.7	1.35 V	153	45.1	9.2
10	7311.00	48.6 AV	54.0	-5.4	1.35 V	153	39.4	9.2

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.

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

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	111.7 PK			1.40 H	16	113.5	-1.8
2	*2462.00	109.7 AV			1.40 H	16	111.5	-1.8
3	2483.50	66.7 PK	74.0	-7.3	1.40 H	16	68.4	-1.7
4	2483.50	53.7 AV	54.0	-0.3	1.40 H	16	55.4	-1.7
5	4924.00	50.7 PK	74.0	-23.3	1.42 H	277	48.2	2.5
6	4924.00	48.0 AV	54.0	-6.0	1.42 H	277	45.5	2.5
7	7386.00	52.5 PK	74.0	-21.5	1.21 H	125	43.1	9.4
8	7386.00	46.1 AV	54.0	-7.9	1.21 H	125	36.7	9.4
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	107.2 PK			1.00 V	48	109.0	-1.8
2	*2462.00	105.3 AV			1.00 V	48	107.1	-1.8
3	2483.50	63.2 PK	74.0	-10.8	1.00 V	48	64.9	-1.7
4	2483.50	50.1 AV	54.0	-3.9	1.00 V	48	51.8	-1.7
5	4924.00	51.6 PK	74.0	-22.4	1.16 V	335	49.1	2.5
6	4924.00	48.6 AV	54.0	-5.4	1.16 V	335	46.1	2.5
7	7386.00	53.7 PK	74.0	-20.3	1.29 V	157	44.3	9.4
8	7386.00	48.1 AV	54.0	-5.9	1.29 V	157	38.7	9.4

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

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

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	71.9 PK	74.0	-2.1	1.11 H	111	73.5	-1.6
2	2390.00	53.8 AV	54.0	-0.2	1.11 H	111	55.4	-1.6
3	*2412.00	109.8 PK			1.11 H	111	111.5	-1.7
4	*2412.00	101.7 AV			1.11 H	111	103.4	-1.7
5	4824.00	44.6 PK	74.0	-29.4	1.47 H	261	42.3	2.3
6	4824.00	32.8 AV	54.0	-21.2	1.47 H	261	30.5	2.3
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	70.2 PK	74.0	-3.8	1.01 V	57	71.8	-1.6
2	2390.00	50.5 AV	54.0	-3.5	1.01 V	57	52.1	-1.6
3	*2412.00	105.2 PK			1.01 V	57	106.9	-1.7
4	*2412.00	97.0 AV			1.01 V	57	98.7	-1.7
5	4824.00	42.8 PK	74.0	-31.2	1.21 V	360	40.5	2.3
6	4824.00	30.3 AV	54.0	-23.7	1.21 V	360	28.0	2.3

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.

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

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	71.0 PK	74.0	-3.0	1.20 H	16	72.6	-1.6
2	2390.00	53.1 AV	54.0	-0.9	1.20 H	16	54.7	-1.6
3	*2437.00	114.7 PK			1.20 H	16	116.5	-1.8
4	*2437.00	106.4 AV			1.20 H	16	108.2	-1.8
5	2483.50	68.9 PK	74.0	-5.1	1.20 H	16	70.6	-1.7
6	2483.50	53.7 AV	54.0	-0.3	1.20 H	16	55.4	-1.7
7	4874.00	46.8 PK	74.0	-27.2	1.40 H	265	44.4	2.4
8	4874.00	34.2 AV	54.0	-19.8	1.40 H	265	31.8	2.4
9	7311.00	56.2 PK	74.0	-17.8	1.27 H	126	47.0	9.2
10	7311.00	42.1 AV	54.0	-11.9	1.27 H	126	32.9	9.2

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	60.4 PK	74.0	-13.6	1.00 V	60	62.0	-1.6
2	2390.00	48.8 AV	54.0	-5.2	1.00 V	60	50.4	-1.6
3	*2437.00	109.8 PK			1.00 V	60	111.6	-1.8
4	*2437.00	101.5 AV			1.00 V	60	103.3	-1.8
5	2483.50	61.1 PK	74.0	-12.9	1.00 V	60	62.8	-1.7
6	2483.50	49.5 AV	54.0	-4.5	1.00 V	60	51.2	-1.7
7	4874.00	47.5 PK	74.0	-26.5	1.18 V	339	45.1	2.4
8	4874.00	36.3 AV	54.0	-17.7	1.18 V	339	33.9	2.4
9	7311.00	57.2 PK	74.0	-16.8	1.35 V	163	48.0	9.2
10	7311.00	43.1 AV	54.0	-10.9	1.35 V	163	33.9	9.2

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.

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

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	108.9 PK			2.46 H	360	110.7	-1.8
2	*2462.00	100.3 AV			2.46 H	360	102.1	-1.8
3	2483.50	71.1 PK	74.0	-2.9	2.46 H	360	72.8	-1.7
4	2483.50	53.7 AV	54.0	-0.3	2.46 H	360	55.4	-1.7
5	4924.00	44.9 PK	74.0	-29.1	1.38 H	282	42.4	2.5
6	4924.00	32.8 AV	54.0	-21.2	1.38 H	282	30.3	2.5
7	7386.00	54.2 PK	74.0	-19.8	1.20 H	139	44.8	9.4
8	7386.00	40.3 AV	54.0	-13.7	1.20 H	139	30.9	9.4

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	103.6 PK			1.00 V	44	105.4	-1.8
2	*2462.00	95.5 AV			1.00 V	44	97.3	-1.8
3	2483.50	63.3 PK	74.0	-10.7	1.00 V	44	65.0	-1.7
4	2483.50	50.4 AV	54.0	-3.6	1.00 V	44	52.1	-1.7
5	4924.00	42.4 PK	74.0	-31.6	1.13 V	354	39.9	2.5
6	4924.00	30.1 AV	54.0	-23.9	1.13 V	354	27.6	2.5
7	7386.00	54.8 PK	74.0	-19.2	1.33 V	142	45.4	9.4
8	7386.00	40.9 AV	54.0	-13.1	1.33 V	142	31.5	9.4

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)

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

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	72.9 PK	74.0	-1.1	1.19 H	16	74.5	-1.6
2	2390.00	53.7 AV	54.0	-0.3	1.19 H	16	55.3	-1.6
3	*2412.00	108.7 PK			1.19 H	16	110.4	-1.7
4	*2412.00	100.6 AV			1.19 H	16	102.3	-1.7
5	4824.00	44.7 PK	74.0	-29.3	1.37 H	286	42.4	2.3
6	4824.00	32.7 AV	54.0	-21.3	1.37 H	286	30.4	2.3
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	63.4 PK	74.0	-10.6	1.00 V	60	65.0	-1.6
2	2390.00	50.3 AV	54.0	-3.7	1.00 V	60	51.9	-1.6
3	*2412.00	103.9 PK			1.00 V	60	105.6	-1.7
4	*2412.00	95.6 AV			1.00 V	60	97.3	-1.7
5	4824.00	42.9 PK	74.0	-31.1	1.12 V	360	40.6	2.3
6	4824.00	30.4 AV	54.0	-23.6	1.12 V	360	28.1	2.3

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.

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

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	72.3 PK	74.0	-1.7	1.49 H	14	73.9	-1.6
2	2390.00	53.9 AV	54.0	-0.1	1.49 H	14	55.5	-1.6
3	*2437.00	113.5 PK			1.49 H	14	115.3	-1.8
4	*2437.00	105.6 AV			1.49 H	14	107.4	-1.8
5	2483.50	72.2 PK	74.0	-1.8	1.49 H	14	73.9	-1.7
6	2483.50	52.7 AV	54.0	-1.3	1.49 H	14	54.4	-1.7
7	4874.00	46.6 PK	74.0	-27.4	1.39 H	263	44.2	2.4
8	4874.00	34.3 AV	54.0	-19.7	1.39 H	263	31.9	2.4
9	7311.00	56.2 PK	74.0	-17.8	1.29 H	139	47.0	9.2
10	7311.00	42.3 AV	54.0	-11.7	1.29 H	139	33.1	9.2

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	60.5 PK	74.0	-13.5	1.00 V	46	62.1	-1.6
2	2390.00	48.8 AV	54.0	-5.2	1.00 V	46	50.4	-1.6
3	*2437.00	108.6 PK			1.00 V	46	110.4	-1.8
4	*2437.00	100.9 AV			1.00 V	46	102.7	-1.8
5	2483.50	60.5 PK	74.0	-13.5	1.00 V	46	62.2	-1.7
6	2483.50	48.7 AV	54.0	-5.3	1.00 V	46	50.4	-1.7
7	4874.00	47.7 PK	74.0	-26.3	1.13 V	349	45.3	2.4
8	4874.00	36.4 AV	54.0	-17.6	1.13 V	349	34.0	2.4
9	7311.00	56.9 PK	74.0	-17.1	1.39 V	153	47.7	9.2
10	7311.00	42.9 AV	54.0	-11.1	1.39 V	153	33.7	9.2

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.

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

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	107.2 PK			1.20 H	15	109.0	-1.8
2	*2462.00	99.1 AV			1.20 H	15	100.9	-1.8
3	2483.50	73.3 PK	74.0	-0.7	1.20 H	15	75.0	-1.7
4	2483.50	53.8 AV	54.0	-0.2	1.20 H	15	55.5	-1.7
5	4924.00	45.3 PK	74.0	-28.7	1.45 H	272	42.8	2.5
6	4924.00	33.1 AV	54.0	-20.9	1.45 H	272	30.6	2.5
7	7386.00	54.3 PK	74.0	-19.7	1.25 H	126	44.9	9.4
8	7386.00	40.5 AV	54.0	-13.5	1.25 H	126	31.1	9.4

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	103.1 PK			1.00 V	41	104.9	-1.8
2	*2462.00	94.5 AV			1.00 V	41	96.3	-1.8
3	2483.50	63.2 PK	74.0	-10.8	1.00 V	41	64.9	-1.7
4	2483.50	50.4 AV	54.0	-3.6	1.00 V	41	52.1	-1.7
5	4924.00	42.6 PK	74.0	-31.4	1.09 V	352	40.1	2.5
6	4924.00	30.1 AV	54.0	-23.9	1.09 V	352	27.6	2.5
7	7386.00	54.5 PK	74.0	-19.5	1.33 V	146	45.1	9.4
8	7386.00	40.6 AV	54.0	-13.4	1.33 V	146	31.2	9.4

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.

Below 1GHz Data:

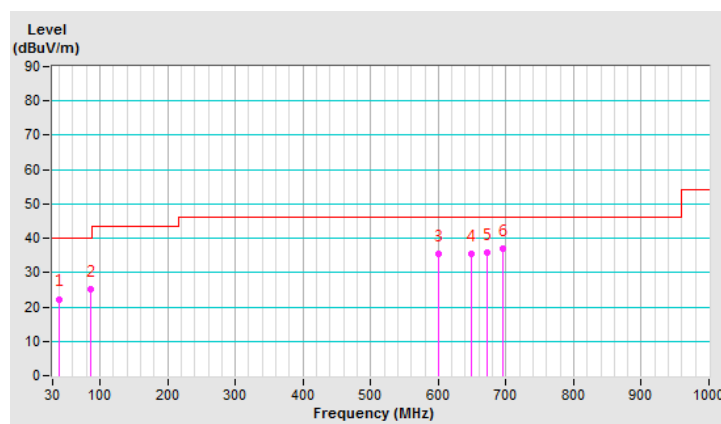
802.11b

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 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	39.14	22.3 QP	40.0	-17.7	1.00 H	258	30.9	-8.6
2	86.04	25.1 QP	40.0	-14.9	2.00 H	93	38.5	-13.4
3	600.00	35.3 QP	46.0	-10.7	1.50 H	40	34.6	0.7
4	648.01	35.6 QP	46.0	-10.4	1.50 H	34	34.1	1.5
5	671.99	35.7 QP	46.0	-10.3	1.00 H	339	33.9	1.8
6	696.00	37.0 QP	46.0	-9.0	1.00 H	337	34.9	2.1

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 of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

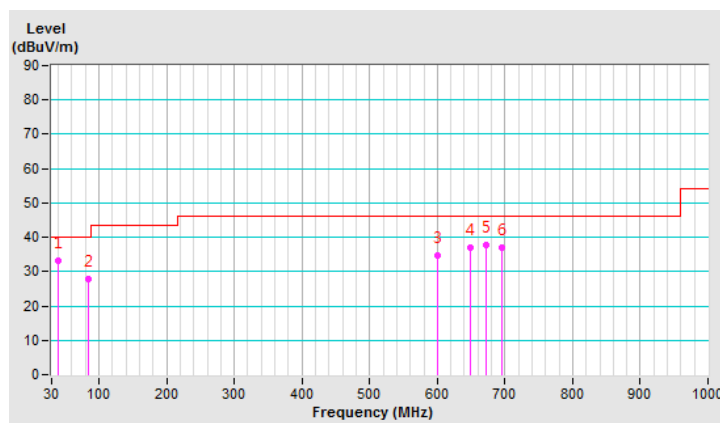


CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	39.53	33.0 QP	40.0	-7.0	1.00 V	248	41.7	-8.7
2	85.24	27.8 QP	40.0	-12.2	1.00 V	358	41.2	-13.4
3	600.00	34.8 QP	46.0	-11.2	2.00 V	360	34.1	0.7
4	647.99	37.0 QP	46.0	-9.0	1.50 V	0	35.5	1.5
5	672.02	37.8 QP	46.0	-8.2	1.50 V	0	36.0	1.8
6	696.00	36.9 QP	46.0	-9.1	1.50 V	0	34.8	2.1

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 of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



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	847124/029	Oct. 24, 2018	Oct. 23, 2019
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 22, 2018	Oct. 21, 2019
Line-Impedance Stabilization Network (for Peripheral) R&S	ESH3-Z5	835239/001	Mar. 17, 2019	Mar. 16, 2020
50 ohms Terminator	N/A	3	Oct. 22, 2018	Oct. 21, 2019
RF Cable	5D-FB	COCCAB-001	Sep. 28, 2018	Sep. 27, 2019
Fixed attenuator EMCI	STI02-2200-10	003	Mar. 14, 2019	Mar. 13, 2020
Software BVADT	BVADT_Cond_ V7.3.7.4	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 Conduction 1.
- 3 Tested Date: Aug. 06, 2019

4.2.3 Test Procedures

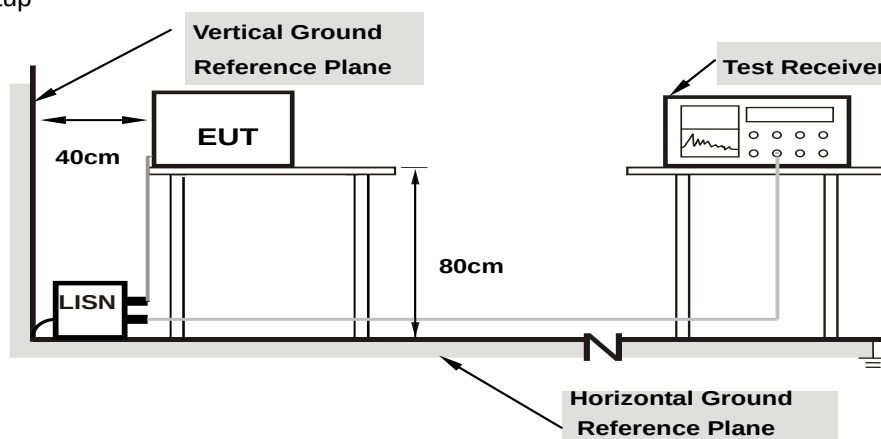
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- 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.

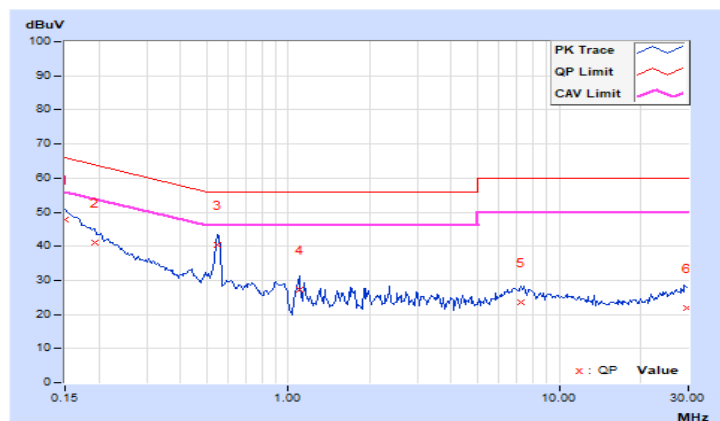
4.2.7 Test Results

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

No	Freq. [MHz]	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.96	37.69	25.97	47.65	35.93	66.00	56.00	-18.35	-20.07
2	0.19297	9.97	31.26	18.97	41.23	28.94	63.91	53.91	-22.68	-24.97
3	0.54844	9.99	30.34	21.98	40.33	31.97	56.00	46.00	-15.67	-14.03
4	1.09766	10.04	17.12	5.55	27.16	15.59	56.00	46.00	-28.84	-30.41
5	7.24219	10.47	13.13	5.31	23.60	15.78	60.00	50.00	-36.40	-34.22
6	29.58984	11.66	10.36	3.01	22.02	14.67	60.00	50.00	-37.98	-35.33

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.

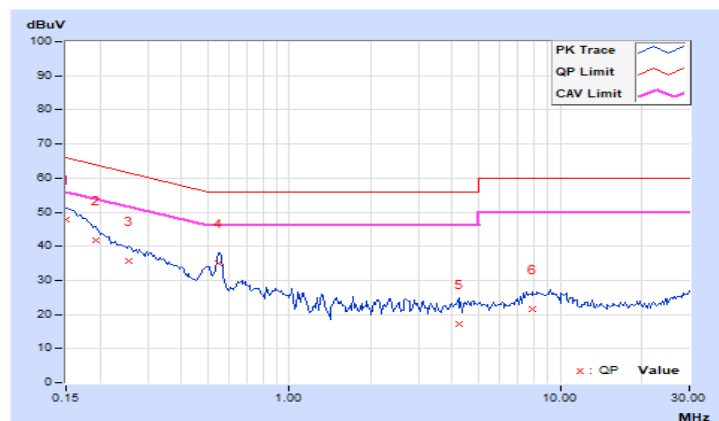


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.94	38.00	25.02	47.94	34.96	66.00	56.00	-18.06	-21.04
2	0.19297	9.95	31.74	19.11	41.69	29.06	63.91	53.91	-22.22	-24.85
3	0.25547	9.96	25.63	12.87	35.59	22.83	61.58	51.58	-25.99	-28.75
4	0.54844	9.98	25.16	18.70	35.14	28.68	56.00	46.00	-20.86	-17.32
5	4.21875	10.20	7.04	-1.17	17.24	9.03	56.00	46.00	-38.76	-36.97
6	7.92188	10.43	11.12	2.95	21.55	13.38	60.00	50.00	-38.45	-36.62

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.

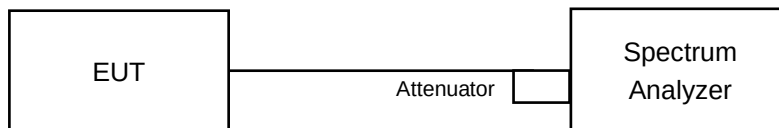


4.3 6dB Bandwidth Measurement

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

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- 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 Result

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	9.05	0.5	Pass
6	2437	9.63	0.5	Pass
11	2462	9.14	0.5	Pass

802.11g

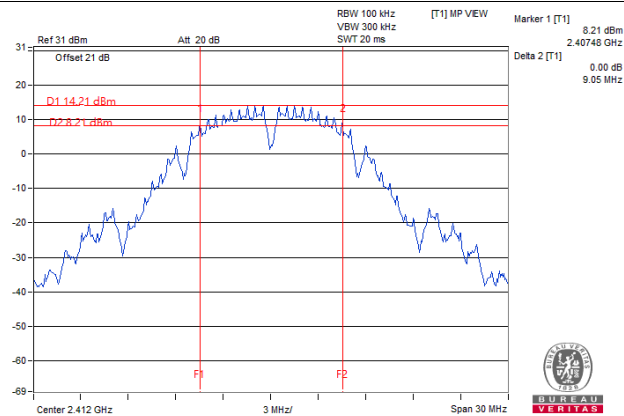
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.46	0.5	Pass
6	2437	16.44	0.5	Pass
11	2462	16.43	0.5	Pass

802.11n (HT20)

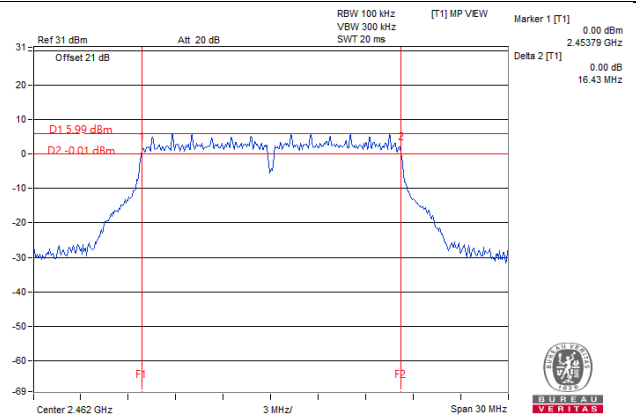
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.69	0.5	Pass
6	2437	17.70	0.5	Pass
11	2462	17.72	0.5	Pass

Spectrum Plot of Worst Value

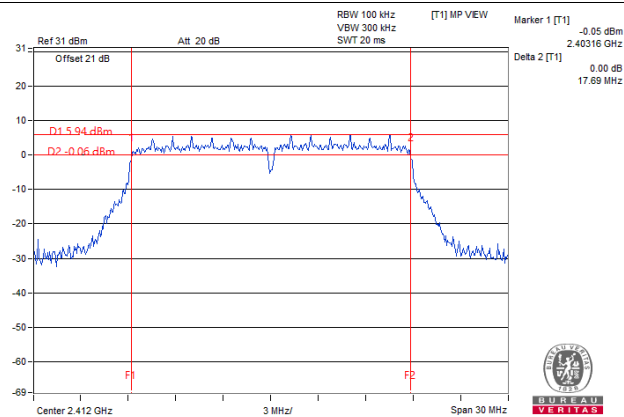
802.11b / CH1



802.11g / CH11



802.11n (HT20) / CH1

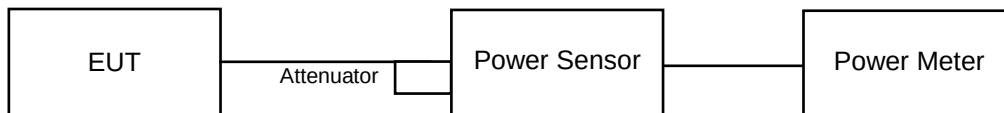


4.4 Conducted Output Power Measurement

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

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.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

802.11b

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	192.309	22.84	30	Pass
6	2437	304.089	24.83	30	Pass
11	2462	186.638	22.71	30	Pass

802.11g

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	69.343	18.41	30	Pass
6	2437	164.816	22.17	30	Pass
11	2462	59.293	17.73	30	Pass

802.11n (HT20)

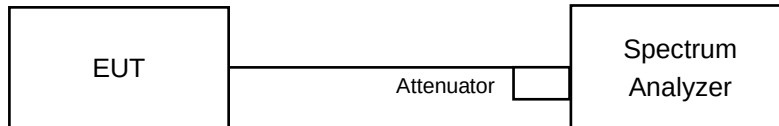
Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	59.02	17.71	30	Pass
6	2437	164.816	22.17	30	Pass
11	2462	50.582	17.04	30	Pass

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz.

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

For 802.11b

- Set instrument center frequency to DTS channel center frequency.
- Set span to at least 1.5 times the OBW.
- Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set VBW $\geq 3 \times \text{RBW}$.
- Detector = power averaging (RMS) or sample detector (when RMS not available).
- Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span}/\text{RBW}$.
- Sweep time = auto couple.
- Employ trace averaging (RMS) mode over a minimum of 100 traces.
- Use the peak marker function to determine the maximum amplitude level.

For 802.11g, 802.11n (HT20)

- Measure the duty cycle (x).
- Set instrument center frequency to DTS channel center frequency.
- Set span to at least 1.5 times the OBW.
- Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set VBW $\geq 3 \times \text{RBW}$.
- Detector = power averaging (RMS) or sample detector (when RMS not available).
- Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span}/\text{RBW}$.
- Sweep time = auto couple.
- Do not use sweep triggering. Allow sweep to "free run".
- Employ trace averaging (RMS) mode over a minimum of 100 traces.
- Use the peak marker function to determine the maximum amplitude level.
- Add $10 \log (1/x)$, where x is the duty cycle measured in step (a), to the measured PSD to compute the average PSD during the actual transmission time.

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	Frequency (MHz)	PSD (dBm/3kHz)	TOTAL PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-8.08	-8.08	8	Pass
6	2437	-7.07	-7.07	8	Pass
11	2462	-8.75	-8.75	8	Pass

802.11g

Channel	Frequency (MHz)	PSD W/O Duty Factor (dBm/3kHz)	Duty Factor (dB)	TOTAL PSD With Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-13.32	0.33	-12.99	8	Pass
6	2437	-9.26	0.33	-8.93	8	Pass
11	2462	-13.15	0.33	-12.82	8	Pass

Note: 1. Refer to section 3.3 for duty cycle spectrum plot.

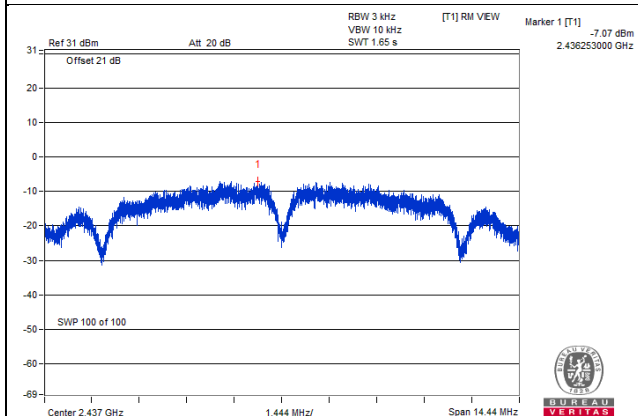
802.11n (HT20)

Channel	Frequency (MHz)	PSD W/O Duty Factor (dBm/3kHz)	Duty Factor (dB)	TOTAL PSD With Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-15.74	0.36	-15.38	8	Pass
6	2437	-10.80	0.36	-10.44	8	Pass
11	2462	-15.93	0.36	-15.57	8	Pass

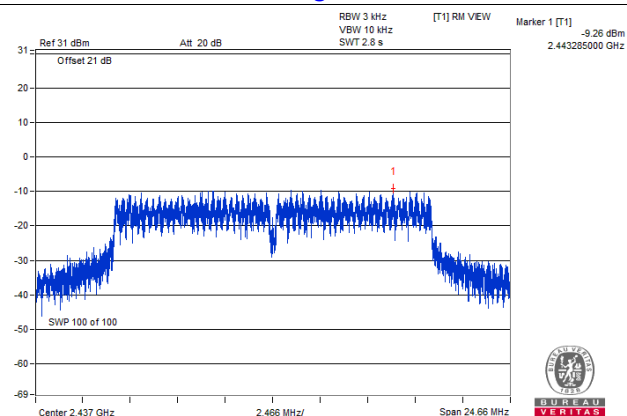
Note: 1. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

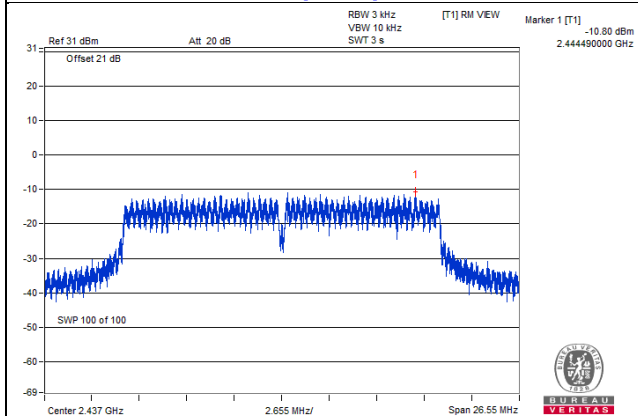
802.11b / CH6



802.11g / CH6



802.11n (HT20) / CH6

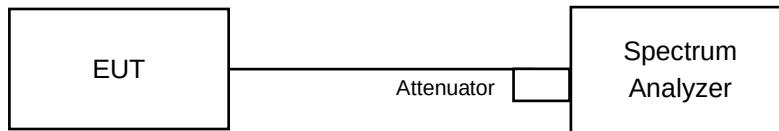


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

Below -30dB 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 $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. 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.

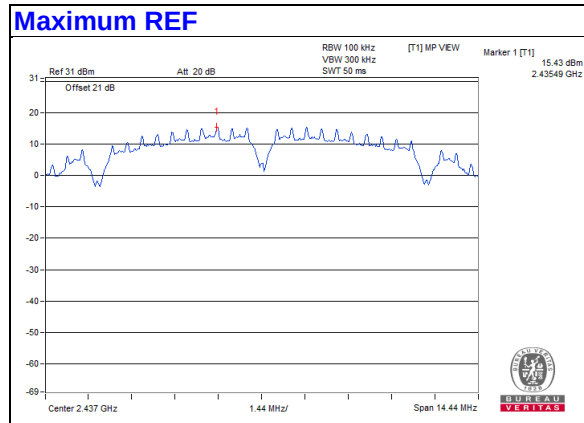
4.6.6 EUT Operating Condition

Same as Item 4.3.6

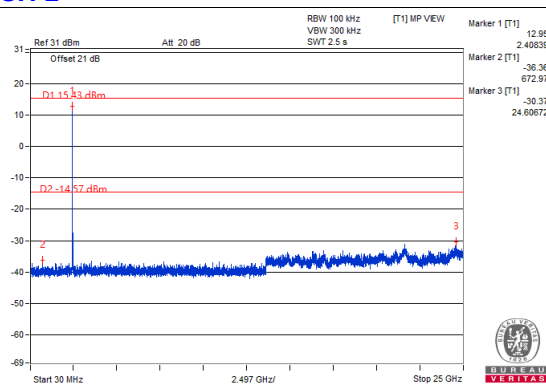
4.6.7 Test Results

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

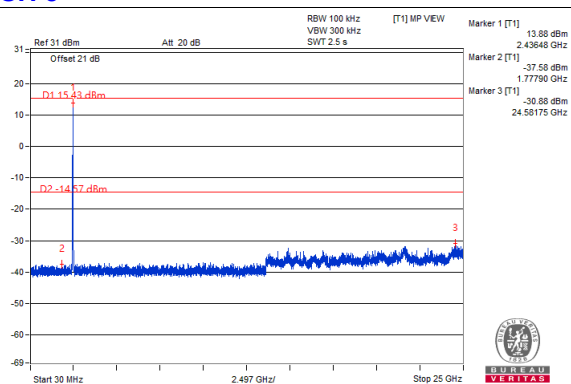
802.11b



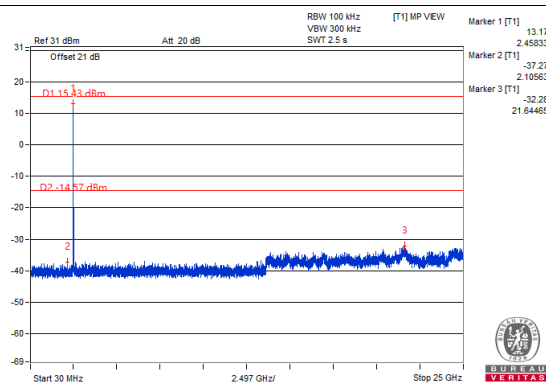
CH 1



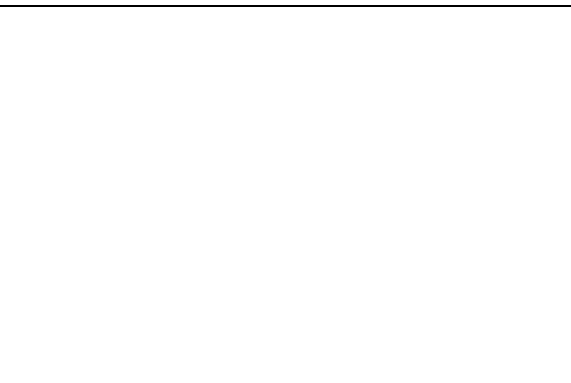
CH 6



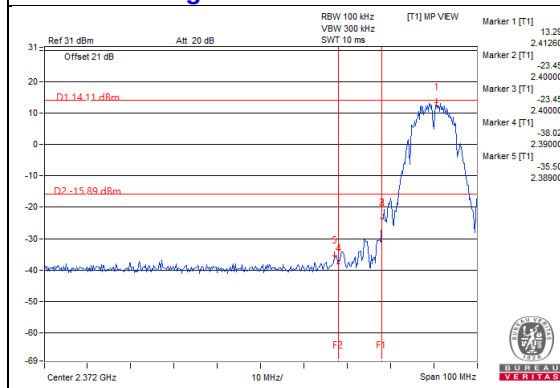
CH 11



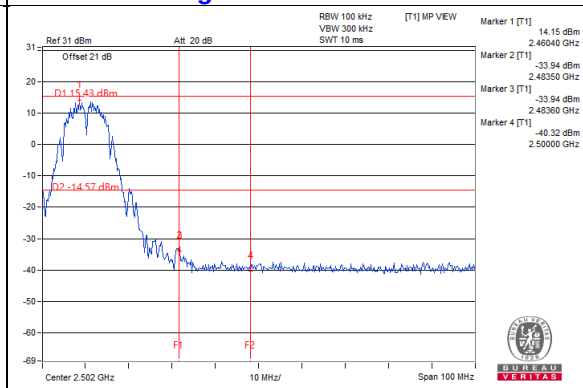
CH 11



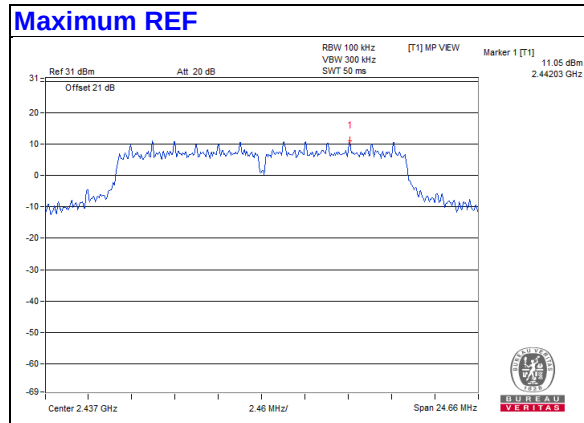
CH 1 Band edge



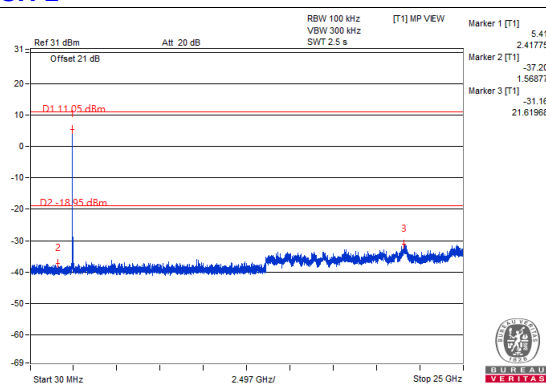
CH 11 Band edge



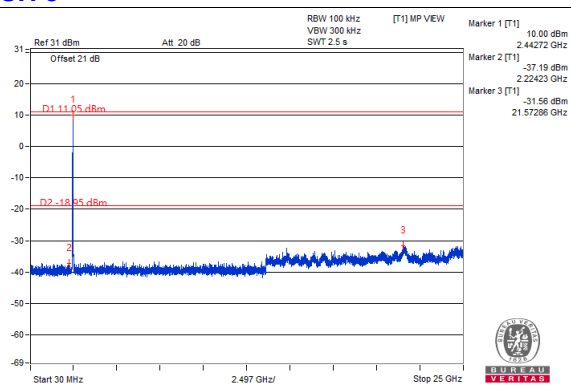
802.11g



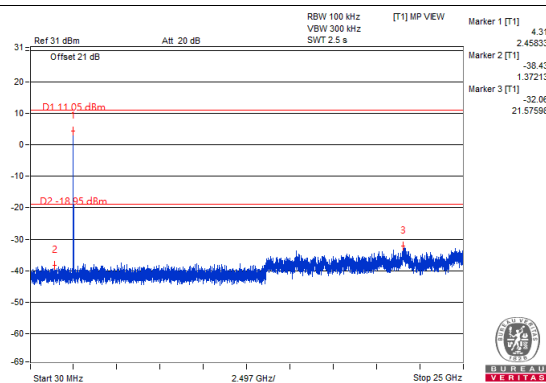
CH 1



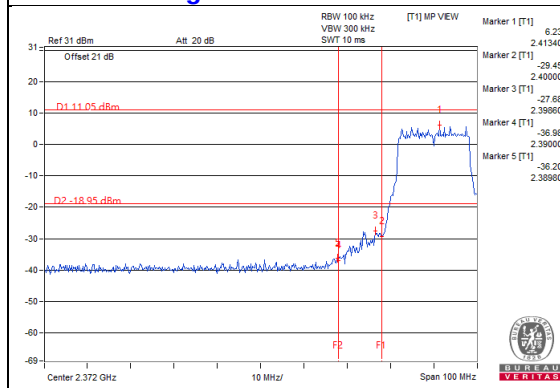
CH 6



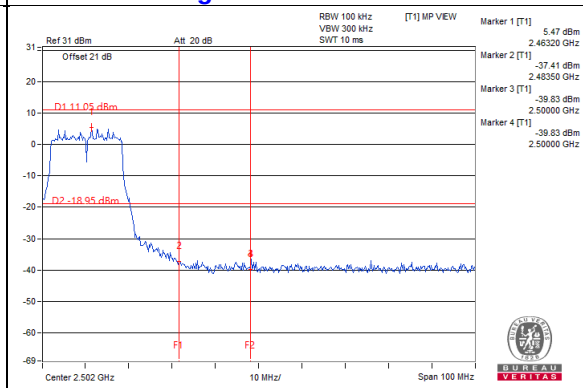
CH 11



CH 1 Band edge

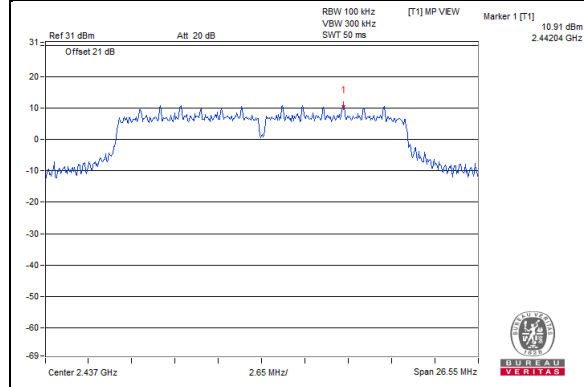


CH 11 Band edge

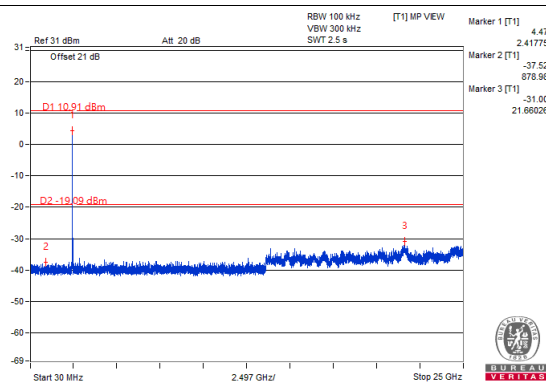


802.11n (HT20)

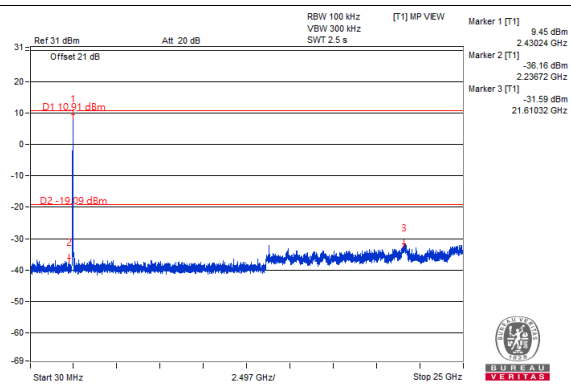
Maximum REF



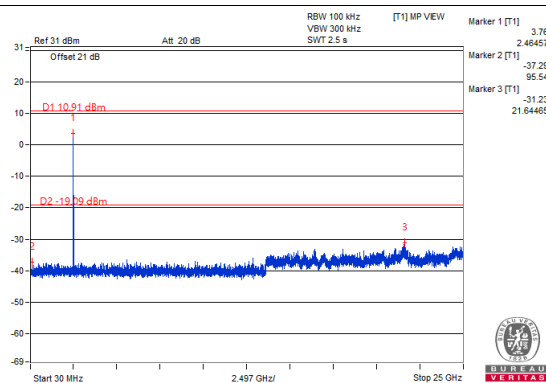
CH 1



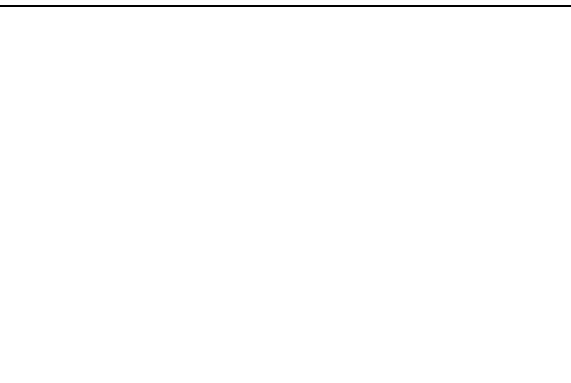
CH 6



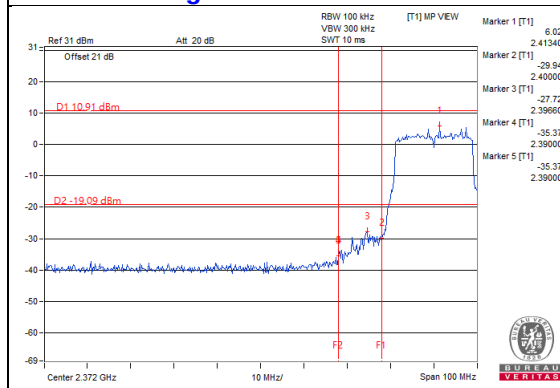
CH 11



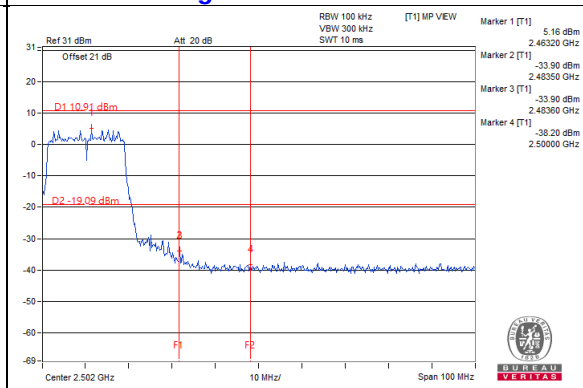
CH 11



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 accredited and approved according to ISO/IEC 17025.

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

Lin Kou EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

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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