

FCC Test Report

Report No.: RF170407E01

FCC ID: S9GH320

Model No.: H320

Received Date: Apr. 07, 2017

Test Date: Apr. 21 to May 03, 2017

Issued Date: May 26, 2017

Applicant: Ruckus Wireless, Inc.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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Release Control Record

Issue No.	Description	Date Issued
RF170407E01	Original release.	May 26, 2017

1 Certificate of Conformity

Product: H320 Access Point

Brand: Ruckus

Model No.: H320

Sample Status: ENGINEERING SAMPLE

Applicant: Ruckus Wireless, Inc.

Test Date: Apr. 21 to May 03, 2017

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:** May 26, 2017
Wendy Wu / Specialist

Approved by : May Chen, **Date:** May 26, 2017
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 -2.05dB at 0.45859MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -1.1dB at 2483.50MHz.
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	Antenna connector is i-pex not a standard connector.

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	1.84 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.32 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	4.82 dB
	6GHz ~ 18GHz	4.58 dB
	18GHz ~ 40GHz	5.03 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	H320 Access Point
Brand	Ruckus
Model No.	H320
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 48V from POE
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode and VHT20/40 mode in 2.4GHz band
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps
Operating Frequency	2.4GHz: 2.412 ~ 2.462GHz 5GHz: 5.18GHz ~ 5.24GHz, 5.745GHz ~ 5.825GHz
Number of Channel	2.4GHz: 802.11b, 802.11g, 802.11n (HT20), VHT20: 11 802.11n (HT40), VHT40: 7 5GHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 9 802.11n (HT40), 802.11ac (VHT40): 4 802.11ac (VHT80): 2
Output Power	2.4GHz: 221.82mW 5.18 ~ 5.24GHz: 122.782mW 5.745 ~ 5.825GHz: 125.354mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. Simultaneously transmission condition.

Condition	Technology	
1	WLAN 2.4GHz	WLAN 5GHz

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

2. The EUT must be supplied with a POE (only for test not for sale) as following table:

Brand	Model No.	Spec.
Ruckus Wireless, Inc	740-64214-001	Input: 100-240Vac, 50/60Hz, 0.75A Output: 48Vdc, 0.5A

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

No.	PCB Chain No	Brand	Model	Antenna Gain(dBi)	Frequency range	Antenna Type	Connector type
1	Chain 0	Ruckus	H320 Hpol	1	2.4~2.4835GHz	Printed	I-pex
				3	5.15~5.85GHz		
2	Chain 1	Ruckus	H320 Vpol	1	5.15~5.85GHz	Printed	I-pex

4. The EUT incorporates a MIMO function:

2.4GHz Band			
MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11b	1 ~ 11Mbps	1TX	1RX
802.11g	6 ~ 54Mbps	1TX	1RX
802.11n (HT20)	MCS 0~7	1TX	1RX
802.11n (HT40)	MCS 0~7	1TX	1RX
VHT20	MCS 0~8, Nss=1	1TX	1RX
VHT40	MCS 0~9, Nss=1	1TX	1RX
5GHz Band			
MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11a	6 ~ 54Mbps	2TX	2RX
802.11n (HT20)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11ac (VHT20)	MCS 0~8, Nss=1	2TX	2RX
	MCS 0~8, Nss=2	2TX	2RX
802.11ac (VHT40)	MCS 0~9, Nss=1	2TX	2RX
	MCS 0~9, Nss=2	2TX	2RX
802.11ac (VHT80)	MCS 0~9, Nss=1	2TX	2RX
	MCS 0~9, Nss=2	2TX	2RX

Note:

1. The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz) and 802.11ac mode for 20MHz (40MHz), therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

5. 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), VHT20:

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		

7 channels are provided for 802.11n (HT40), VHT40:

Channel	Frequency	Channel	Frequency
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
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 2 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
VHT20	1 to 11	1, 6, 11	OFDM	BPSK	6.5
VHT40	3 to 9	3, 6, 9	OFDM	BPSK	13.5

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)
VHT40	3 to 9	6	OFDM	BPSK	13.5

Power Line Conducted Emission Test:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates 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)
VHT40	3 to 9	6	OFDM	BPSK	13.5

Antenna Port Conducted Measurement:

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
VHT20	1 to 11	1, 6, 11	OFDM	BPSK	6.5
VHT40	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (System)	TESTED BY
RE $\geq$ 1G	23deg. C, 66%RH	120Vac, 60Hz	Terry Huang
RE<1G	22deg. C, 66%RH	120Vac, 60Hz	Terry Huang
PLC	23deg. C, 61%RH	120Vac, 60Hz	Weiwei Lo
APCM	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng

3.3 Duty Cycle of Test Signal

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

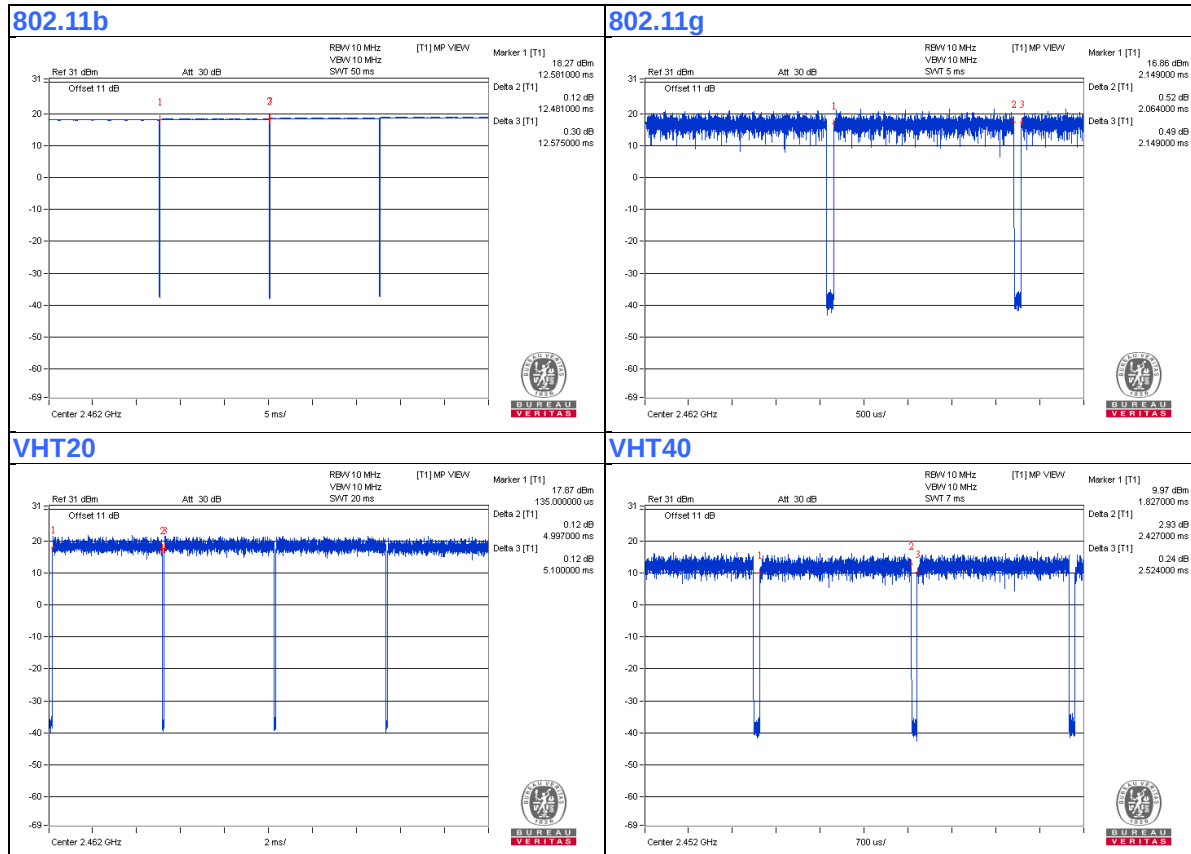
If duty cycle of test signal is $< 98\%$, duty factor shall be considered.

802.11b: Duty cycle = $12.481/12.575 = 0.993$

802.11g: Duty cycle = $2.064/2.149 = 0.96$, Duty factor = $10 * \log(1/0.96) = 0.18$

VHT20: Duty cycle = $4.997/5.1 = 0.98$

VHT40: Duty cycle = $2.427/2.524 = 0.962$, Duty factor = $10 * \log(1/0.962) = 0.17$



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.

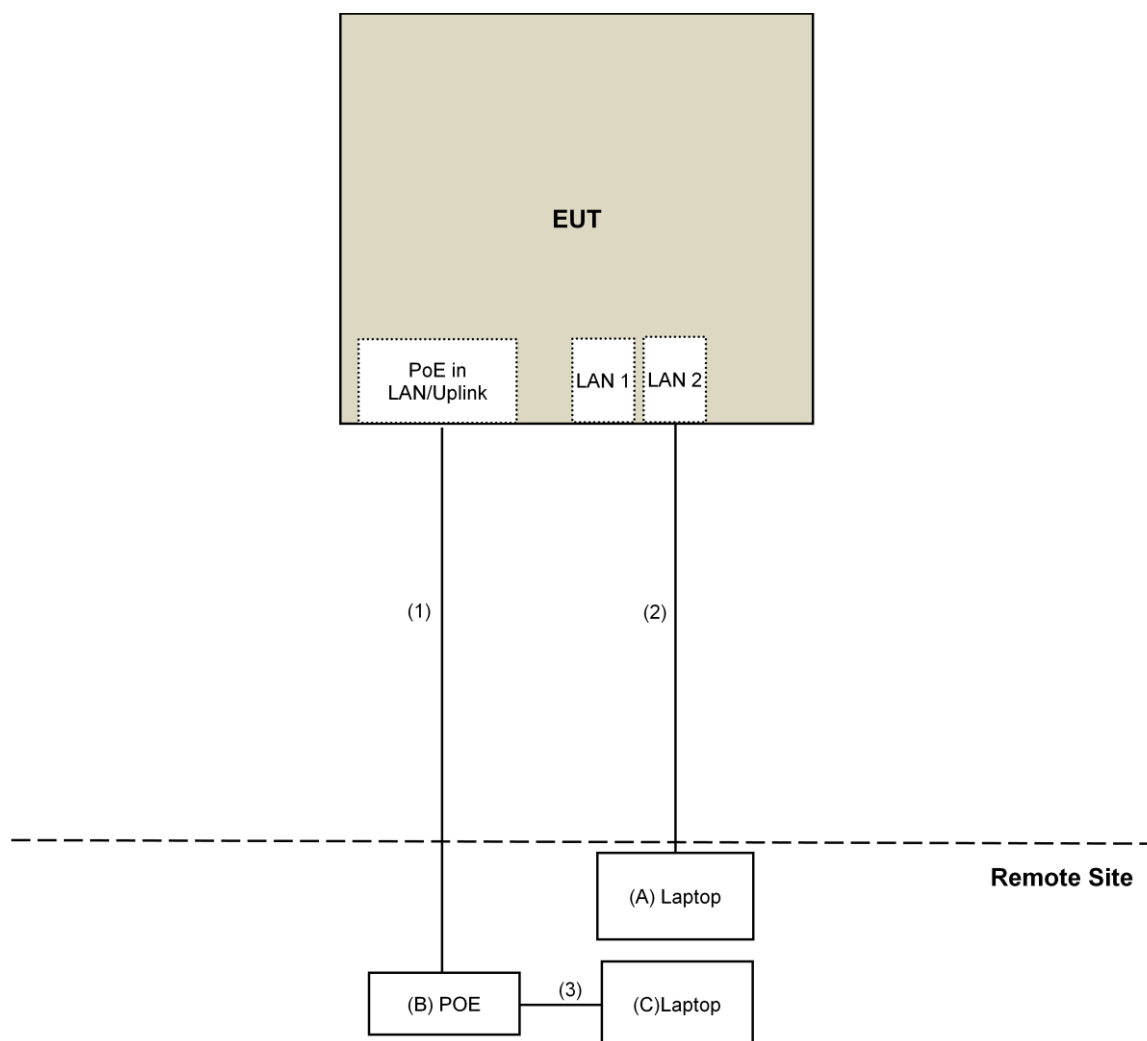
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	DELL	E6440	F9LYQ32	F9LYQ32	Provided by Lab
B.	POE	Ruckus Wireless, Inc	740-64214-001	NA	NA	Supplied by client
C.	Laptop	DELL	XPS 13	NA	NA	Supplied by client

ote:

1. All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ-45 Cable	1	10	No	0	Provided by Lab
2.	RJ-45 Cable	1	10	No	0	Provided by Lab
3.	RJ-45 Cable	1	3	No	0	Provided by Lab

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 DTS Meas Guidance v04

ANSI C63.10-2013

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. 18, 2016	Aug. 17, 2017
Pre-Amplifier ^(*) EMCI	EMC001340	980142	Jan. 20, 2016	Jan. 19, 2018
Loop Antenna ^(*) Electro-Metrics	EM-6879	264	Dec. 16, 2016	Dec. 15, 2018
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 17, 2017	Jan. 16, 2018
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	May 07, 2016	May 06, 2017
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Dec. 29, 2016	Dec. 28, 2017
RF Cable	8D	966-3-1 966-3-2 966-3-3	Apr. 01, 2017	Mar. 31, 2018
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Oct. 05, 2016	Oct. 04, 2017
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Dec. 28, 2016	Dec. 27, 2017
Pre-Amplifier EMCI	EMC12630SE	980384	Feb. 02, 2017	Feb. 01, 2018
RF Cable	EMC104-SM-SM-1200 EMC104-SM-SM-2000 EMC104-SM-SM-5000	160922 150317 150322	Feb. 02, 2017 Mar. 29, 2017 Mar. 29, 2017	Feb. 01, 2018 Mar. 28, 2018 Mar. 28, 2018
Spectrum Analyzer Keysight	N9030A	MY54490520	July 29, 2016	July 28, 2017
Pre-Amplifier EMCI	EMC184045SE	980386	Feb. 02, 2017	Feb. 01, 2018
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 15, 2016	Dec. 14, 2017
RF Cable	SUCOFLEX 102	36432/2 36433/2	Jan. 15, 2017	Jan. 14, 2018
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Spectrum Analyzer R&S	FSv40	100964	June 28, 2016	June 27, 2017
Spectrum Analyzer Agilent	E4446A	MY48250253	Dec. 21, 2016	Dec. 20, 2017
Power meter Anritsu	ML2495A	1014008	May 5, 2016	May 4, 2017

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 calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in 966 Chamber No. 3.
4. The FCC Site Registration No. is 147459
5. The CANADA Site Registration No. is 20331-1
- 6 Loop antenna was used for all emissions below 30 MHz.
7. Tested Date: Apr. 21 to May 03, 2017

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. Both X and Y axes 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 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:

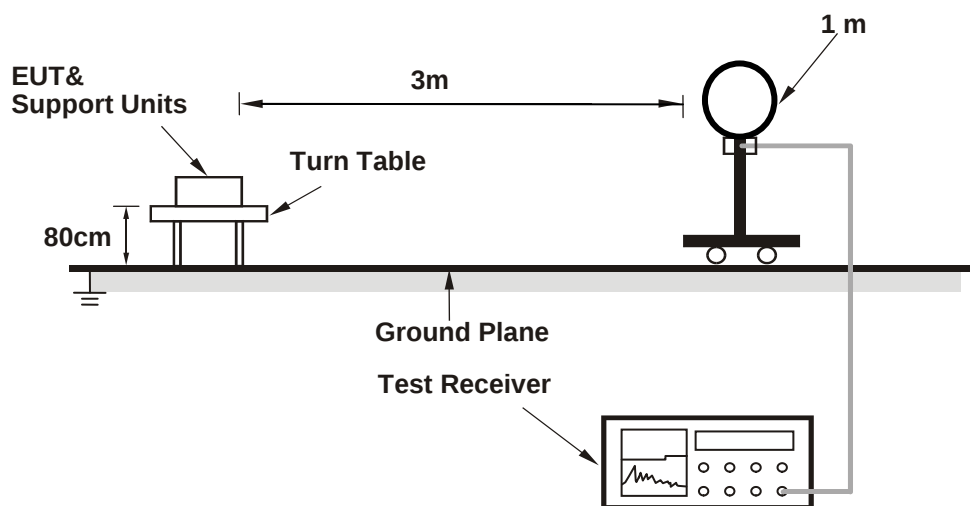
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Average detection (AV) at frequency above 1GHz. If duty cycle of test signal is < 98%, the duty factor need added to measured value.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

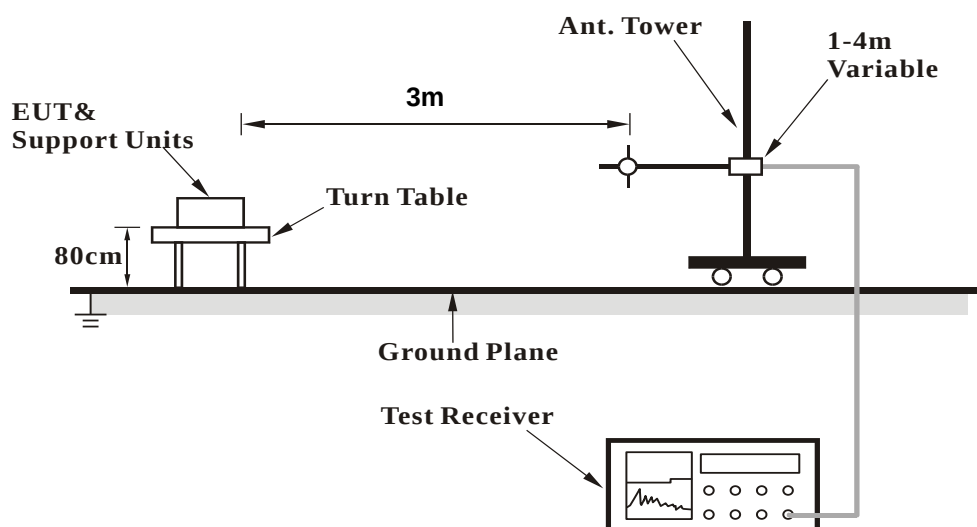
No deviation.

4.1.5 Test Setup

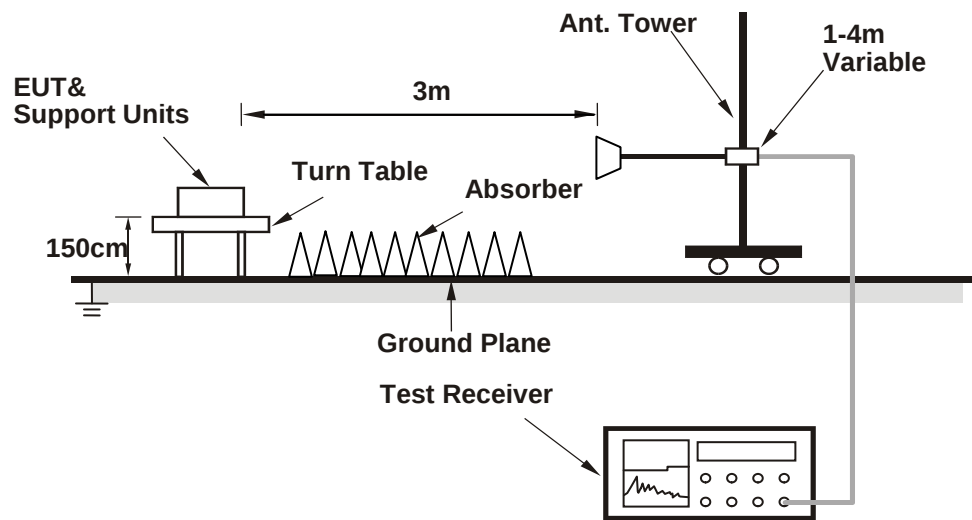
For Radiated emission below 30MHz



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

- Connected the EUT with the Laptop which is placed on remote site.
- Contorlling software (QRCT.exe[Ver3.0.187.0]) has been activated to set the EUT on specific status.

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	55.6 PK	74.0	-18.4	1.22 H	182	57.2	-1.6
2	2390.00	42.9 AV	54.0	-11.1	1.22 H	182	44.5	-1.6
3	*2412.00	108.7 PK			1.22 H	182	110.2	-1.5
4	*2412.00	106.2 AV			1.22 H	182	107.7	-1.5
5	4824.00	42.2 PK	74.0	-31.8	1.07 H	228	39.2	3.0
6	4824.00	36.6 AV	54.0	-17.4	1.07 H	228	33.6	3.0
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	54.3 PK	74.0	-19.7	3.43 V	338	55.9	-1.6
2	2390.00	41.5 AV	54.0	-12.5	3.43 V	338	43.1	-1.6
3	*2412.00	101.5 PK			3.43 V	338	103.0	-1.5
4	*2412.00	98.4 AV			3.43 V	338	99.9	-1.5
5	4824.00	39.7 PK	74.0	-34.3	3.95 V	210	36.7	3.0
6	4824.00	34.9 AV	54.0	-19.1	3.95 V	210	31.9	3.0

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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)
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	*2437.00	108.8 PK			1.20 H	181	110.3	-1.5
2	*2437.00	106.3 AV			1.20 H	181	107.8	-1.5
3	4874.00	41.7 PK	74.0	-32.3	1.08 H	229	38.5	3.2
4	4874.00	35.8 AV	54.0	-18.2	1.08 H	229	32.6	3.2
5	7311.00	43.4 PK	74.0	-30.6	2.10 H	242	34.5	8.9
6	7311.00	33.0 AV	54.0	-21.0	2.10 H	242	24.1	8.9
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	101.6 PK			3.44 V	326	103.1	-1.5
2	*2437.00	98.6 AV			3.44 V	326	100.1	-1.5
3	4874.00	40.0 PK	74.0	-34.0	4.00 V	221	36.8	3.2
4	4874.00	35.1 AV	54.0	-18.9	4.00 V	221	31.9	3.2
5	7311.00	43.3 PK	74.0	-30.7	1.60 V	154	34.4	8.9
6	7311.00	29.8 AV	54.0	-24.2	1.60 V	154	20.9	8.9

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)
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	109.2 PK			1.18 H	176	110.6	-1.4
2	*2462.00	106.8 AV			1.18 H	176	108.2	-1.4
3	2483.50	56.8 PK	74.0	-17.2	1.18 H	176	58.2	-1.4
4	2483.50	44.6 AV	54.0	-9.4	1.18 H	176	46.0	-1.4
5	4924.00	41.8 PK	74.0	-32.2	1.10 H	236	38.5	3.3
6	4924.00	36.1 AV	54.0	-17.9	1.10 H	236	32.8	3.3
7	7386.00	43.3 PK	74.0	-30.7	2.06 H	234	34.2	9.1
8	7386.00	32.8 AV	54.0	-21.2	2.06 H	234	23.7	9.1
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	101.8 PK			3.71 V	341	103.2	-1.4
2	*2462.00	99.1 AV			3.71 V	341	100.5	-1.4
3	2483.50	55.4 PK	74.0	-18.6	3.71 V	341	56.8	-1.4
4	2483.50	43.2 AV	54.0	-10.8	3.71 V	341	44.6	-1.4
5	4924.00	40.4 PK	74.0	-33.6	3.98 V	213	37.1	3.3
6	4924.00	35.3 AV	54.0	-18.7	3.98 V	213	32.0	3.3
7	7386.00	43.5 PK	74.0	-30.5	1.55 V	167	34.4	9.1
8	7386.00	30.1 AV	54.0	-23.9	1.55 V	167	21.0	9.1

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. 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)
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	61.9 PK	74.0	-12.1	1.04 H	167	63.5	-1.6
2	2390.00	49.7 AV	54.0	-4.3	1.04 H	167	51.3	-1.6
3	*2412.00	110.6 PK			1.04 H	167	112.1	-1.5
4	*2412.00	99.5 AV			1.04 H	167	101.0	-1.5
5	4824.00	37.4 PK	74.0	-36.6	1.62 H	64	34.4	3.0
6	4824.00	25.9 AV	54.0	-28.1	1.62 H	64	22.9	3.0
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	3.42 V	338	62.1	-1.6
2	2390.00	48.6 AV	54.0	-5.4	3.42 V	338	50.2	-1.6
3	*2412.00	103.2 PK			3.42 V	338	104.7	-1.5
4	*2412.00	91.9 AV			3.42 V	338	93.4	-1.5
5	4824.00	37.6 PK	74.0	-36.4	3.17 V	236	34.6	3.0
6	4824.00	25.8 AV	54.0	-28.2	3.17 V	236	22.8	3.0

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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)
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	*2437.00	110.7 PK			1.03 H	165	112.2	-1.5
2	*2437.00	99.4 AV			1.03 H	165	100.9	-1.5
3	4874.00	37.1 PK	74.0	-36.9	1.62 H	68	33.9	3.2
4	4874.00	25.4 AV	54.0	-28.6	1.62 H	68	22.2	3.2
5	7311.00	43.0 PK	74.0	-31.0	1.66 H	186	34.1	8.9
6	7311.00	30.1 AV	54.0	-23.9	1.66 H	186	21.2	8.9
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	103.1 PK			3.55 V	328	104.6	-1.5
2	*2437.00	91.6 AV			3.55 V	328	93.1	-1.5
3	4874.00	36.5 PK	74.0	-37.5	3.13 V	248	33.3	3.2
4	4874.00	25.1 AV	54.0	-28.9	3.13 V	248	21.9	3.2
5	7311.00	43.9 PK	74.0	-30.1	2.07 V	113	35.0	8.9
6	7311.00	31.0 AV	54.0	-23.0	2.07 V	113	22.1	8.9

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)
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	111.1 PK			1.05 H	168	112.5	-1.4
2	*2462.00	99.8 AV			1.05 H	168	101.2	-1.4
3	2483.50	69.1 PK	74.0	-4.9	1.00 H	168	70.5	-1.4
4	2483.50	52.9 AV	54.0	-1.1	1.00 H	168	54.3	-1.4
5	4924.00	37.1 PK	74.0	-36.9	1.59 H	69	33.8	3.3
6	4924.00	25.5 AV	54.0	-28.5	1.59 H	69	22.2	3.3
7	7386.00	43.2 PK	74.0	-30.8	1.65 H	179	34.1	9.1
8	7386.00	30.5 AV	54.0	-23.5	1.65 H	179	21.4	9.1
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	103.7 PK			3.56 V	342	105.1	-1.4
2	*2462.00	92.1 AV			3.56 V	342	93.5	-1.4
3	2483.50	68.2 PK	74.0	-5.8	3.56 V	342	69.6	-1.4
4	2483.50	51.7 AV	54.0	-2.3	3.56 V	342	53.1	-1.4
5	4924.00	37.0 PK	74.0	-37.0	3.13 V	245	33.7	3.3
6	4924.00	25.4 AV	54.0	-28.6	3.13 V	245	22.1	3.3
7	7386.00	43.5 PK	74.0	-30.5	2.08 V	118	34.4	9.1
8	7386.00	30.7 AV	54.0	-23.3	2.08 V	118	21.6	9.1

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

VHT20

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	61.1 PK	74.0	-12.9	2.89 H	183	62.7	-1.6
2	2390.00	48.4 AV	54.0	-5.6	2.89 H	183	50.0	-1.6
3	*2412.00	110.0 PK			2.89 H	183	111.5	-1.5
4	*2412.00	98.7 AV			2.89 H	183	100.2	-1.5
5	4824.00	37.5 PK	74.0	-36.5	1.63 H	89	34.5	3.0
6	4824.00	25.5 AV	54.0	-28.5	1.63 H	89	22.5	3.0
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	60.2 PK	74.0	-13.8	3.60 V	358	61.8	-1.6
2	2390.00	47.6 AV	54.0	-6.4	3.60 V	358	49.2	-1.6
3	*2412.00	102.3 PK			3.60 V	358	103.8	-1.5
4	*2412.00	91.3 AV			3.60 V	358	92.8	-1.5
5	4824.00	37.9 PK	74.0	-36.1	3.09 V	243	34.9	3.0
6	4824.00	26.0 AV	54.0	-28.0	3.09 V	243	23.0	3.0

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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)
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	*2437.00	110.3 PK			3.29 H	195	111.8	-1.5
2	*2437.00	98.8 AV			3.29 H	195	100.3	-1.5
3	4874.00	37.9 PK	74.0	-36.1	1.58 H	79	34.7	3.2
4	4874.00	25.8 AV	54.0	-28.2	1.58 H	79	22.6	3.2
5	7311.00	43.6 PK	74.0	-30.4	1.64 H	184	34.7	8.9
6	7311.00	30.9 AV	54.0	-23.1	1.64 H	184	22.0	8.9
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	102.9 PK			3.45 V	356	104.4	-1.5
2	*2437.00	91.4 AV			3.45 V	356	92.9	-1.5
3	4874.00	37.5 PK	74.0	-36.5	3.10 V	236	34.3	3.2
4	4874.00	25.6 AV	54.0	-28.4	3.10 V	236	22.4	3.2
5	7311.00	43.3 PK	74.0	-30.7	2.09 V	123	34.4	8.9
6	7311.00	30.9 AV	54.0	-23.1	2.09 V	123	22.0	8.9

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)
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	110.5 PK			3.31 H	171	111.9	-1.4
2	*2462.00	99.5 AV			3.31 H	171	100.9	-1.4
3	2483.50	70.2 PK	74.0	-3.8	3.31 H	171	71.6	-1.4
4	2483.50	52.8 AV	54.0	-1.2	3.31 H	171	54.2	-1.4
5	4924.00	37.4 PK	74.0	-36.6	1.60 H	85	34.1	3.3
6	4924.00	25.6 AV	54.0	-28.4	1.60 H	85	22.3	3.3
7	7386.00	43.3 PK	74.0	-30.7	1.65 H	183	34.2	9.1
8	7386.00	30.4 AV	54.0	-23.6	1.65 H	183	21.3	9.1
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	104.0 PK			3.52 V	333	105.4	-1.4
2	*2462.00	92.6 AV			3.52 V	333	94.0	-1.4
3	2483.50	69.4 PK	74.0	-4.6	3.52 V	333	70.8	-1.4
4	2483.50	51.6 AV	54.0	-2.4	3.52 V	333	53.0	-1.4
5	4924.00	37.7 PK	74.0	-36.3	3.07 V	243	34.4	3.3
6	4924.00	25.9 AV	54.0	-28.1	3.07 V	243	22.6	3.3
7	7386.00	43.2 PK	74.0	-30.8	2.12 V	107	34.1	9.1
8	7386.00	30.5 AV	54.0	-23.5	2.12 V	107	21.4	9.1

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

VHT40

CHANNEL	TX Channel 3	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	61.5 PK	74.0	-12.5	2.71 H	187	63.1	-1.6
2	2390.00	51.2 AV	54.0	-2.8	2.71 H	187	52.8	-1.6
3	*2422.00	108.1 PK			2.71 H	187	109.7	-1.6
4	*2422.00	98.9 AV			2.71 H	187	100.5	-1.6
5	4844.00	36.9 PK	74.0	-37.1	1.61 H	66	33.8	3.1
6	4844.00	25.5 AV	54.0	-28.5	1.61 H	66	22.4	3.1
7	7266.00	43.5 PK	74.0	-30.5	1.66 H	190	34.6	8.9
8	7266.00	30.6 AV	54.0	-23.4	1.66 H	190	21.7	8.9
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	60.6 PK	74.0	-13.4	2.65 V	342	62.2	-1.6
2	2390.00	50.4 AV	54.0	-3.6	2.65 V	342	52.0	-1.6
3	*2422.00	100.7 PK			2.65 V	342	102.3	-1.6
4	*2422.00	91.2 AV			2.65 V	342	92.8	-1.6
5	4844.00	37.3 PK	74.0	-36.7	3.13 V	240	34.2	3.1
6	4844.00	25.6 AV	54.0	-28.4	3.13 V	240	22.5	3.1
7	7266.00	44.0 PK	74.0	-30.0	2.01 V	113	35.1	8.9
8	7266.00	31.1 AV	54.0	-22.9	2.01 V	113	22.2	8.9

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)
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	55.9 PK	74.0	-18.1	2.77 H	188	57.5	-1.6
2	2390.00	45.8 AV	54.0	-8.2	2.77 H	188	47.4	-1.6
3	*2437.00	107.9 PK			2.77 H	188	109.4	-1.5
4	*2437.00	98.8 AV			2.77 H	188	100.3	-1.5
5	2483.50	62.2 PK	74.0	-11.8	2.77 H	188	63.6	-1.4
6	2483.50	51.0 AV	54.0	-3.0	2.77 H	188	52.4	-1.4
7	4874.00	37.1 PK	74.0	-36.9	1.56 H	58	33.9	3.2
8	4874.00	25.5 AV	54.0	-28.5	1.56 H	58	22.3	3.2
9	7311.00	43.1 PK	74.0	-30.9	1.63 H	192	34.2	8.9
10	7311.00	30.3 AV	54.0	-23.7	1.63 H	192	21.4	8.9

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	54.3 PK	74.0	-19.7	2.65 V	342	55.9	-1.6
2	2390.00	44.5 AV	54.0	-9.5	2.65 V	342	46.1	-1.6
3	*2437.00	100.5 PK			2.66 V	329	102.0	-1.5
4	*2437.00	91.1 AV			2.66 V	329	92.6	-1.5
5	2483.50	61.3 PK	74.0	-12.7	2.65 V	342	62.7	-1.4
6	2483.50	50.3 AV	54.0	-3.7	2.65 V	342	51.7	-1.4
7	4874.00	37.3 PK	74.0	-36.7	3.08 V	239	34.1	3.2
8	4874.00	25.6 AV	54.0	-28.4	3.08 V	239	22.4	3.2
9	7311.00	44.0 PK	74.0	-30.0	2.03 V	116	35.1	8.9
10	7311.00	31.1 AV	54.0	-22.9	2.03 V	116	22.2	8.9

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 9	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	*2452.00	105.8 PK			2.74 H	186	107.3	-1.5
2	*2452.00	96.7 AV			2.74 H	186	98.2	-1.5
3	2483.50	67.5 PK	74.0	-6.5	2.74 H	186	68.9	-1.4
4	2483.50	52.9 AV	54.0	-1.1	2.74 H	186	54.3	-1.4
5	4904.00	36.9 PK	74.0	-37.1	1.56 H	71	33.7	3.2
6	4904.00	25.3 AV	54.0	-28.7	1.56 H	71	22.1	3.2
7	7356.00	43.1 PK	74.0	-30.9	1.69 H	200	34.0	9.1
8	7356.00	30.6 AV	54.0	-23.4	1.69 H	200	21.5	9.1
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	*2452.00	99.4 PK			2.67 V	346	100.9	-1.5
2	*2452.00	90.0 AV			2.67 V	346	91.5	-1.5
3	2483.50	66.8 PK	74.0	-7.2	2.67 V	346	68.2	-1.4
4	2483.50	51.7 AV	54.0	-2.3	2.67 V	346	53.1	-1.4
5	4904.00	37.9 PK	74.0	-36.1	3.09 V	241	34.7	3.2
6	4904.00	26.0 AV	54.0	-28.0	3.09 V	241	22.8	3.2
7	7356.00	43.6 PK	74.0	-30.4	1.98 V	103	34.5	9.1
8	7356.00	30.9 AV	54.0	-23.1	1.98 V	103	21.8	9.1

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

Below 1GHz Data:

VHT40

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	31.26	25.8 QP	40.0	-14.2	1.50 H	1	35.5	-9.7
2	71.08	28.3 QP	40.0	-11.7	1.50 H	288	39.2	-10.9
3	161.77	37.9 QP	43.5	-5.6	2.00 H	74	46.2	-8.3
4	250.00	27.6 QP	46.0	-18.4	1.00 H	290	37.1	-9.5
5	499.99	29.1 QP	46.0	-16.9	2.00 H	38	31.8	-2.7
6	947.84	31.8 QP	46.0	-14.2	1.50 H	0	27.1	4.7
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	55.03	36.5 QP	40.0	-3.5	1.50 V	7	45.1	-8.6
2	162.07	34.7 QP	43.5	-8.8	1.00 V	156	43.0	-8.3
3	250.04	24.2 QP	46.0	-21.8	2.00 V	135	33.7	-9.5
4	499.99	29.0 QP	46.0	-17.0	1.00 V	190	31.7	-2.7
5	644.37	29.7 QP	46.0	-16.3	1.50 V	56	29.3	0.4
6	963.02	30.9 QP	54.0	-23.1	1.00 V	36	26.1	4.8

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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	847124/029	Oct. 24, 2016	Oct. 23, 2017
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 26, 2016	Oct. 25, 2017
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 13, 2016	June 12, 2017
50 ohms Terminator	N/A	EMC-02	Sep. 29, 2016	Sep. 28, 2017
RF Cable	5D-FB	COCCAB-001	Sep. 30, 2016	Sep. 29, 2017
10 dB PAD Mini-Circuits	HAT-10+	CONATT-004	June 20, 2016	June 19, 2017
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 Shielded Room No. 1.
3. Tested Date: May 02, 2017

4.2.3 Test Procedures

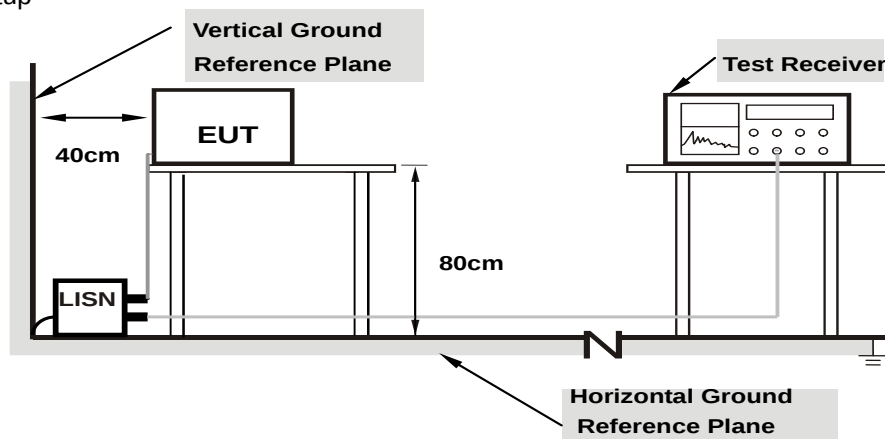
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

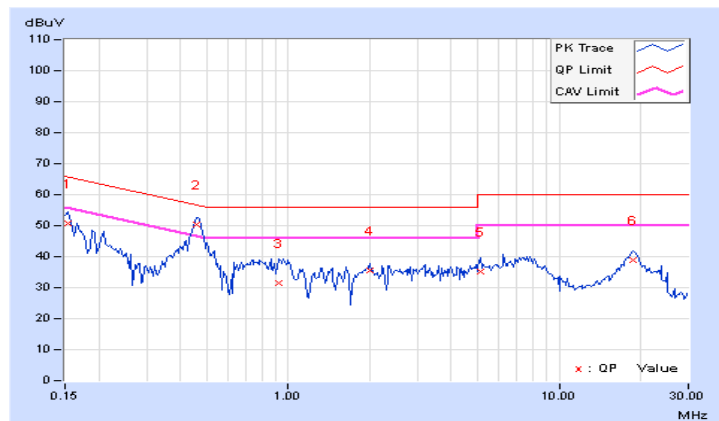
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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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	0.15391	10.19	40.71	25.06	50.90	35.25	65.79	55.79	-14.89	-20.54
2	0.45859	10.22	40.10	34.45	50.32	44.67	56.72	46.72	-6.40	-2.05
3	0.91953	10.25	21.40	7.72	31.65	17.97	56.00	46.00	-24.35	-28.03
4	1.99219	10.24	25.26	17.41	35.50	27.65	56.00	46.00	-20.50	-18.35
5	5.10938	10.30	24.84	17.55	35.14	27.85	60.00	50.00	-24.86	-22.15
6	18.71484	11.30	27.56	23.09	38.86	34.39	60.00	50.00	-21.14	-15.61

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.

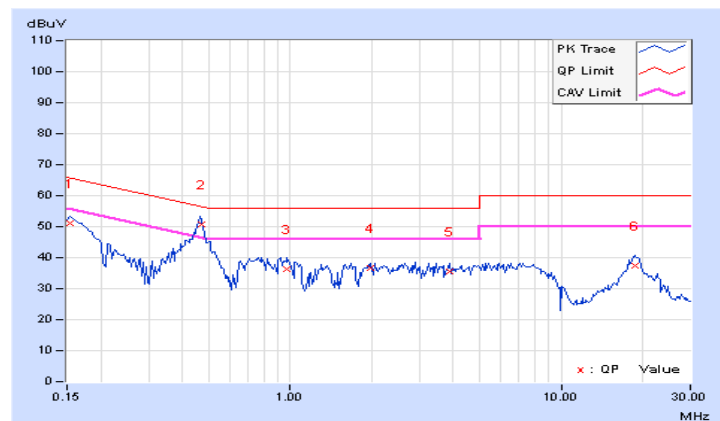


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.18	40.81	25.50	50.99	35.68	65.79	55.79	-14.80	-20.11
2	0.47031	10.21	40.51	33.58	50.72	43.79	56.51	46.51	-5.79	-2.72
3	0.96641	10.23	26.12	18.30	36.35	28.53	56.00	46.00	-19.65	-17.47
4	1.97266	10.28	26.22	19.01	36.50	29.29	56.00	46.00	-19.50	-16.71
5	3.89063	10.17	25.49	18.18	35.66	28.35	56.00	46.00	-20.34	-17.65
6	18.73438	11.04	26.19	21.36	37.23	32.40	60.00	50.00	-22.77	-17.60

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.

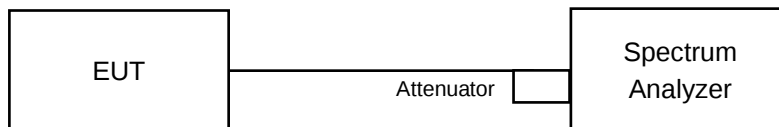


4.3 6dB Bandwidth Measurement

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	7.64	0.5	PASS
6	2437	8.12	0.5	PASS
11	2462	7.61	0.5	PASS

802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.40	0.5	PASS
6	2437	16.40	0.5	PASS
11	2462	16.41	0.5	PASS

VHT20

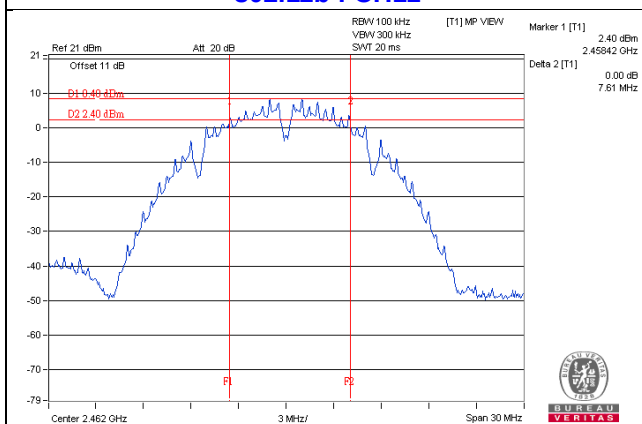
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.61	0.5	Pass
6	2437	17.27	0.5	Pass
11	2462	17.61	0.5	Pass

VHT40

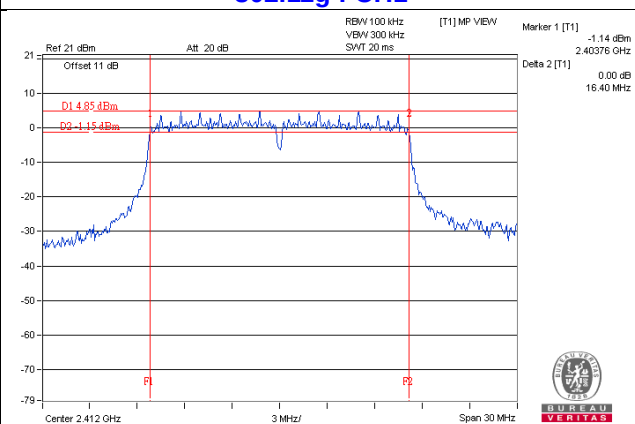
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	35.30	0.5	Pass
6	2437	34.03	0.5	Pass
9	2452	35.63	0.5	Pass

Spectrum Plot of Worst Value

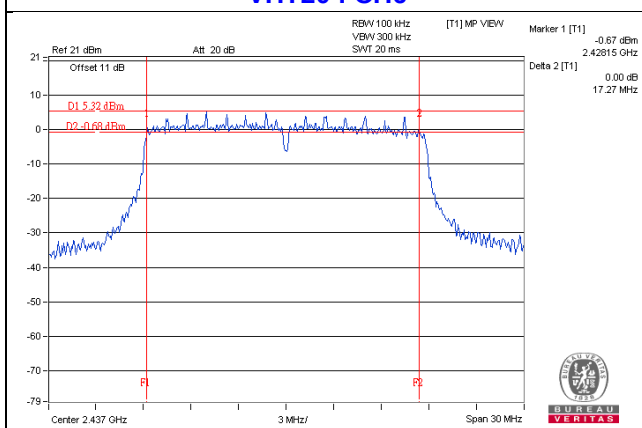
802.11b : CH11



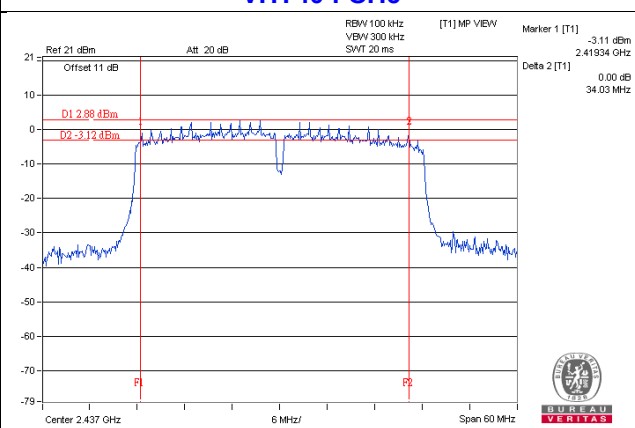
802.11g : CH1



VHT20 : CH6



VHT40 : CH6

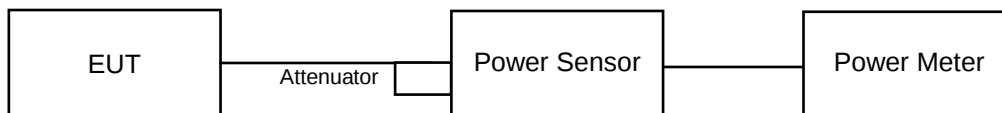


4.4 Conducted Output Power Measurement

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	76.208	18.82	30	Pass
6	2437	76.736	18.85	30	Pass
11	2462	74.645	18.73	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	203.704	23.09	30	Pass
6	2437	217.27	23.37	30	Pass
11	2462	208.449	23.19	30	Pass

VHT20

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	178.649	22.52	30	Pass
6	2437	198.609	22.98	30	Pass
11	2462	194.984	22.90	30	Pass

VHT40

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
3	2422	199.986	23.01	30	Pass
6	2437	221.82	23.46	30	Pass
9	2452	149.279	21.74	30	Pass

FOR AVERAGE POWER

802.11b

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	43.752	16.41
6	2437	44.566	16.49
11	2462	43.652	16.40

802.11g

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	44.668	16.50
6	2437	43.652	16.40
11	2462	44.361	16.47

VHT20

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	44.361	16.47
6	2437	44.771	16.51
11	2462	43.053	16.34

VHT40

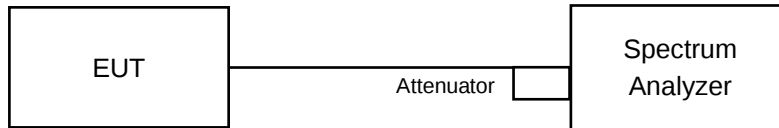
Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
3	2422	43.752	16.41
6	2437	44.875	16.52
9	2452	20.045	13.02

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

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set the VBW $\geq 3 \times \text{RBW}$.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- 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/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-9.64	8	Pass
6	2437	-8.71	8	Pass
11	2462	-7.43	8	Pass

802.11g

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-11.36	8	Pass
6	2437	-12.04	8	Pass
11	2462	-12.07	8	Pass

VHT20

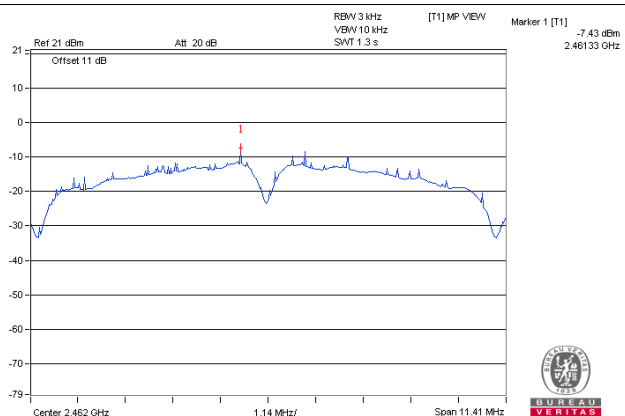
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-11.67	8	Pass
6	2437	-11.31	8	Pass
11	2462	-11.54	8	Pass

VHT40

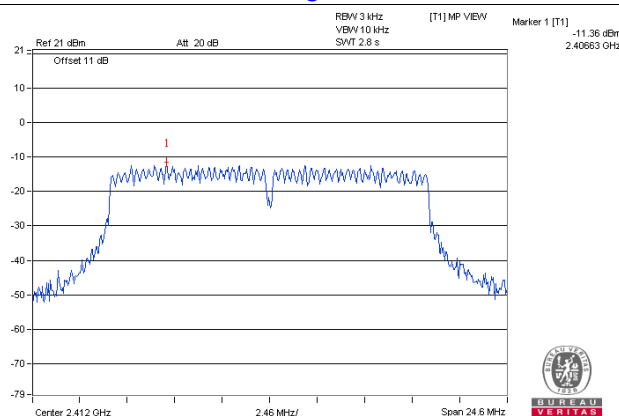
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
3	2422	-14.36	8	Pass
6	2437	-13.72	8	Pass
9	2452	-15.98	8	Pass

Spectrum Plot of Worst Value

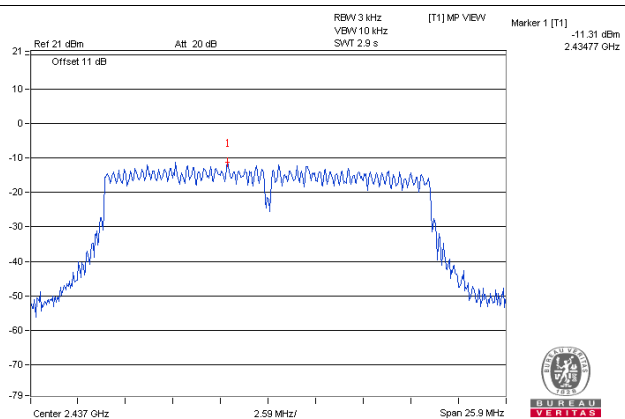
802.11b: CH11



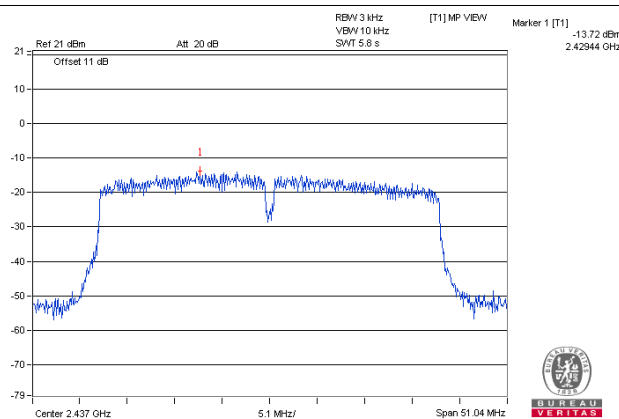
802.11g : CH1



VHT20: CH6



VHT40 : CH6

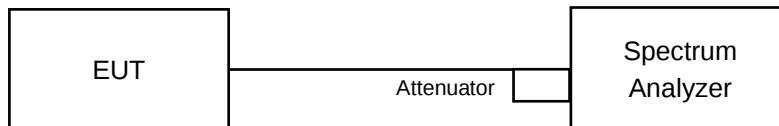


4.6 Conducted Out of Band Emission Measurement

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 $\geq$ 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

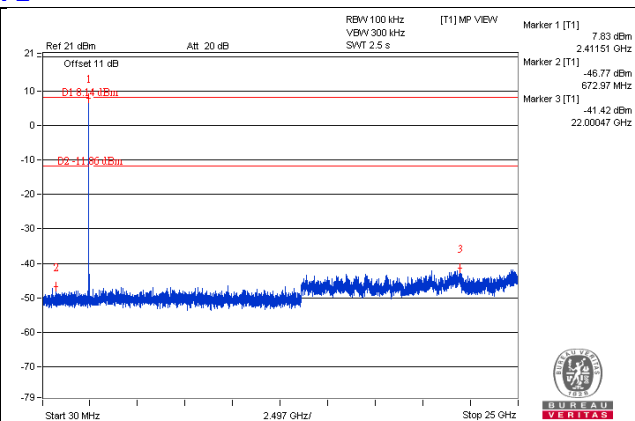
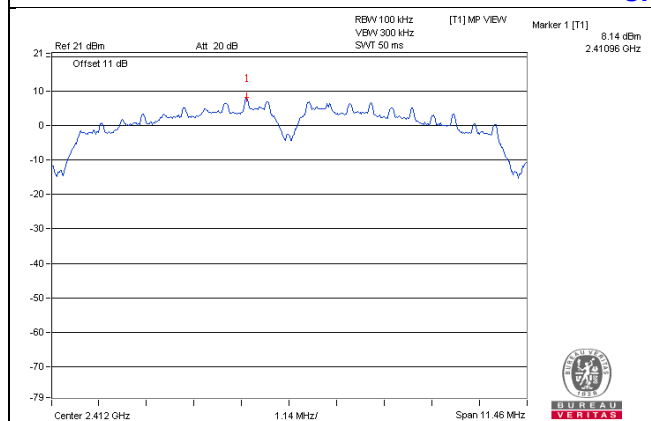
Same as Item 4.3.6

4.6.7 Test Results

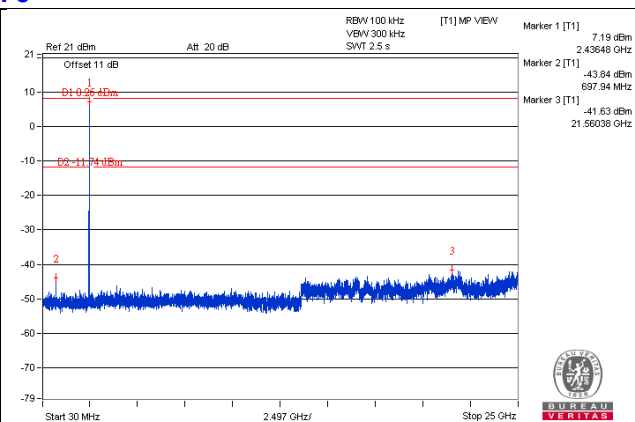
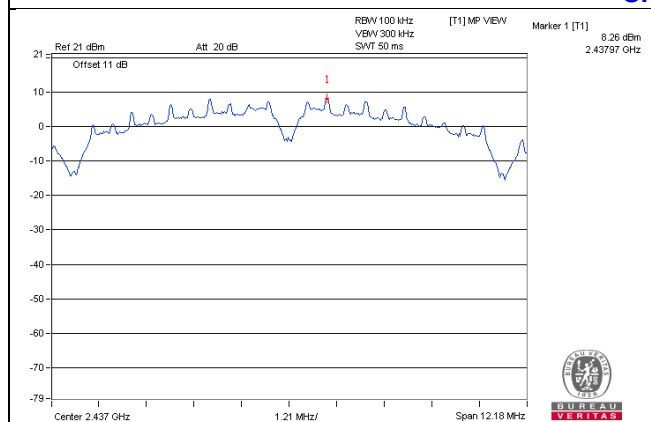
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11b

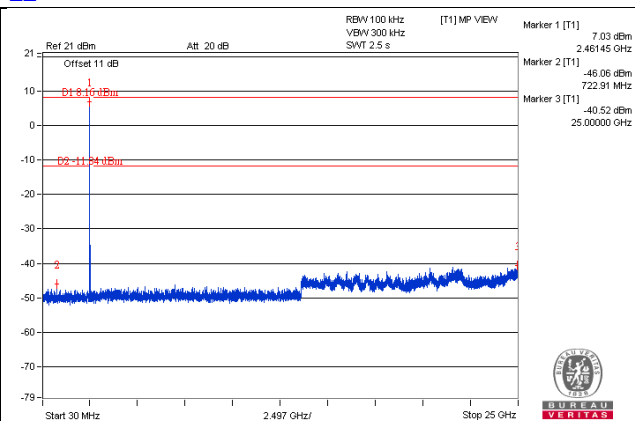
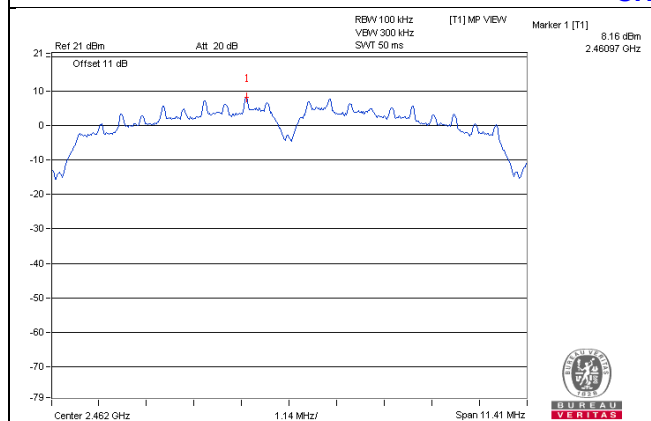
CH 1



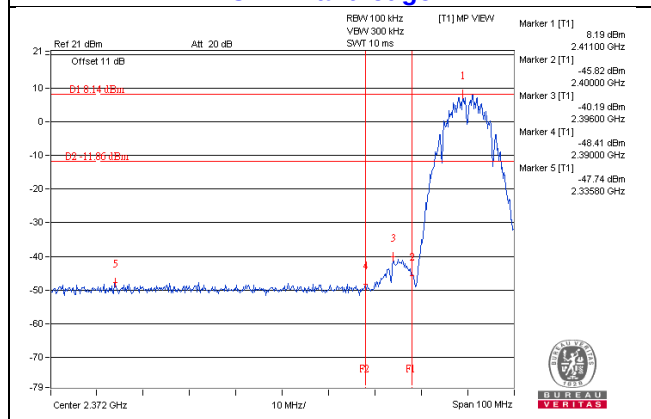
CH 6



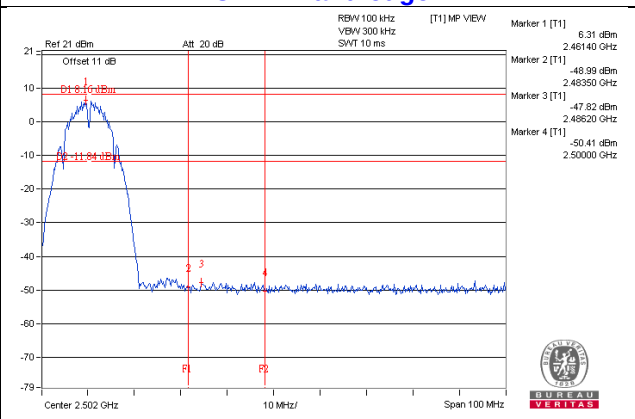
CH 11



CH 1 Band edge

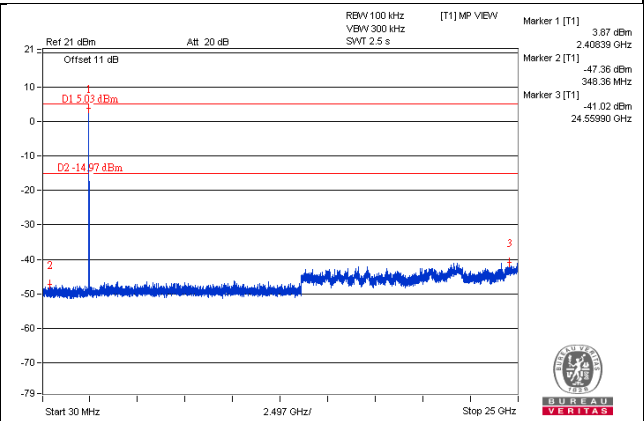
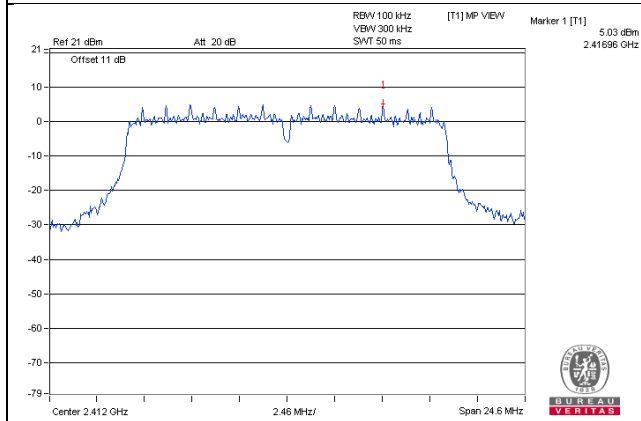


CH 11 Band edge

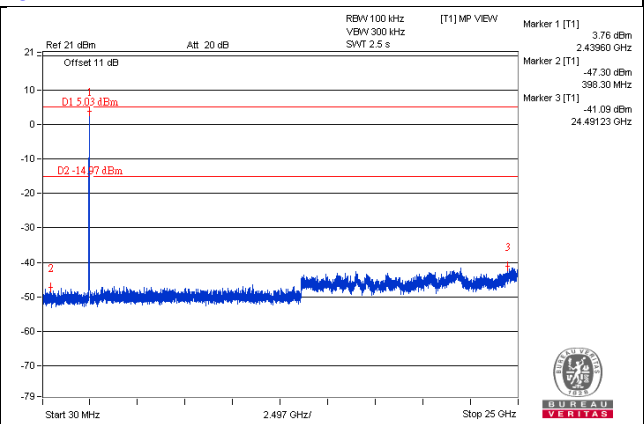
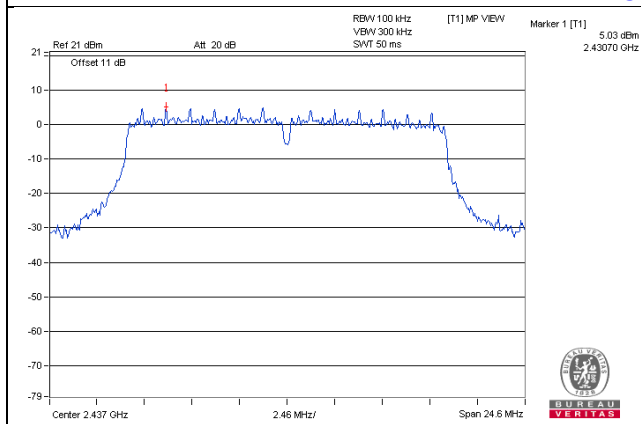


802.11g

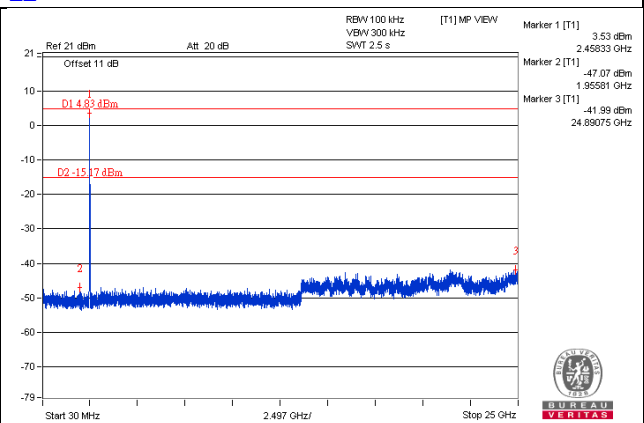
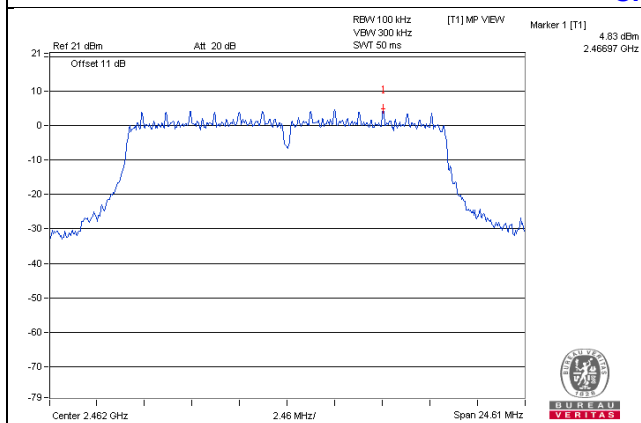
CH 1



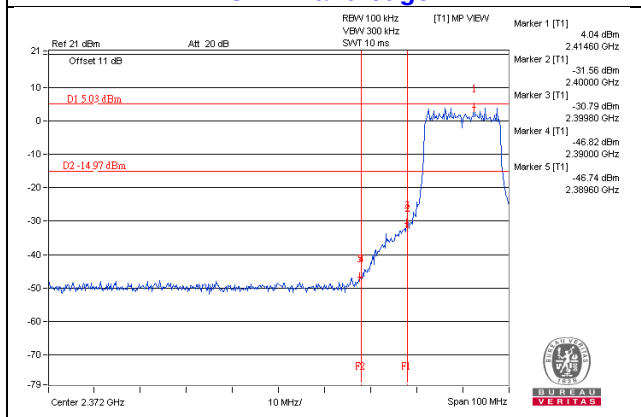
CH 6



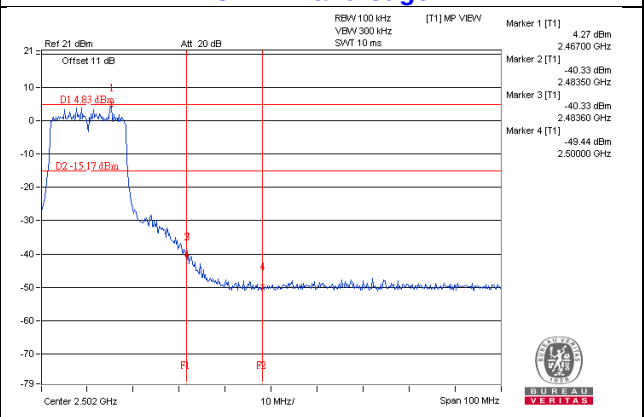
CH 11



CH 1 Band edge

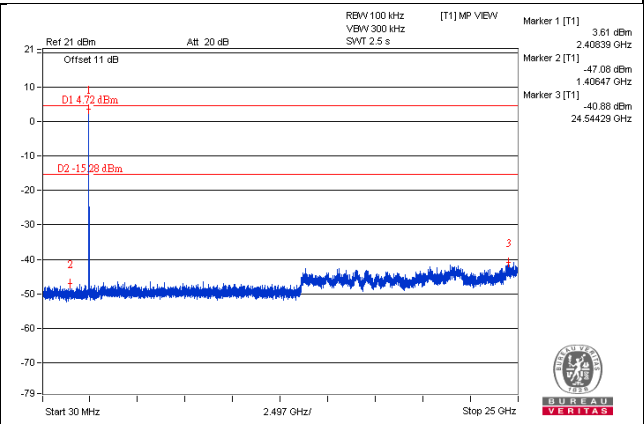
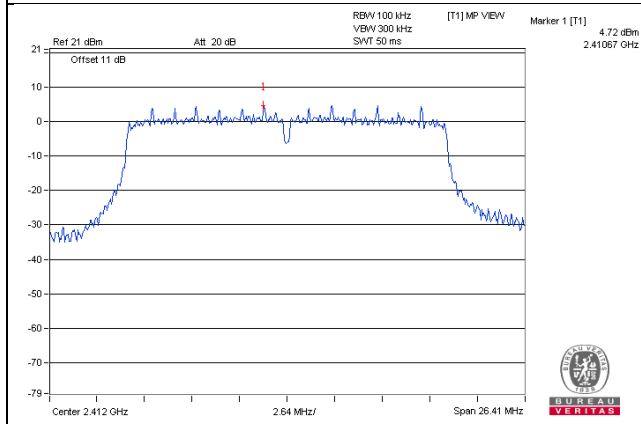


CH 11 Band edge

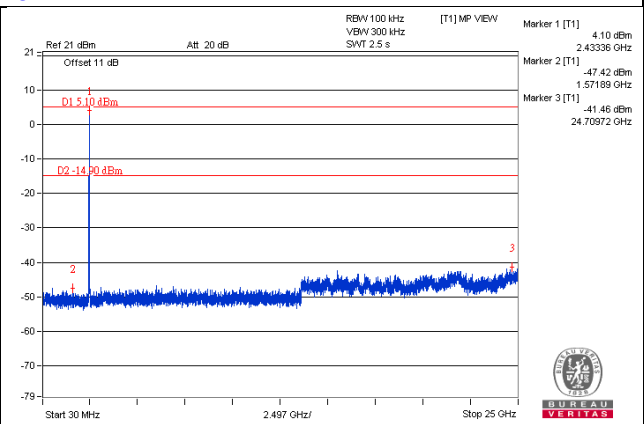
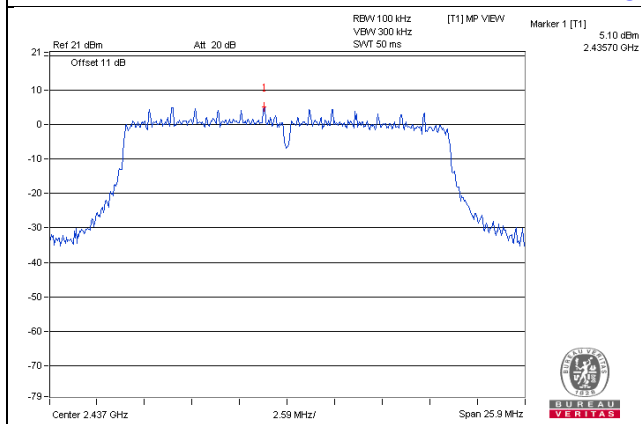


VHT20

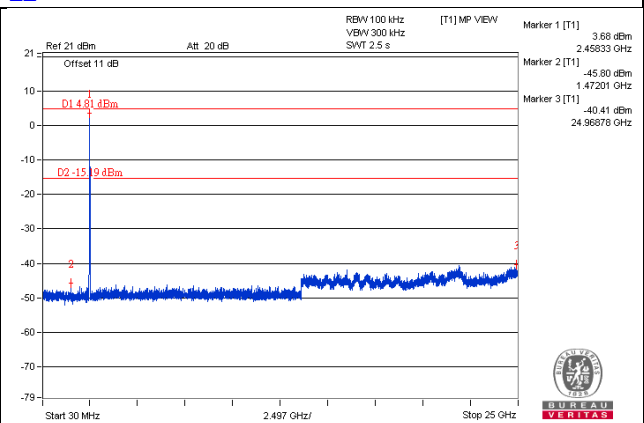
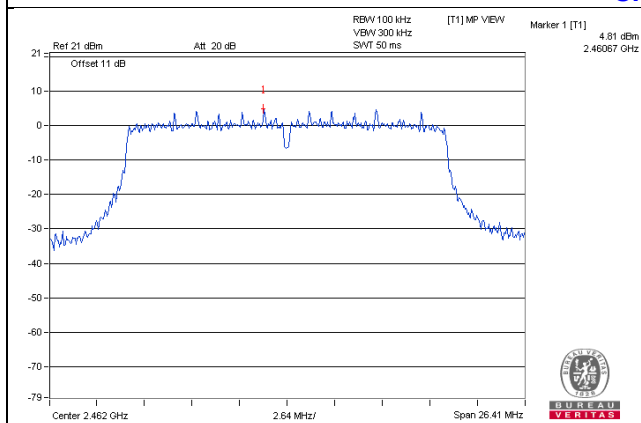
CH 1



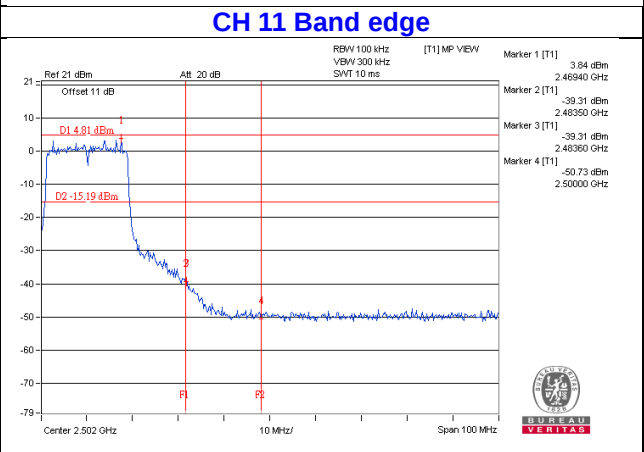
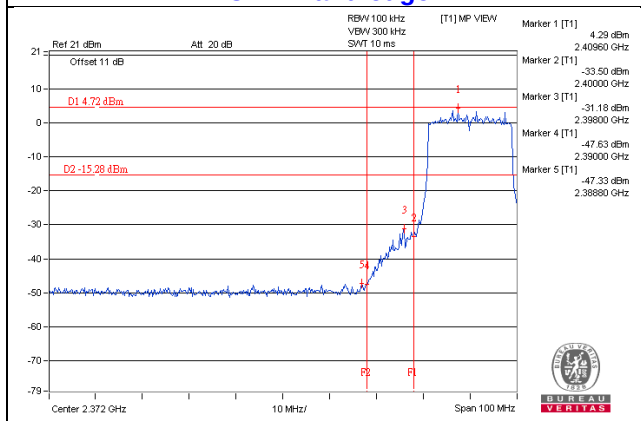
CH 6



CH 11

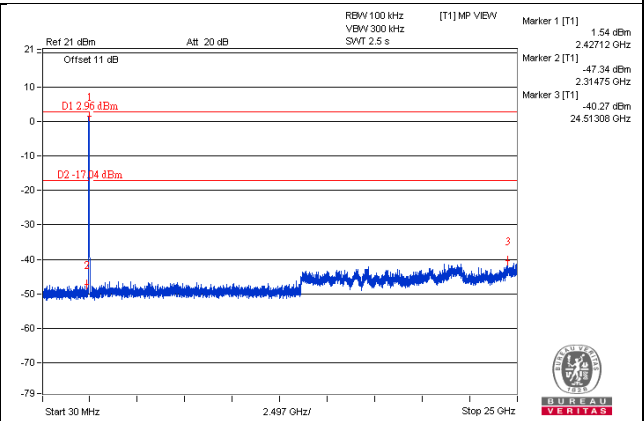
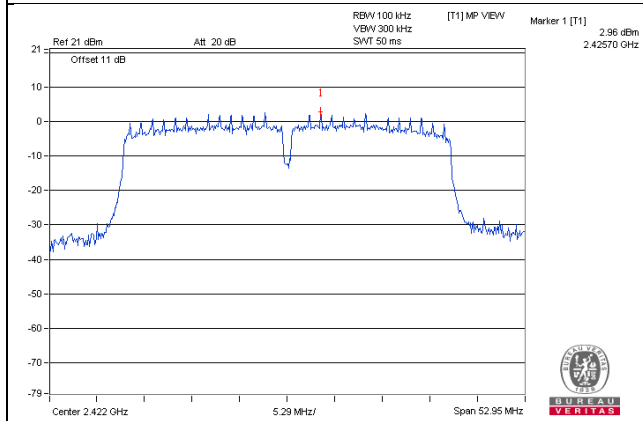


CH 1 Band edge

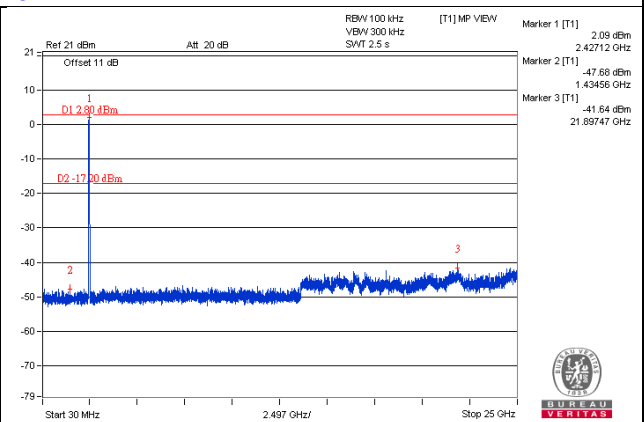
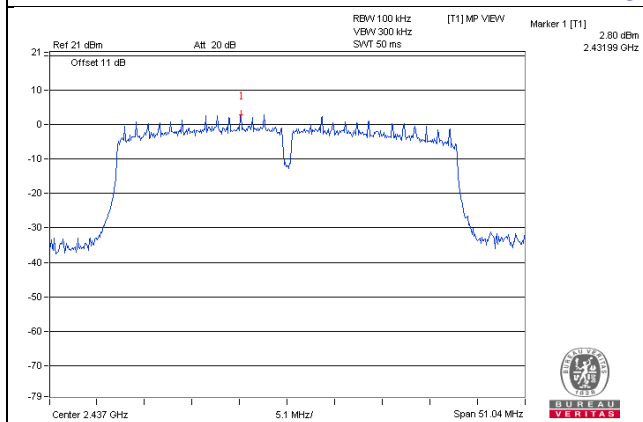


VHT40

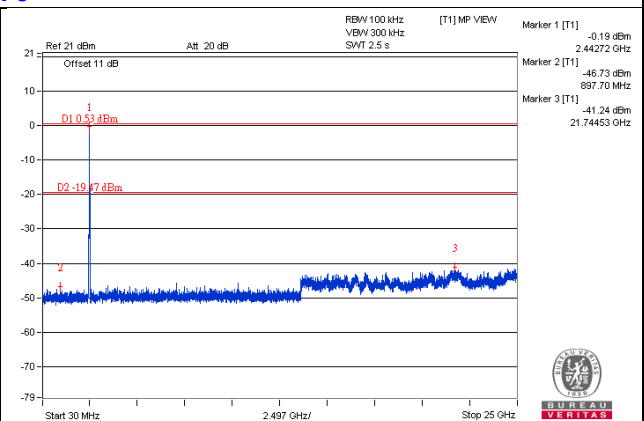
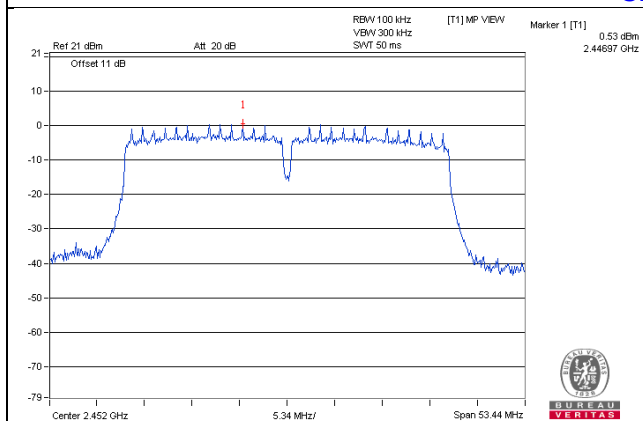
CH 3



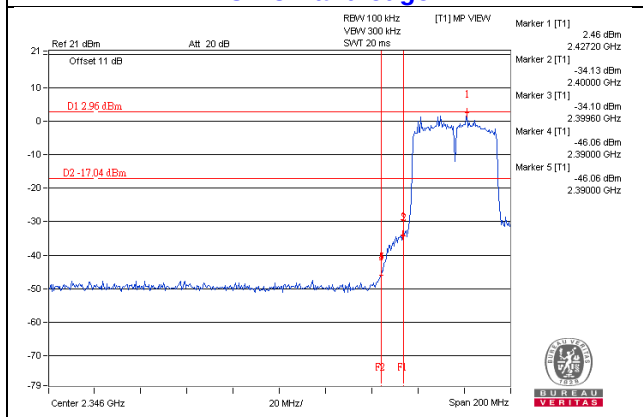
CH 6



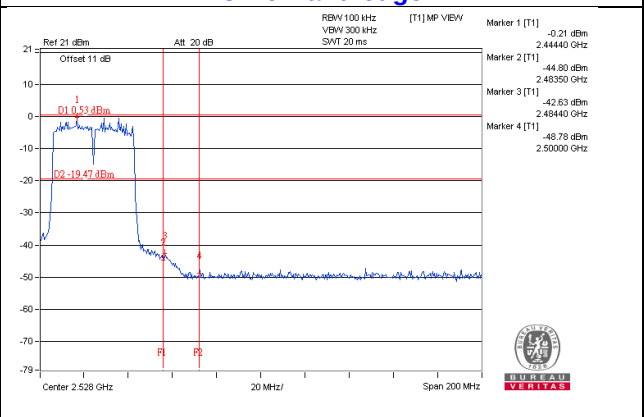
CH 9



CH 3 Band edge



CH 9 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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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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