FCC Test Report

Report No.:	RF180109E07
FCC ID:	PY317300399
Test Model:	VMB3500
Received Date:	Jan. 19, 2018
Test Date:	Mar. 06 to 13, 2018
Issued Date:	Mar. 22, 2018
Applicant:	NETGEAR, Inc.
Address:	350 East Plumeria Drive San Jose, CA 95134
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
RF180109E07	Original release.	Mar. 22, 2018

1 Certificate of Conformity

Product:	IP Camera Base Station
Brand:	NETGEAR
Test Model:	VMB3500
Sample Status:	ENGINEERING SAMPLE
Applicant:	NETGEAR, Inc.
Test Date:	Mar. 06 to 13, 2018
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 : _____ , **Date:** Mar. 22, 2018

Phoenix Huang / Specialist

Approved by : _____ , **Date:** Mar. 22, 2018

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 -13.75dB at 0.37266MHz.
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 2390MHz & 2483.5MHz.
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.

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	5.53 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.08 dB
	6GHz ~ 18GHz	4.98 dB
	18GHz ~ 40GHz	5.19 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	IP Camera Base Station
Brand	NETGEAR
Test Model	VMB3500
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	12Vdc from power adapter
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	327.341mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x1
Data Cable Supplied	NA

Note:

1. The EUT must be supplied with a power adapter and the following different models could be chosen:

No	Brand	Model No.	P/N No.	Spec.	Plug
1	NETGEAR	AD2072F20	332-10830-01	Input: 100-240Vac, 0.15A, 50/60Hz Output: 12Vdc, 0.5A DC output cable (Unshielded, 1.8m)	FCC
2	NETGEAR	2ACT006F NJ	332-10919-01	Input: 100-240Vac, 0.2A, 50/60Hz Output: 12Vdc, 0.5A DC output cable (Unshielded, 1.8m)	FCC
Note: For radiated emissions test, the EUT of adapters was pre-tested with above Adapter 1 & 2, the worst case was found in Adapter 2.					

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

Antenna No.	Transmitter Circuit	Brand	Model No.	Antenna Net Gain (dBi)	Frequency Range (GHz)	Antenna Type	Connecter Type
1	Chain (0)	Master Wave	902E00006N0	1.62	2.4~2.4835	PIFA	NA
2	Chain (1)	Master Wave	902E00007N0	2.58	2.4~2.4835	PIFA	NA
Note: For transmission mode will fix transmission on Chain (0)							

3. The EUT incorporates a SIMO function.

MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11b	1~11Mbps	1TX (Fixed Chain 0)	2RX
802.11g	6~54Mbps	1TX (Fixed Chain 0)	2RX
802.11n (HT20)	MCS 0~7	1TX (Fixed Chain 0)	2RX

4. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

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

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
1	√	√	√	√	EUT with Adapter 2
2	-	-	√	-	EUT with Adapter 1

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

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

Note: "-"means no effect.

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)
802.11g	1 to 11	6	OFDM	BPSK	6

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)
802.11g	1 to 11	6	OFDM	BPSK	6

Antenna Port Conducted Measurement:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

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

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

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

Test Condition:

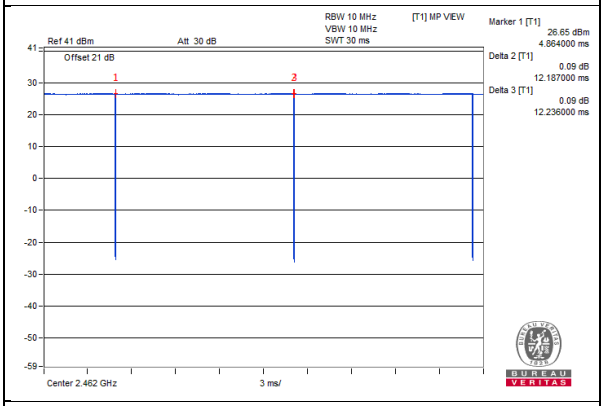
APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	23deg. C, 67%RH	120Vac, 60Hz	Frank Chuang
RE<1G	22deg. C, 68%RH	120Vac, 60Hz	Frank Chuang
PLC	25deg. C, 75%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Jyunchung Lin

3.3 Duty Cycle of Test Signal

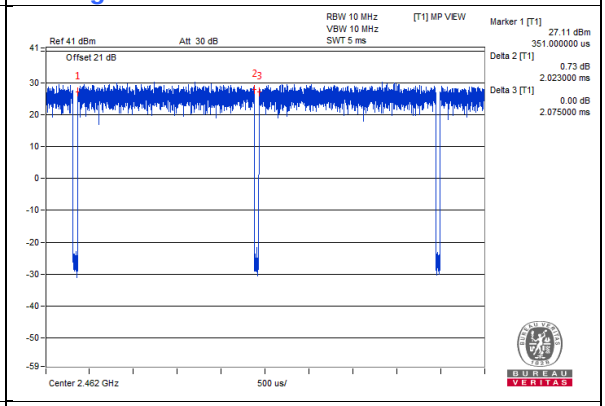
If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11b: Duty cycle = 12.187/12.236 = 0.996
802.11g: Duty cycle = 2.023/2.075 = 0.975, Duty factor = 10 * log(1/ Duty cycle) = 0.11
802.11n (HT20): Duty cycle = 1.887/1.938 = 0.974, Duty factor = 10 * log(1/ Duty cycle) = 0.12

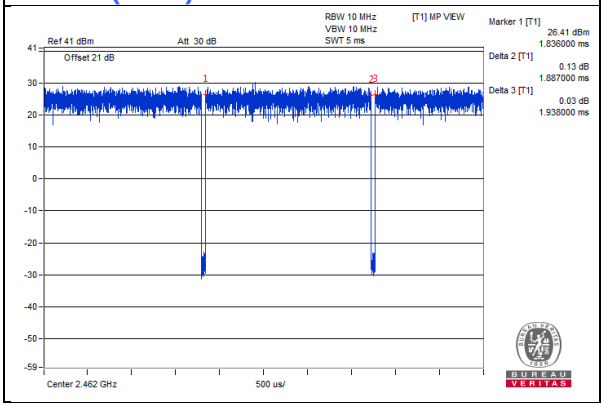
802.11b



802.11g



802.11n (HT20)



3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

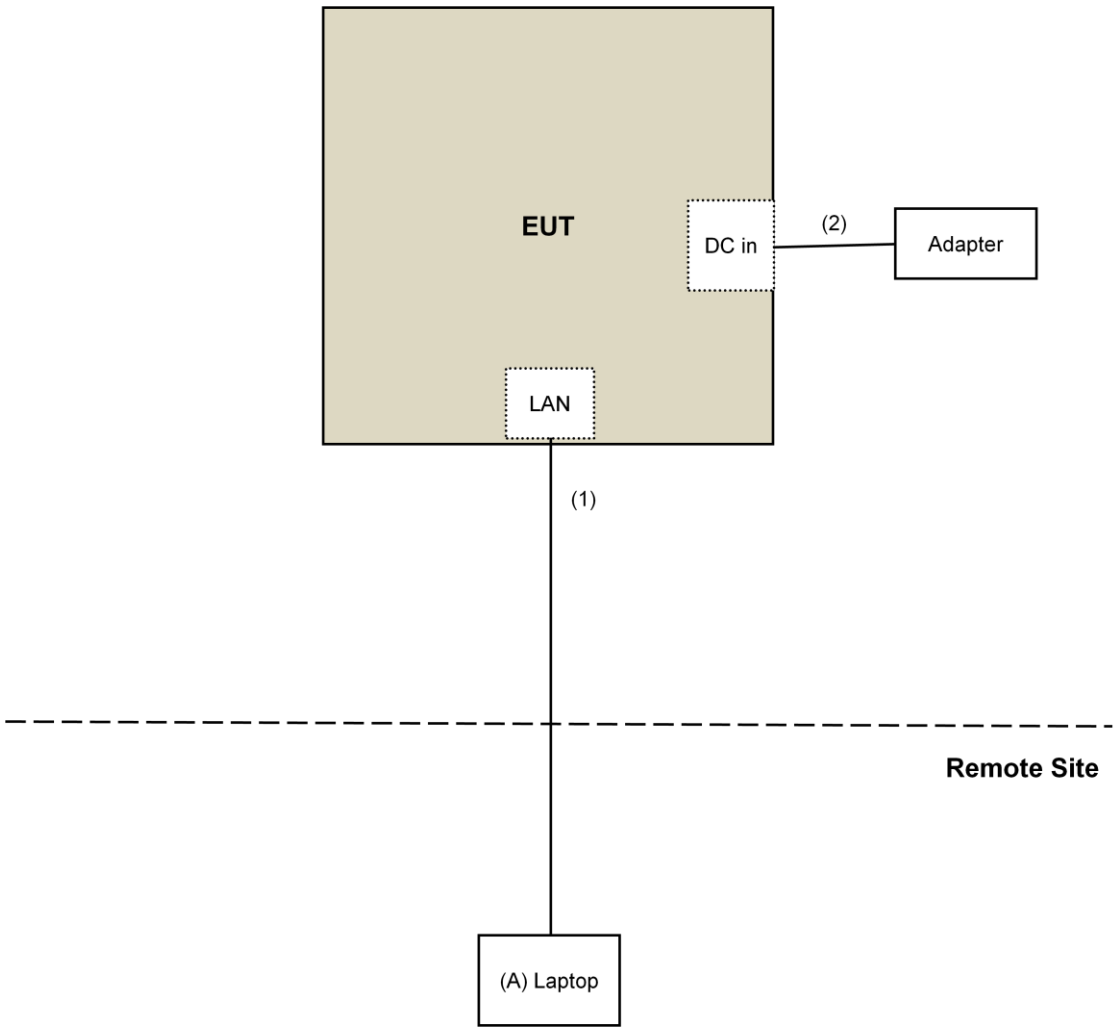
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	DELL	E6420	B92T3R1	FCC DoC	Provided by Lab

Note:

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.	DC Cable	1	1.8	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 DTS Meas Guidance v04

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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	July 12, 2017	July 11, 2018
Pre-Amplifier(*) EMCI	EMC001340	980142	Feb. 09, 2018	Feb. 08, 2019
Loop Antenna(*) Electro-Metrics	EM-6879	264	Dec. 16, 2016	Dec. 15, 2018
RF Cable	5D-FB	LOOPCAB-001 LOOPCAB-002	Jan. 15, 2018	Jan. 14, 2019
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	May 06, 2017	May 05, 2018
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Nov. 29, 2017	Nov. 28, 2018
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. 03, 2017	Oct. 02, 2018
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Dec. 12, 2017	Dec. 11, 2018
Pre-Amplifier EMCI	EMC12630SE	980384	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-1200 EMC104-SM-SM-2000 EMC104-SM-SM-5000	160922 150317 150322	Jan. 29, 2018	Jan. 28, 2019
Spectrum Analyzer Keysight	N9030A	MY54490679	July 25, 2017	July 24, 2018
Pre-Amplifier EMCI	EMC184045SE	980386	Jan. 29, 2018	Jan. 28, 2019
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 14, 2017	Dec. 13, 2018
RF Cable	EMC102-KM-KM-1200	160924	Jan. 29, 2018	Jan. 28, 2019
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	July 1, 2017	June 30, 2018
Power meter Anritsu	ML2495A	1014008	May 11, 2017	May 10, 2018
Power sensor Anritsu	MA2411B	0917122	May 11, 2017	May 10, 2018

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 CANADA Site Registration No. is 20331-1
5. Loop antenna was used for all emissions below 30 MHz.
6. Tested Date: Mar. 13, 2018

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 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:

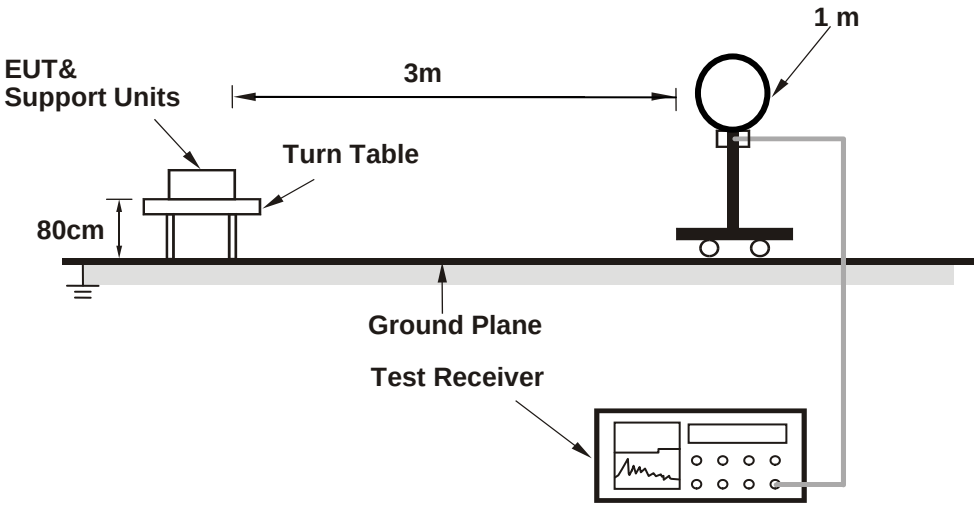
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 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

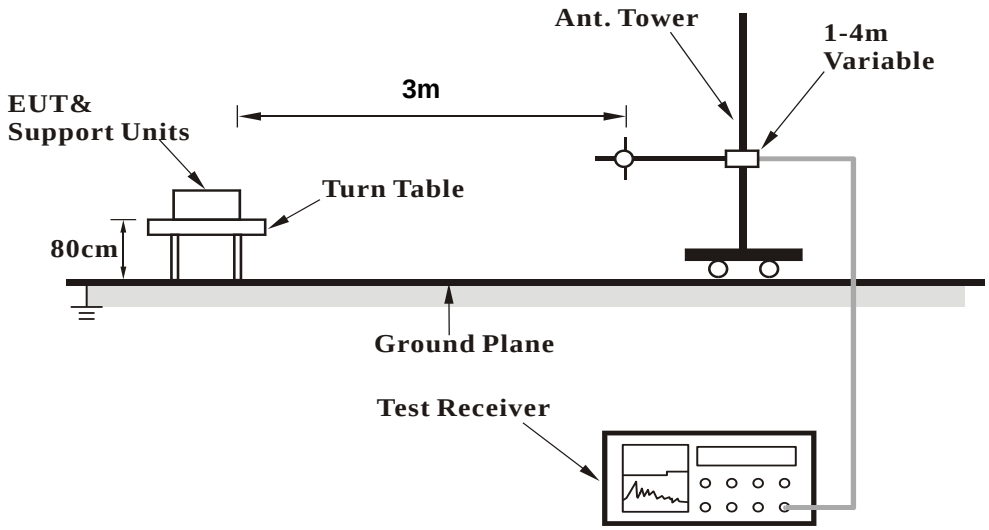
No deviation.

4.1.5 Test Setup

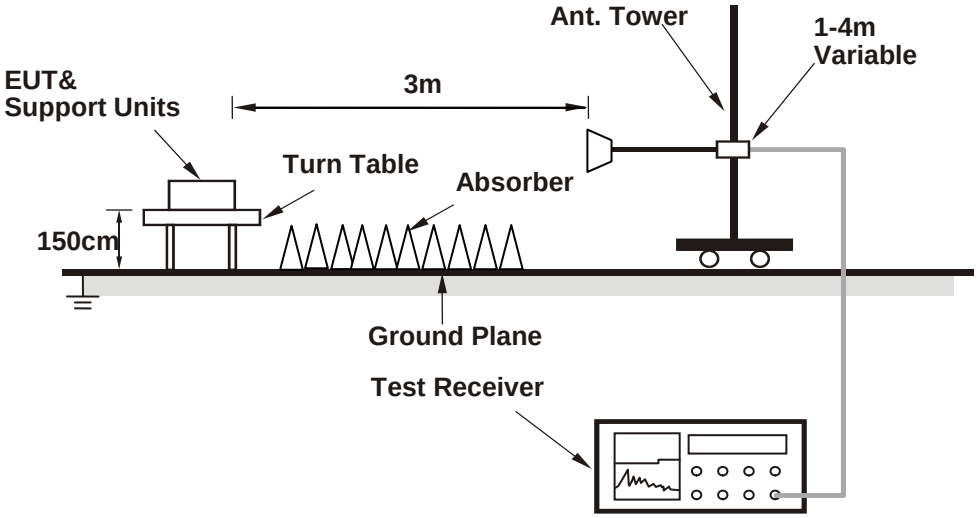
For Radiated emission below 30MHz



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

a. Connected the EUT with the Laptop which is placed on remote site.
b. Controlling software (Atheros Radio Test 2(ART2-GUI) Version:2.3) 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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2365.00	62.3 PK	74.0	-11.7	1.50 H	157	63.9	-1.6
2	2365.00	51.2 AV	54.0	-2.8	1.50 H	157	52.8	-1.6
3	*2412.00	112.4 PK			1.50 H	157	114.2	-1.8
4	*2412.00	110.3 AV			1.50 H	157	112.1	-1.8
5	4824.00	53.6 PK	74.0	-20.4	2.05 H	226	50.5	3.1
6	4824.00	53.3 AV	54.0	-0.7	2.05 H	226	50.2	3.1
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	2365.00	63.9 PK	74.0	-10.1	1.03 V	118	65.5	-1.6
2	2365.00	53.2 AV	54.0	-0.8	1.03 V	118	54.8	-1.6
3	*2412.00	113.5 PK			1.03 V	118	115.3	-1.8
4	*2412.00	111.3 AV			1.03 V	118	113.1	-1.8
5	4824.00	54.6 PK	74.0	-19.4	1.01 V	351	51.5	3.1
6	4824.00	53.8 AV	54.0	-0.2	1.01 V	351	50.7	3.1

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.

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	61.4 PK	74.0	-12.6	1.56 H	151	63.1	-1.7
2	2390.00	50.8 AV	54.0	-3.2	1.56 H	151	52.5	-1.7
3	*2437.00	112.5 PK			1.56 H	151	114.6	-2.1
4	*2437.00	110.2 AV			1.56 H	151	112.3	-2.1
5	2483.50	59.6 PK	74.0	-14.4	1.56 H	151	61.6	-2.0
6	2483.50	47.9 AV	54.0	-6.1	1.56 H	151	49.9	-2.0
7	4874.00	53.9 PK	74.0	-20.1	2.08 H	226	50.7	3.2
8	4874.00	53.4 AV	54.0	-0.6	2.08 H	226	50.2	3.2
9	7311.00	45.2 PK	74.0	-28.8	2.13 H	172	36.0	9.2
10	7311.00	34.8 AV	54.0	-19.2	2.13 H	172	25.6	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	64.8 PK	74.0	-9.2	1.04 V	117	66.5	-1.7
2	2390.00	53.1 AV	54.0	-0.9	1.04 V	117	54.8	-1.7
3	*2437.00	113.4 PK			1.04 V	117	115.5	-2.1
4	*2437.00	110.9 AV			1.04 V	117	113.0	-2.1
5	2483.50	62.7 PK	74.0	-11.3	1.04 V	117	64.7	-2.0
6	2483.50	50.6 AV	54.0	-3.4	1.04 V	117	52.6	-2.0
7	4874.00	54.4 PK	74.0	-19.6	1.07 V	10	51.2	3.2
8	4874.00	53.5 AV	54.0	-0.5	1.07 V	10	50.3	3.2
9	7311.00	44.7 PK	74.0	-29.3	1.72 V	281	35.5	9.2
10	7311.00	34.2 AV	54.0	-19.8	1.72 V	281	25.0	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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	111.8 PK			1.53 H	162	113.8	-2.0
2	*2462.00	109.7 AV			1.53 H	162	111.7	-2.0
3	2483.50	57.4 PK	74.0	-16.6	1.53 H	162	59.4	-2.0
4	2483.50	46.8 AV	54.0	-7.2	1.53 H	162	48.8	-2.0
5	4924.00	53.3 PK	74.0	-20.7	1.56 H	82	50.0	3.3
6	4924.00	52.3 AV	54.0	-1.7	1.56 H	82	49.0	3.3
7	7386.00	45.1 PK	74.0	-28.9	2.12 H	159	35.7	9.4
8	7386.00	34.5 AV	54.0	-19.5	2.12 H	159	25.1	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	112.9 PK			1.02 V	93	114.9	-2.0
2	*2462.00	110.6 AV			1.02 V	93	112.6	-2.0
3	2483.50	59.6 PK	74.0	-14.4	1.02 V	93	61.6	-2.0
4	2483.50	48.1 AV	54.0	-5.9	1.02 V	93	50.1	-2.0
5	4924.00	54.1 PK	74.0	-19.9	1.03 V	9	50.8	3.3
6	4924.00	53.5 AV	54.0	-0.5	1.03 V	9	50.2	3.3
7	7386.00	44.5 PK	74.0	-29.5	1.69 V	271	35.1	9.4
8	7386.00	33.8 AV	54.0	-20.2	1.69 V	271	24.4	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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.5 PK	74.0	-7.5	1.45 H	164	68.2	-1.7
2	2390.00	51.5 AV	54.0	-2.5	1.45 H	164	53.2	-1.7
3	*2412.00	115.0 PK			1.45 H	164	116.8	-1.8
4	*2412.00	104.5 AV			1.45 H	164	106.3	-1.8
5	4824.00	55.6 PK	74.0	-18.4	1.89 H	284	52.5	3.1
6	4824.00	41.4 AV	54.0	-12.6	1.89 H	284	38.3	3.1
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	2390.00	67.2 PK	74.0	-6.8	1.26 V	91	68.9	-1.7
2	2390.00	53.7 AV	54.0	-0.3	1.26 V	91	55.4	-1.7
3	*2412.00	116.3 PK			1.26 V	91	118.1	-1.8
4	*2412.00	105.9 AV			1.26 V	91	107.7	-1.8
5	4824.00	54.3 PK	74.0	-19.7	1.94 V	332	51.2	3.1
6	4824.00	40.7 AV	54.0	-13.3	1.94 V	332	37.6	3.1

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.

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	66.5 PK	74.0	-7.5	1.47 H	166	68.2	-1.7
2	2390.00	52.3 AV	54.0	-1.7	1.47 H	166	54.0	-1.7
3	*2437.00	114.8 PK			1.47 H	166	116.9	-2.1
4	*2437.00	106.0 AV			1.47 H	166	108.1	-2.1
5	2483.50	64.2 PK	74.0	-9.8	1.47 H	166	66.2	-2.0
6	2483.50	51.1 AV	54.0	-2.9	1.47 H	166	53.1	-2.0
7	4874.00	55.0 PK	74.0	-19.0	1.95 H	185	51.8	3.2
8	4874.00	41.0 AV	54.0	-13.0	1.95 H	185	37.8	3.2
9	7311.00	44.5 PK	74.0	-29.5	1.14 H	194	35.3	9.2
10	7311.00	34.2 AV	54.0	-19.8	1.14 H	194	25.0	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	66.8 PK	74.0	-7.2	1.24 V	92	68.5	-1.7
2	2390.00	53.8 AV	54.0	-0.2	1.24 V	92	55.5	-1.7
3	*2437.00	117.7 PK			1.24 V	92	119.8	-2.1
4	*2437.00	107.3 AV			1.24 V	92	109.4	-2.1
5	2483.50	66.2 PK	74.0	-7.8	1.24 V	92	68.2	-2.0
6	2483.50	52.3 AV	54.0	-1.7	1.24 V	92	54.3	-2.0
7	4874.00	54.3 PK	74.0	-19.7	1.14 V	343	51.1	3.2
8	4874.00	40.5 AV	54.0	-13.5	1.14 V	343	37.3	3.2
9	7311.00	45.0 PK	74.0	-29.0	1.73 V	275	35.8	9.2
10	7311.00	34.0 AV	54.0	-20.0	1.73 V	275	24.8	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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	113.6 PK			1.51 H	157	115.6	-2.0
2	*2462.00	103.1 AV			1.51 H	157	105.1	-2.0
3	2483.50	67.1 PK	74.0	-6.9	1.51 H	157	69.1	-2.0
4	2483.50	51.9 AV	54.0	-2.1	1.51 H	157	53.9	-2.0
5	4924.00	54.7 PK	74.0	-19.3	1.96 H	188	51.4	3.3
6	4924.00	40.7 AV	54.0	-13.3	1.96 H	188	37.4	3.3
7	7386.00	44.3 PK	74.0	-29.7	1.14 H	209	34.9	9.4
8	7386.00	33.9 AV	54.0	-20.1	1.14 H	209	24.5	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	115.2 PK			1.44 V	112	117.2	-2.0
2	*2462.00	104.8 AV			1.44 V	112	106.8	-2.0
3	2483.50	68.0 PK	74.0	-6.0	1.44 V	112	70.0	-2.0
4	**2483.50**	**53.9 AV**	**54.0**	**-0.1**	**1.44 V**	**112**	**55.9**	**-2.0**
5	4924.00	54.0 PK	74.0	-20.0	1.94 V	338	50.7	3.3
6	4924.00	40.3 AV	54.0	-13.7	1.94 V	338	37.0	3.3
7	7386.00	44.7 PK	74.0	-29.3	1.74 V	17	35.3	9.4
8	7386.00	34.0 AV	54.0	-20.0	1.74 V	17	24.6	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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

802.11n (HT20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	65.6 PK	74.0	-8.4	1.47 H	176	67.3	-1.7
2	2390.00	51.6 AV	54.0	-2.4	1.47 H	176	53.3	-1.7
3	*2412.00	114.2 PK			1.47 H	176	116.0	-1.8
4	*2412.00	104.3 AV			1.47 H	176	106.1	-1.8
5	4824.00	53.6 PK	74.0	-20.4	1.29 H	292	50.5	3.1
6	4824.00	39.8 AV	54.0	-14.2	1.29 H	292	36.7	3.1
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	2390.00	66.8 PK	74.0	-7.2	1.29 V	91	68.5	-1.7
2	**2390.00**	**53.9 AV**	**54.0**	**-0.1**	**1.29 V**	**91**	**55.6**	**-1.7**
3	*2412.00	116.5 PK			1.29 V	91	118.3	-1.8
4	*2412.00	106.1 AV			1.29 V	91	107.9	-1.8
5	4824.00	53.9 PK	74.0	-20.1	2.25 V	357	50.8	3.1
6	4824.00	40.6 AV	54.0	-13.4	2.25 V	357	37.5	3.1

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.

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	66.2 PK	74.0	-7.8	1.48 H	161	67.9	-1.7
2	2390.00	52.1 AV	54.0	-1.9	1.48 H	161	53.8	-1.7
3	*2437.00	114.8 PK			1.48 H	161	116.9	-2.1
4	*2437.00	104.9 AV			1.48 H	161	107.0	-2.1
5	2483.50	64.0 PK	74.0	-10.0	1.48 H	161	66.0	-2.0
6	2483.50	50.7 AV	54.0	-3.3	1.48 H	161	52.7	-2.0
7	4874.00	53.6 PK	74.0	-20.4	1.26 H	287	50.4	3.2
8	4874.00	40.1 AV	54.0	-13.9	1.26 H	287	36.9	3.2
9	7311.00	44.2 PK	74.0	-29.8	2.02 H	118	35.0	9.2
10	7311.00	33.7 AV	54.0	-20.3	2.02 H	118	24.5	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	67.1 PK	74.0	-6.9	1.27 V	92	68.8	-1.7
2	**2390.00**	**53.9 AV**	**54.0**	**-0.1**	**1.27 V**	**92**	**55.6**	**-1.7**
3	*2437.00	116.7 PK			1.27 V	92	118.8	-2.1
4	*2437.00	106.4 AV			1.27 V	92	108.5	-2.1
5	2483.50	63.8 PK	74.0	-10.2	1.27 V	92	65.8	-2.0
6	2483.50	51.1 AV	54.0	-2.9	1.27 V	92	53.1	-2.0
7	4874.00	54.1 PK	74.0	-19.9	1.20 V	352	50.9	3.2
8	4874.00	40.5 AV	54.0	-13.5	1.20 V	352	37.3	3.2
9	7311.00	44.3 PK	74.0	-29.7	1.70 V	260	35.1	9.2
10	7311.00	33.6 AV	54.0	-20.4	1.70 V	260	24.4	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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	112.5 PK			1.51 H	173	114.5	-2.0
2	*2462.00	102.7 AV			1.51 H	173	104.7	-2.0
3	2483.50	66.3 PK	74.0	-7.7	1.51 H	173	68.3	-2.0
4	2483.50	51.4 AV	54.0	-2.6	1.51 H	173	53.4	-2.0
5	4924.00	54.1 PK	74.0	-19.9	1.24 H	281	50.8	3.3
6	4924.00	40.4 AV	54.0	-13.6	1.24 H	281	37.1	3.3
7	7386.00	43.8 PK	74.0	-30.2	1.97 H	124	34.4	9.4
8	7386.00	33.5 AV	54.0	-20.5	1.97 H	124	24.1	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	115.1 PK			1.28 V	90	117.1	-2.0
2	*2462.00	104.7 AV			1.28 V	90	106.7	-2.0
3	2483.50	67.0 PK	74.0	-7.0	1.28 V	90	69.0	-2.0
4	**2483.50**	**53.9 AV**	**54.0**	**-0.1**	**1.28 V**	**90**	**55.9**	**-2.0**
5	4924.00	54.0 PK	74.0	-20.0	1.17 V	356	50.7	3.3
6	4924.00	40.5 AV	54.0	-13.5	1.17 V	356	37.2	3.3
7	7386.00	44.0 PK	74.0	-30.0	1.72 V	264	34.6	9.4
8	7386.00	33.2 AV	54.0	-20.8	1.72 V	264	23.8	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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

Below 1GHz Data:

802.11g

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	59.37	27.6 QP	40.0	-12.4	2.00 H	281	35.9	-8.3
2	163.25	29.9 QP	43.5	-13.6	2.00 H	212	38.2	-8.3
3	263.21	25.4 QP	46.0	-20.6	1.00 H	81	34.2	-8.8
4	597.55	31.8 QP	46.0	-14.2	1.50 H	230	32.4	-0.6
5	716.35	30.4 QP	46.0	-15.6	1.00 H	113	29.6	0.8
6	811.12	32.9 QP	46.0	-13.1	1.50 H	256	30.3	2.6
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	59.32	35.0 QP	40.0	-5.0	1.00 V	150	43.2	-8.2
2	114.39	26.9 QP	43.5	-16.6	1.00 V	234	37.3	-10.4
3	163.08	25.7 QP	43.5	-17.8	2.00 V	122	34.0	-8.3
4	371.68	24.5 QP	46.0	-21.5	1.00 V	138	30.2	-5.7
5	597.67	30.7 QP	46.0	-15.3	1.00 V	269	31.3	-0.6
6	748.72	32.0 QP	46.0	-14.0	1.50 V	199	30.0	2.0

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

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	Nov. 01, 2017	Oct. 31, 2018
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Nov. 15, 2017	Nov. 14, 2018
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 03, 2017	June 02, 2018
50 ohms Terminator	N/A	EMC-02	Sep. 22, 2017	Sep. 21, 2018
RF Cable	5D-FB	COCCAB-001	Sep. 29, 2017	Sep. 28, 2018
10 dB PAD Mini-Circuits	HAT-10+	CONATT-004	June 18, 2017	June 17, 2018
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: Mar. 06 to 07, 2018

4.2.3 Test Procedures

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

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

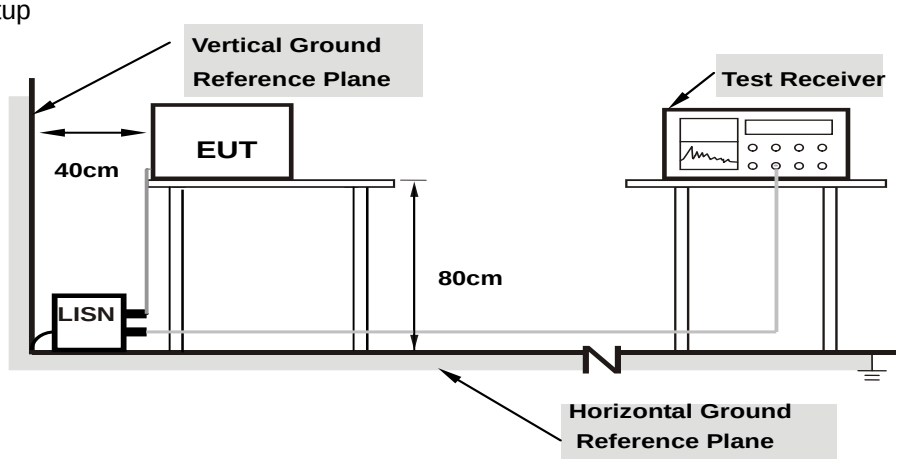
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

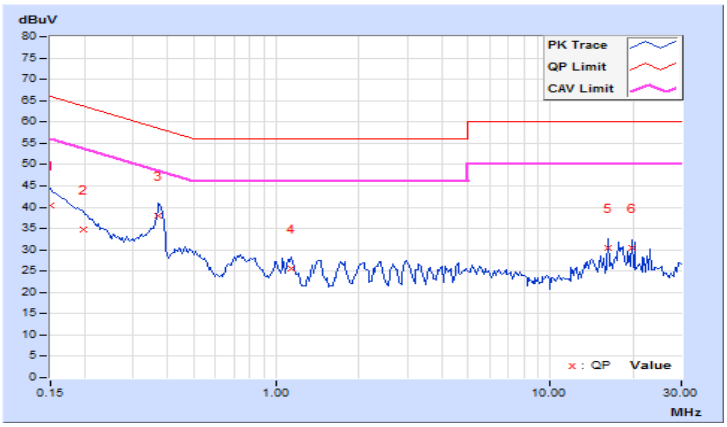
4.2.7 Test Results (Mode 1)

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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.14	30.15	16.44	40.29	26.58	66.00	56.00	-25.71	-29.42
2	0.19687	10.15	24.53	10.57	34.68	20.72	63.74	53.74	-29.06	-33.02
3	**0.37266**	**10.19**	**27.74**	**24.50**	**37.93**	**34.69**	**58.44**	**48.44**	**-20.51**	**-13.75**
4	1.13281	10.26	15.27	11.64	25.53	21.90	56.00	46.00	-30.47	-24.10
5	16.23047	11.25	19.20	12.97	30.45	24.22	60.00	50.00	-29.55	-25.78
6	19.70703	11.49	18.99	13.80	30.48	25.29	60.00	50.00	-29.52	-24.71

Remarks:

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

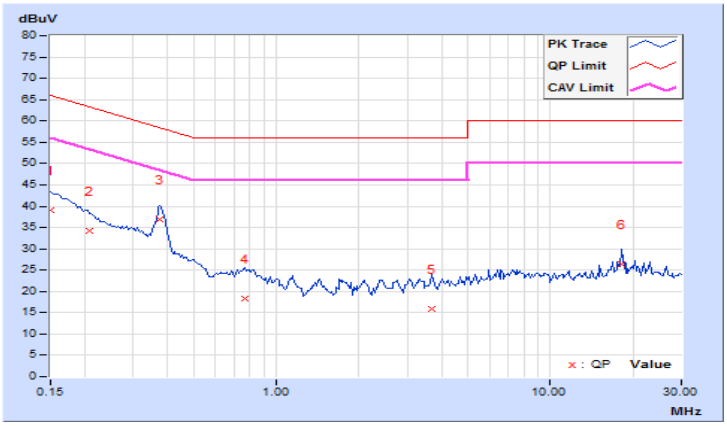


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.05	28.96	14.44	39.01	24.49	66.00	56.00	-26.99	-31.51
2	0.20859	10.05	24.15	9.61	34.20	19.66	63.26	53.26	-29.06	-33.60
3	0.37656	10.09	26.73	19.57	36.82	29.66	58.35	48.35	-21.53	-18.69
4	0.76719	10.11	8.18	3.03	18.29	13.14	56.00	46.00	-37.71	-32.86
5	3.66797	10.27	5.58	1.19	15.85	11.46	56.00	46.00	-40.15	-34.54
6	18.24219	11.18	15.24	8.99	26.42	20.17	60.00	50.00	-33.58	-29.83

Remarks:

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



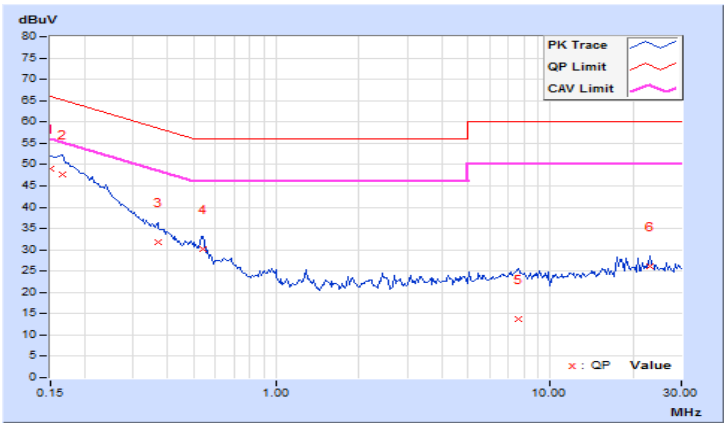
4.2.8 Test Results (Mode 2)

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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.14	38.86	24.52	49.00	34.66	66.00	56.00	-17.00	-21.34
2	0.16562	10.14	37.49	23.57	47.63	33.71	65.18	55.18	-17.55	-21.47
3	0.36875	10.19	21.50	10.58	31.69	20.77	58.53	48.53	-26.84	-27.76
4	0.53672	10.21	19.88	14.71	30.09	24.92	56.00	46.00	-25.91	-21.08
5	7.61719	10.66	3.06	-2.21	13.72	8.45	60.00	50.00	-46.28	-41.55
6	23.12891	11.56	14.53	9.30	26.09	20.86	60.00	50.00	-33.91	-29.14

Remarks:

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

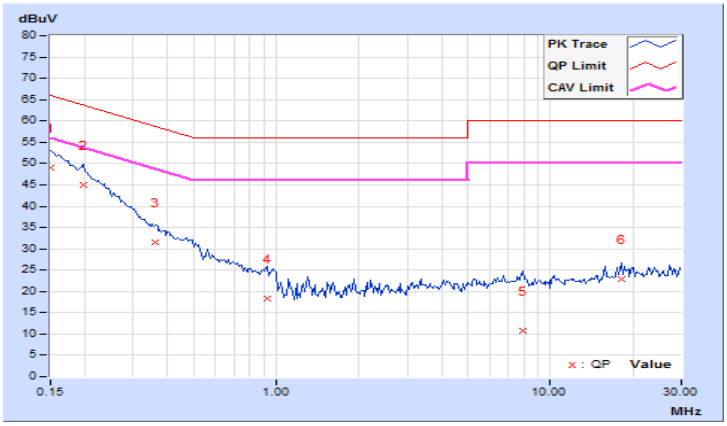


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.05	39.02	24.26	49.07	34.31	66.00	56.00	-16.93	-21.69
2	0.19687	10.05	34.85	20.23	44.90	30.28	63.74	53.74	-18.84	-23.46
3	0.36094	10.09	21.42	8.23	31.51	18.32	58.71	48.71	-27.20	-30.39
4	0.92734	10.12	8.33	-2.84	18.45	7.28	56.00	46.00	-37.55	-38.72
5	7.94141	10.52	0.36	-6.66	10.88	3.86	60.00	50.00	-49.12	-46.14
6	18.24219	11.18	11.84	3.38	23.02	14.56	60.00	50.00	-36.98	-35.44

Remarks:

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

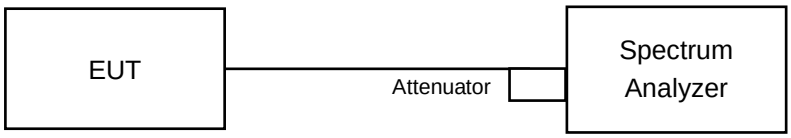


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

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

4.3.5 Deviation 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

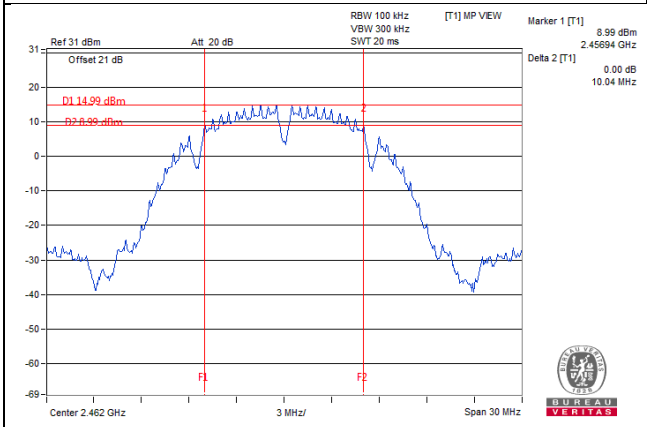
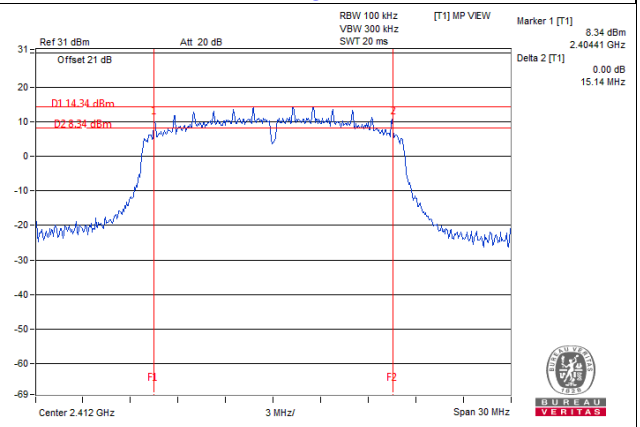
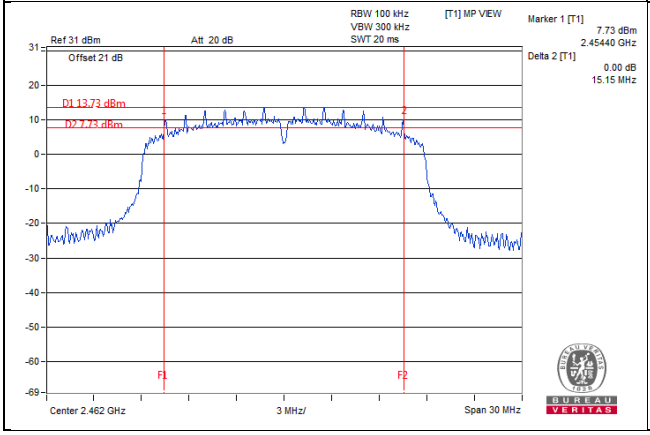
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	10.10	0.5	Pass
6	2437	10.09	0.5	Pass
11	2462	10.04	0.5	Pass

802.11g

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

802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	15.16	0.5	Pass
6	2437	15.18	0.5	Pass
11	2462	15.15	0.5	Pass

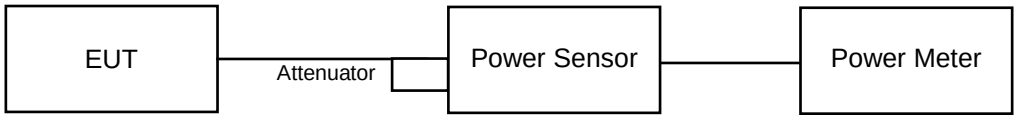
Spectrum Plot of Worst Value	
802.11b / CH11	**802.11g / CH1**
	
802.11n (HT20) / CH11	
	

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	296.483	24.72	30	Pass
6	2437	315.5	24.99	30	Pass
11	2462	270.396	24.32	30	Pass

802.11g

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	287.74	24.59	30	Pass
6	2437	327.341	25.15	30	Pass
11	2462	267.917	24.28	30	Pass

802.11n (HT20)

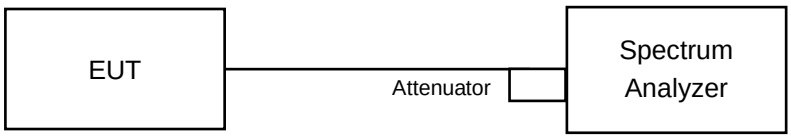
Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	258.226	24.12	30	Pass
6	2437	291.072	24.64	30	Pass
11	2462	230.144	23.62	30	Pass

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

a. Set instrument center frequency to DTS channel center frequency.
b. Set span to at least 1.5 times the OBW.
c. Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz. .
d. Set VBW ≥3 x RBW.
e. Detector = power averaging (RMS) or sample detector (when RMS not available).
f. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
g. Sweep time = auto couple.
h. Employ trace averaging (RMS) mode over a minimum of 100 traces.
i. Use the peak marker function to determine the maximum amplitude level.

For 802.11g, 802.11n (HT20)

a. Measure the duty cycle (x).
b. Set instrument center frequency to DTS channel center frequency.
c. Set span to at least 1.5 times the OBW.
d. Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
e. Set VBW ≥3 x RBW.
f. Detector = power averaging (RMS) or sample detector (when RMS not available).
g. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
h. Sweep time = auto couple.
i. Do not use sweep triggering. Allow sweep to “free run”.
j. Employ trace averaging (RMS) mode over a minimum of 100 traces.
k. Use the peak marker function to determine the maximum amplitude level.
l. 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)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-6.36	8	Pass
6	2437	-6.51	8	Pass
11	2462	-7.00	8	Pass

802.11g

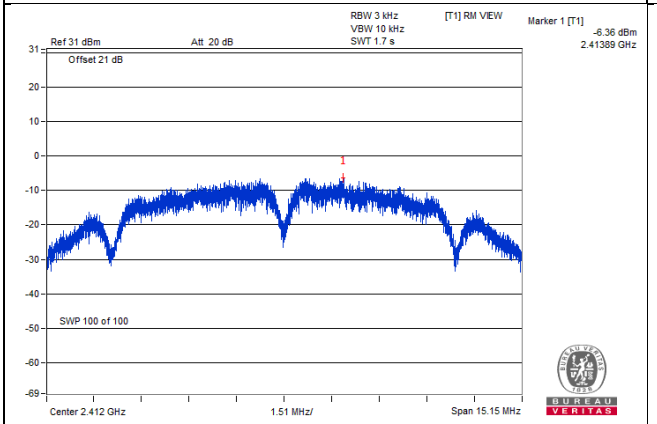
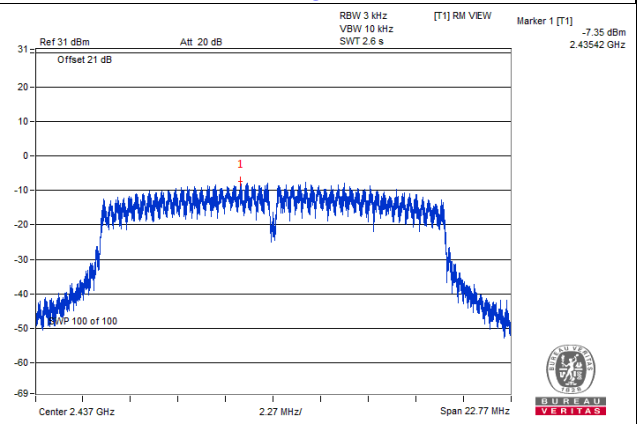
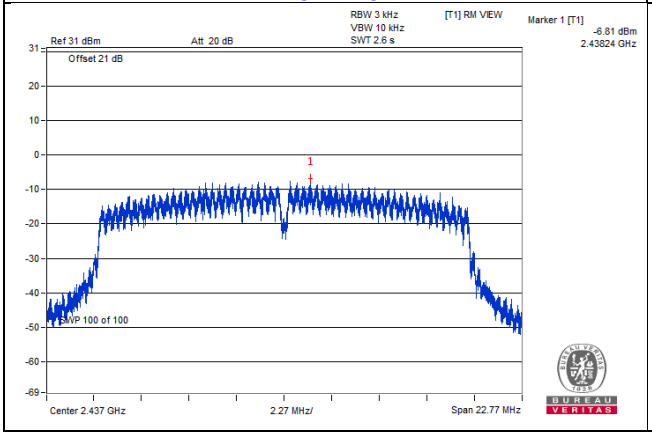
Channel	Frequency (MHz)	PSD W/O Duty Factor (dBm/3kHz)	Duty Factor (dB)	TOTAL PSD With Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-7.38	0.11	-7.27	8	Pass
6	2437	-7.35	0.11	-7.24	8	Pass
11	2462	-8.14	0.11	-8.03	8	Pass

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	-8.08	0.12	-7.96	8	Pass
6	2437	-6.81	0.12	-6.69	8	Pass
11	2462	-8.61	0.12	-8.49	8	Pass

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

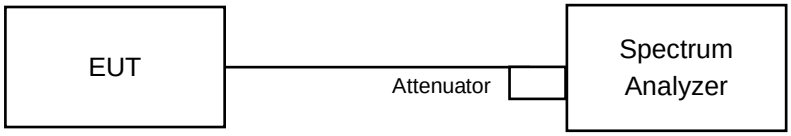
Spectrum Plot of Worst Value	
802.11b / CH1	**802.11g / CH6**
	
802.11n (HT20) / CH6	
	

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

MEASUREMENT PROCEDURE OOBE

1. Set RBW = 100 kHz.
2. Set VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

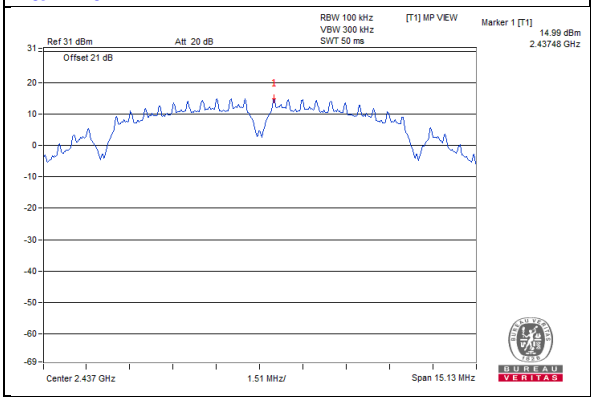
Same as Item 4.3.6

4.6.7 Test Results

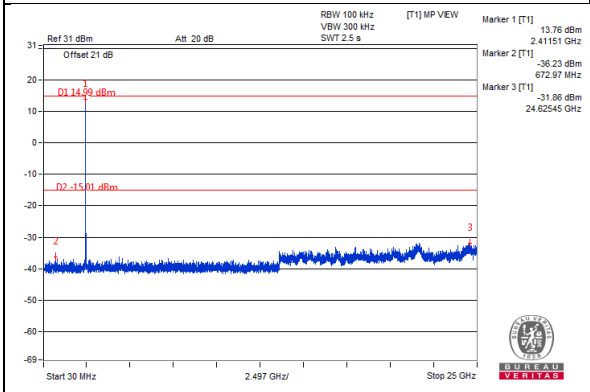
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

802.11b

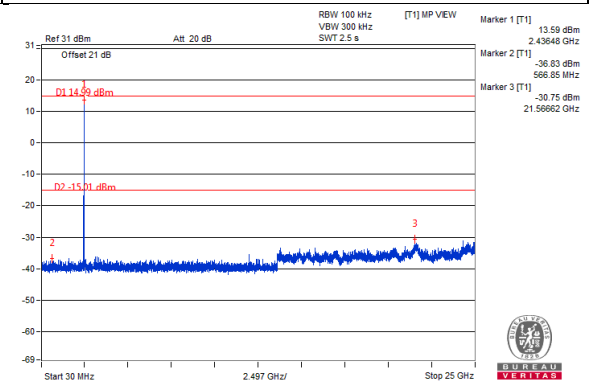
Maximum REF



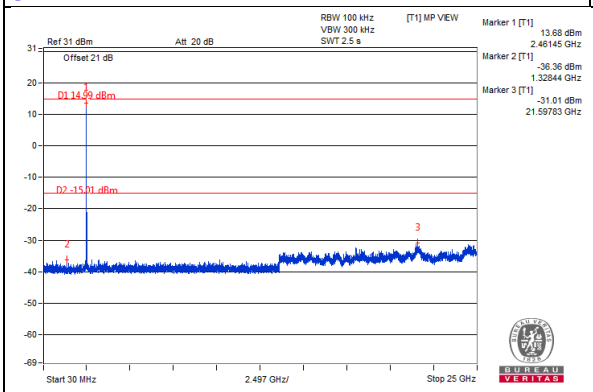
CH 1



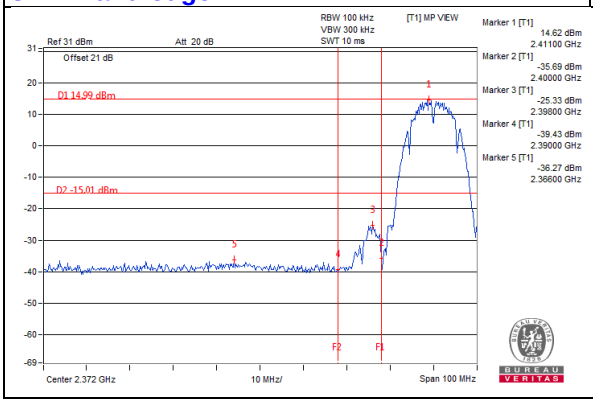
CH 6



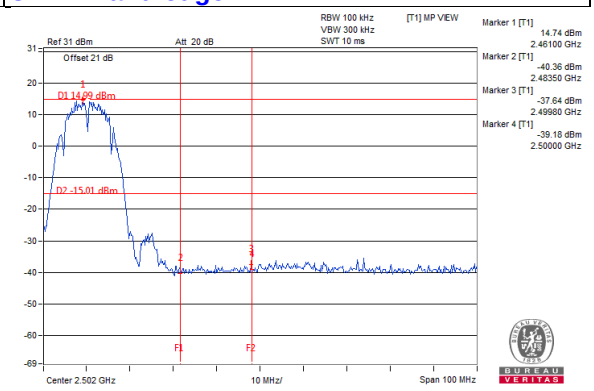
CH 11



CH 1 Band edge

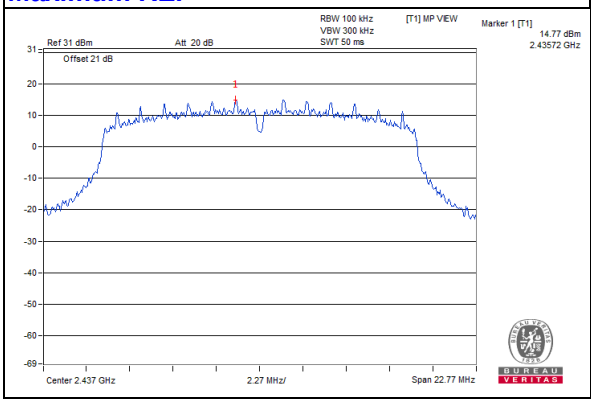


CH 11 Band edge

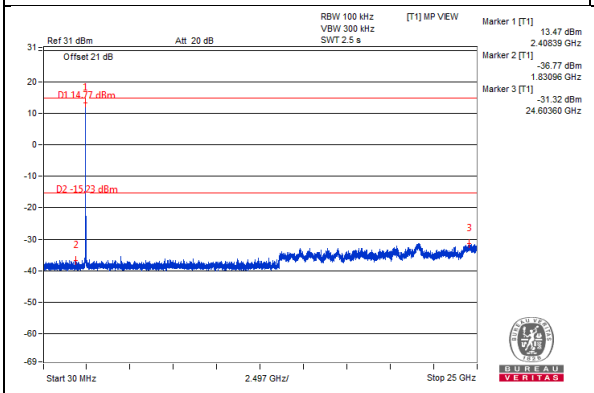


802.11g

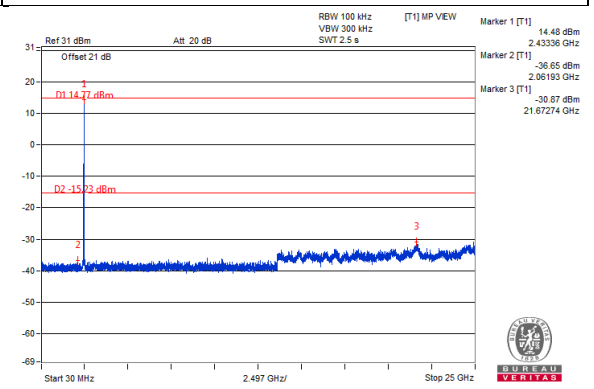
Maximum REF



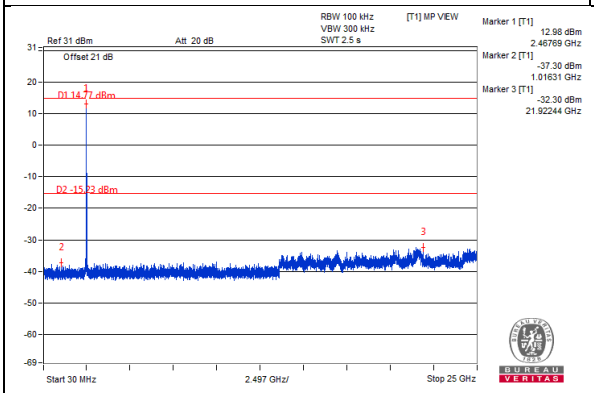
CH 1



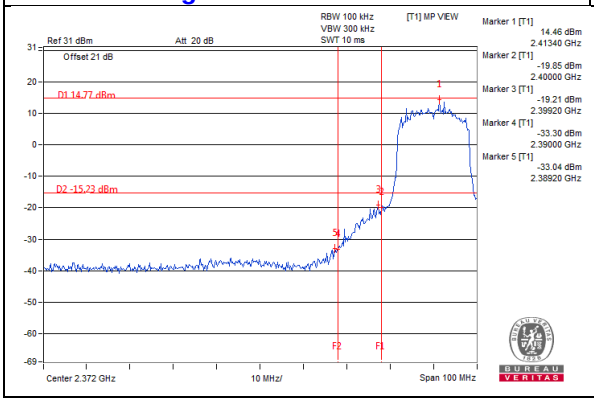
CH 6



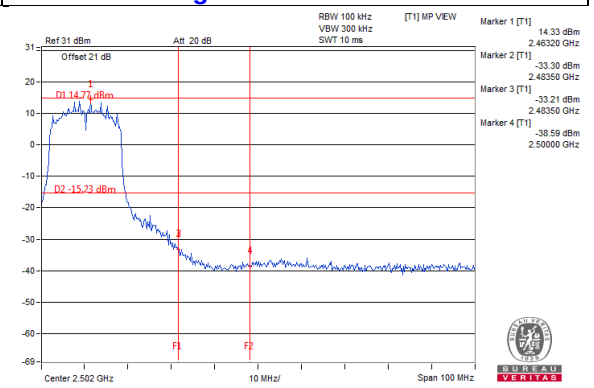
CH 11



CH 1 Band edge

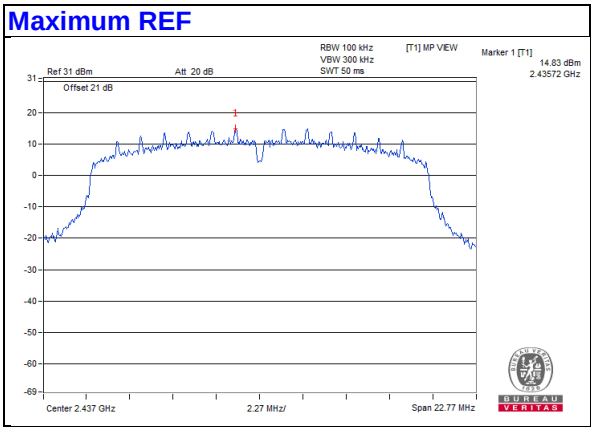


CH 11 Band edge

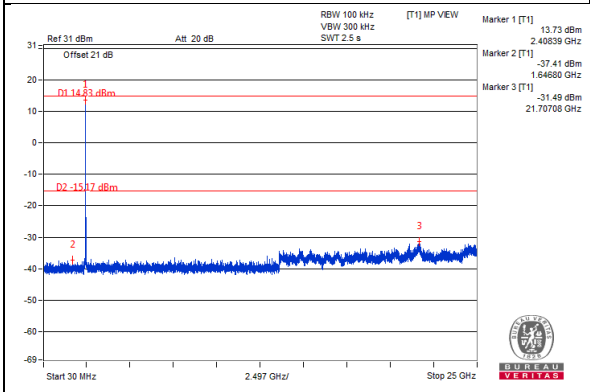


802.11n (HT20)

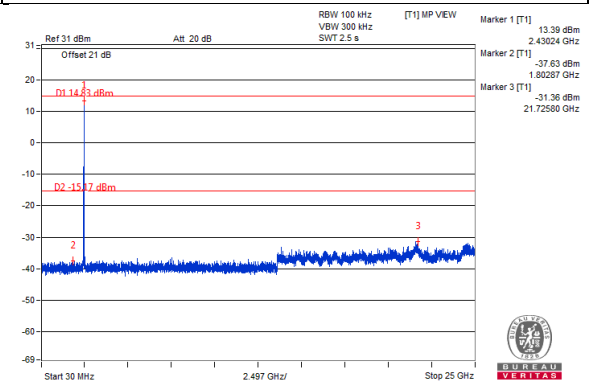
Maximum REF



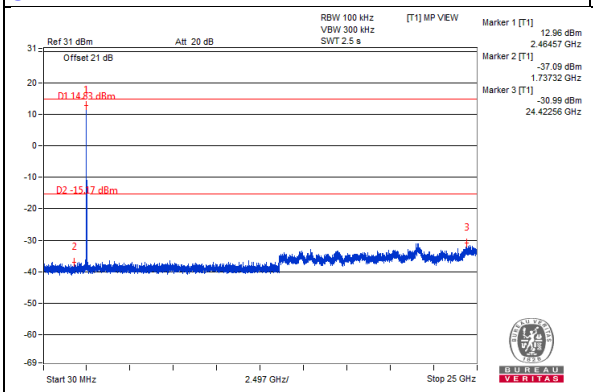
CH 1



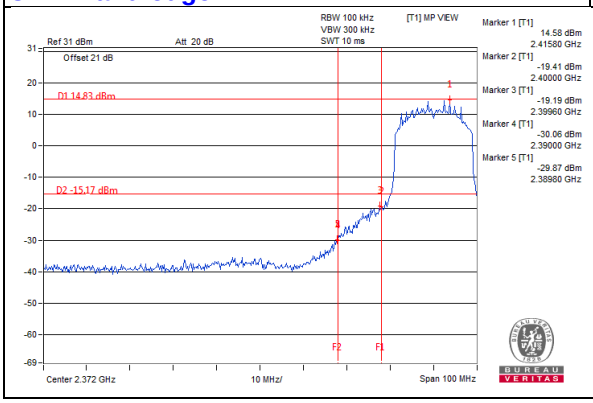
CH 6



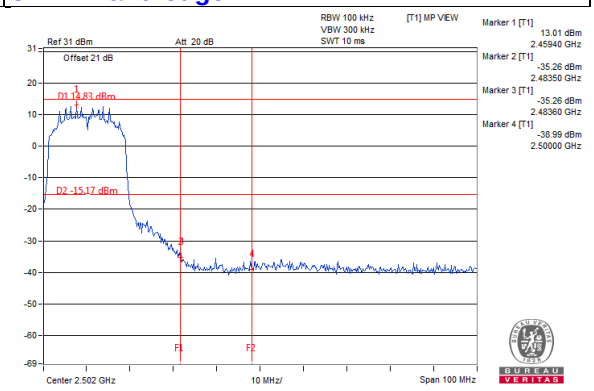
CH 11



CH 1 Band edge



CH 11 Band edge



5 Pictures of Test Arrangements

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

Appendix – Information on the Testing Laboratories

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

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

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