FCC Test Report

Report No.:	RF150821C10I
FCC ID:	ZQ6-AP6356SDXX
Test Model:	AP6356SD, AP6356SDPB_I
Series Model:	AP6356SDPB (Refer to item 3.1 for more details)
Received Date:	Aug. 21, 2015
Test Date:	Nov. 30, 2015 (For test mode A) Jun. 04 ~ Jun. 06, 2018 (For test mode B)
Issued Date:	Jun. 13, 2018
Applicant:	AMPAK Technology Inc.
Address:	3F, No.1, Jen AI Road, Hsinchu Industrial Park, Hsinchu, Taiwan, 30352
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)
Test Location:	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)
FCC Registration / Designation Number:	788550 / TW0003

Testing Laboratory
2021

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Release Control Record

Issue No.	Description	Date Issued
RF150821C10I	Original release	Jun. 13, 2018

1 Certificate of Conformity

Product:	WLAN module for 802.11abgn(2x2) + 11ac + BT4.1
Brand:	Ampak
Test Model:	AP6356SD, AP6356SDPB_I
Series Model:	AP6356SDPB (Refer to item 3.1 for more details)
Sample Status:	Engineering Sample
Applicant:	AMPAK Technology Inc.
Test Date:	Nov. 30, 2015 (For test mode A) Jun. 04 ~ Jun. 06, 2018 (For test mode B)
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) ANSI C63.10:2013

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

Prepared by : Celine Chou , **Date:** Jun. 13, 2018

Celine Chou / Specialist

Approved by : Bruce Chen , **Date:** Jun. 13, 2018

Bruce Chen / Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -11.85dB at 0.34486MHz
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.5dB at 2390.00MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	Pass	Meet the requirement of limit.
15.247(b)	Conducted power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connectors are IPEX and RP-SMA (M) 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	2.94 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.59 dB
	200MHz ~1000MHz	3.60 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	WLAN module for 802.11abgn(2x2) + 11ac + BT4.1
Brand	Ampak
Test Model	AP6356SD, AP6356SDPB_I
Series Model	AP6356SDPB
Model Difference	Refer to note
Sample Status	Engineering Sample
Power Supply Rating	5Vdc (host equipment)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b:11.0/ 5.5/ 2.0/ 1.0Mbps 802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 150Mbps
Operating Frequency	2412 ~ 2462MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
Output Power	30.976mW
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. This report is prepared for FCC class II permissive change, the differences compared with the original report (BV CPS report no.: RF150821C10G) are adding one model name and two antennas. After evaluation, only the radiated emission and power line conducted emission had been an addendum test, the antenna port conducted test data was copy from original report, due to the output power of EUT is not change.
2. The following models are provided to this EUT. (New model name is marked in boldface)

Brand	Model	Description	
		Fixture	Crystal Temperature Operating Range
Ampak	AP6356SD	-	-10~65℃
	AP6356SDPB	**AP12356**	**-10~65℃**
	AP6356SDPB_I	AP12356_I	-40~85℃

* The model of the AP6356SD and AP6356SDPB_I was chosen for final test.

3. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

Modulation Mode	TX Function
802.11b	1TX (Fixed Chain 0)
802.11g	2TX
802.11n (HT20)	2TX
802.11n (HT40)	2TX

4. The following antennas were provided to the EUT. (New antennas are marked in boldface)

No.	Type	Connector	Gain(dBi)	
			2.4G	5G
1	PIFA	I-PEX	3.5	5.5
2	**Dipole**	**RP-SMA (M)**	**3.8**	**5.5**
3	**Dipole**	**RP-SMA (M)**	**3**	**3**

3.2 Description of Test Modes

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

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

7 channels are provided for 802.11n (HT40):

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≥1G	RE<1G	PLC	APCM	
A	-	-	-	√	Model: AP6356SD
B	√	√	√	-	Model: AP6356SDPB_I with AP12356_I Platform

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:
1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.
2. "-" 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.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
B	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
B	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
B	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
B	802.11n (HT40)	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.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
B	802.11b	1 to 11	6	DSSS	DBPSK	1.0

Power Line Conducted Emission Test:

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
B	802.11b	1 to 11	6	DSSS	DBPSK	1.0

Antenna Port Conducted Measurement:

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
A	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
A	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
A	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
A	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

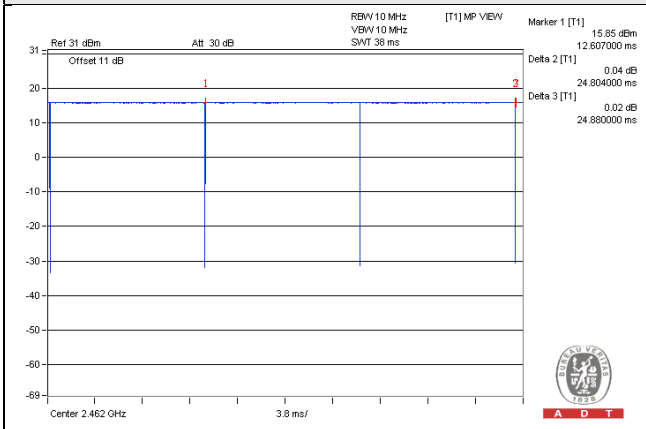
Test Condition:

Applicable to	Environmental Conditions	Input Power (System)	Tested by
RE≥1G	22 deg. C, 66% RH	120Vac, 60Hz	Han Wu
RE<1G	25 deg. C, 65% RH	120Vac, 60Hz	Greg Lin
PLC	25 deg. C, 75% RH	120Vac, 60Hz	Greg Lin
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Frank Liu

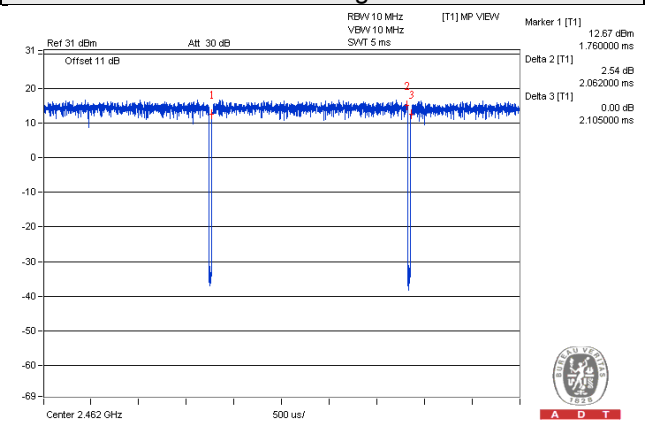
3.3 Duty Cycle of Test Signal

802.11b, 802.11g, 802.11n (HT20): Duty cycle of test signal is > 98%, duty factor is not required.
802.11n (HT40): Duty cycle of test signal is < 98%, duty factor shall be considered.
802.11n (HT40): Duty cycle = 0.943/0.975 = 0.967, Duty factor = 10 * log(1/0.967) = 0.14

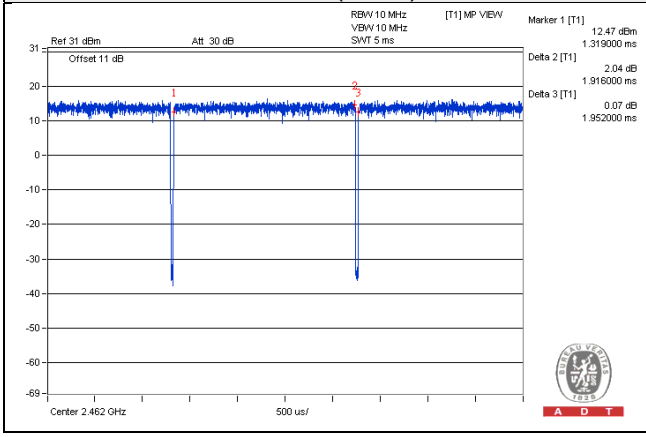
802.11b



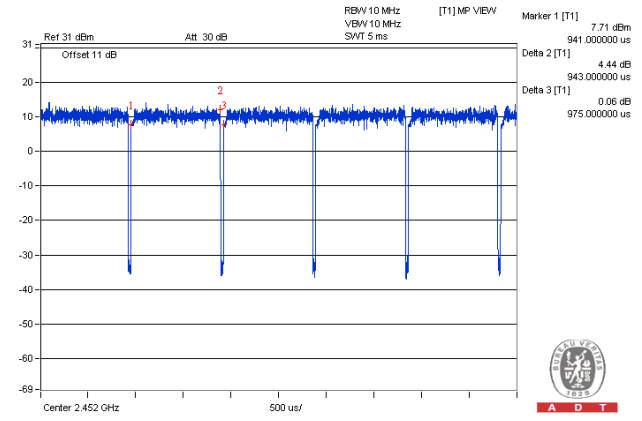
802.11g



802.11n (HT20)



802.11n (HT40)



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.

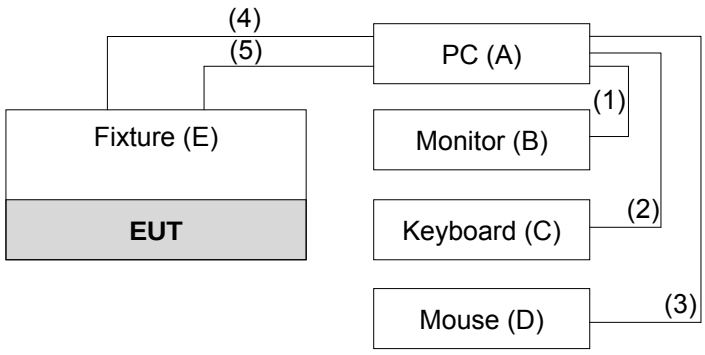
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	PC	Ampak	AC00910	NA	NA	Provided by manufacturer
B.	Monitor	Lenovo	L215pwA	4M0373192470697	FCC DoC Approved	-
C.	Keyboard	DELL	KB4021	CN-05V23T-71581-1A K-01Q7-A01	FCC DoC Approved	-
D.	Mouse	DELL	MS111-P	CN-011D3V-71581-1C J-019A	FCC DoC Approved	-
E.	Fixture	NA	NA	NA	NA	Provided by manufacturer

Note: 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.	D-sub cable	1	1.8	Y	2	-
2.	USB cable	1	1.8	Y	0	-
3.	USB cable	1	1.8	Y	0	-
4.	Mini USB cable	2	1	Y	0	Provided by manufacturer
5.	Convertible cable	1	0.5	N	0	Provided by manufacturer

Note: The core(s) is(are) originally attached to the cable(s).

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
KDB 662911 D01 Multiple Transmitter Output v02r01
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

Test Date: Nov. 30, 2015

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Oct. 12, 2015	Oct. 11, 2016
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Jul. 08, 2015	Jul. 07, 2016
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Feb. 06, 2015	Feb. 05, 2016
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-1170	Feb. 05, 2015	Feb. 04, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 09, 2015	Feb. 08, 2016
Loop Antenna	EM-6879	269	Aug. 11, 2015	Aug. 10, 2016
Preamplifier Agilent	8449B	3008A01960	Aug. 09, 2015	Aug. 08, 2016
Preamplifier Agilent	8447D	2944A10631	Aug. 09, 2015	Aug. 08, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH4-02(295012+ 309220)	Aug. 09, 2015	Aug. 08, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH4-03(250724)	Aug. 09, 2015	Aug. 08, 2016
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021703	NA	NA
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100.	SC93021703	NA	NA
High Speed Peak Power Meter	ML2495A	0824011	Jul. 09, 2015	Jul. 08, 2016
Power Sensor	MA2411B	0738171	Jul. 09, 2015	Jul. 08, 2016

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 4.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.
5. The IC Site Registration No. is IC7450F-4.

Test Date: Jun. 04 ~ Jun. 06, 2018

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038A	MY55420137	Apr. 11, 2018	Apr. 10, 2019
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	May 29, 2018	May 28, 2019
BILOG Antenna SCHWARZBECK	VULB9168	9168-148	Dec. 11, 2017	Dec. 10, 2018
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Dec. 12, 2017	Dec. 11, 2018
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 01, 2017	Nov. 30, 2018
Loop Antenna EMCI	EM-6879	269	Aug. 11, 2017	Aug. 10, 2018
Preamplifier Agilent (Below 1GHz)	8447D	2944A10638	Aug. 08, 2017	Aug. 07, 2018
Preamplifier Agilent (Above 1GHz)	8449B	3008A01638	Feb. 22, 2018	Feb. 21, 2019
RF signal cable HUBER+SUHNER&EMCI	SUCOFLEX 104 & EMC104-SM-SM8000	CABLE-CH9-02 (248780+171006)	Jan. 15, 2018	Jan. 14, 2019
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	Aug. 08, 2017	Aug. 07, 2018
RF signal cable Woken	8D-FB	Cable-CH9-01	Aug. 01, 2017	Jul. 31, 2018
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
High Speed Peak Power Meter	ML2495A	0824012	Aug. 18, 2017	Aug. 17, 2018
Power Sensor	MA2411B	0738171	Aug. 18, 2017	Aug. 17, 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 test was performed in HwaYa Chamber 9.
3. The FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.
4. The IC Site Registration No. is IC 7450F-9.

4.1.3 Test Procedures

For Radiated emission below 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

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

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average 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:

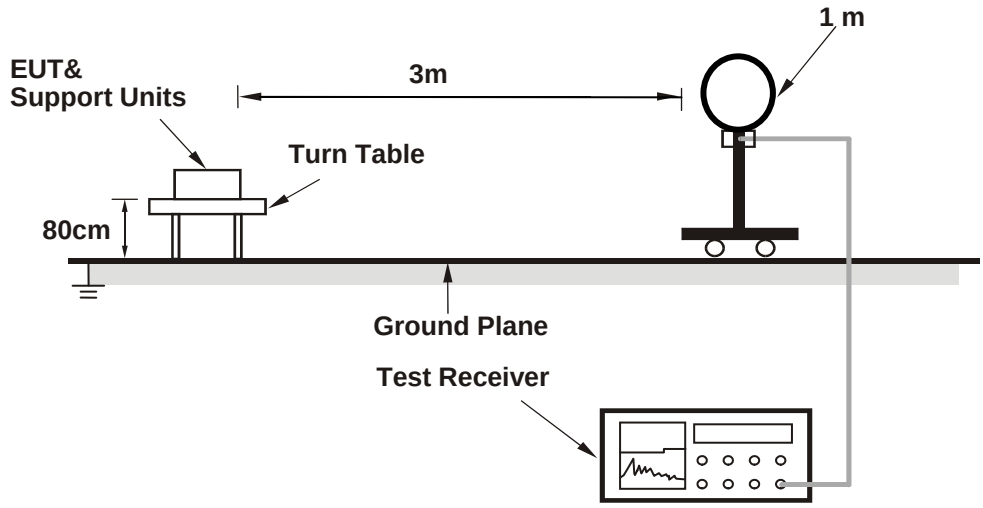
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

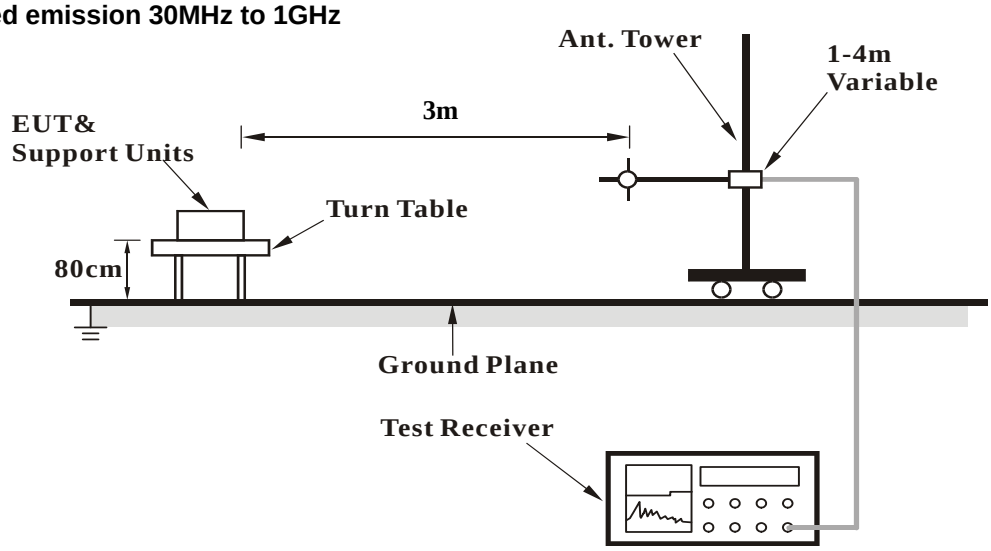
No deviation.

4.1.5 Test Setup

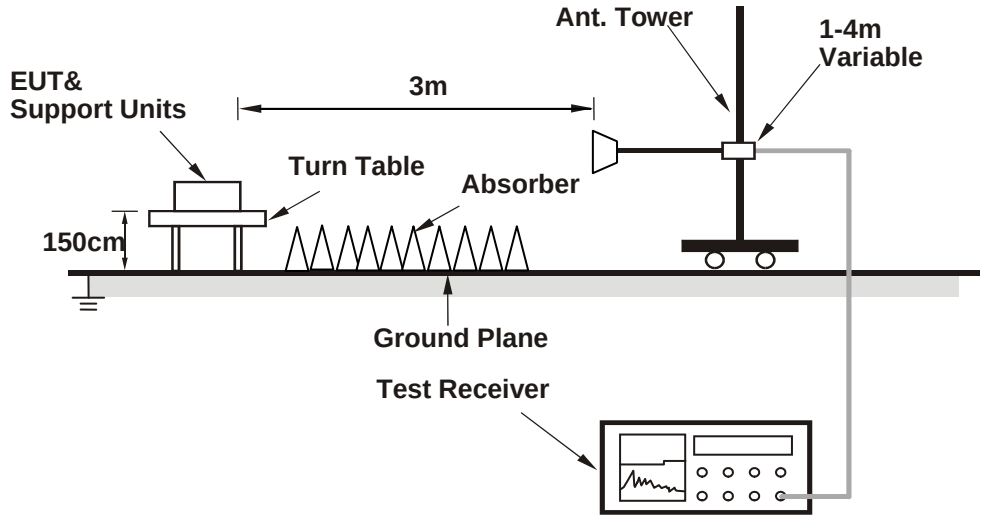
For Radiated emission below 30MHz



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. Conntected EUT with PC via Convertible Board through mini USB cable.

b. Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Worst-Case data:

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	57.5 PK	74.0	-16.5	2.43 H	251	25.3	32.2
2	2390.00	44.5 AV	54.0	-9.5	2.43 H	251	12.3	32.2
3	*2412.00	101.9 PK			2.40 H	247	69.8	32.1
4	*2412.00	97.8 AV			2.40 H	247	65.7	32.1
5	4824.00	44.2 PK	74.0	-29.8	1.70 H	235	43.2	1.0
6	4824.00	30.8 AV	54.0	-23.2	1.70 H	235	29.8	1.0
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	58.6 PK	74.0	-15.4	1.27 V	284	26.4	32.2
2	2390.00	45.8 AV	54.0	-8.2	1.27 V	284	13.6	32.2
3	*2412.00	107.4 PK			1.84 V	284	75.3	32.1
4	*2412.00	103.0 AV			1.84 V	284	70.9	32.1
5	4824.00	43.7 PK	74.0	-30.3	2.26 V	0	42.7	1.0
6	4824.00	31.9 AV	54.0	-22.1	2.26 V	0	30.9	1.0

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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	101.8 PK			2.44 H	249	69.8	32.0
2	*2437.00	97.6 AV			2.44 H	249	65.6	32.0
3	4874.00	44.8 PK	74.0	-29.2	1.77 H	233	43.5	1.3
4	4874.00	31.0 AV	54.0	-23.0	1.77 H	233	29.7	1.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	107.0 PK			1.63 V	284	75.0	32.0
2	*2437.00	102.6 AV			1.63 V	284	70.6	32.0
3	4874.00	43.6 PK	74.0	-30.4	1.76 V	339	42.3	1.3
4	4874.00	31.5 AV	54.0	-22.5	1.76 V	339	30.2	1.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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	101.6 PK			2.48 H	241	69.5	32.1
2	*2462.00	97.4 AV			2.48 H	241	65.3	32.1
3	2483.50	57.7 PK	74.0	-16.3	2.51 H	244	25.6	32.1
4	2483.50	44.6 AV	54.0	-9.4	2.51 H	244	12.5	32.1
5	4924.00	45.2 PK	74.0	-28.8	1.77 H	241	43.6	1.6
6	4924.00	31.7 AV	54.0	-22.3	1.77 H	241	30.1	1.6
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	*2462.00	107.3 PK			2.30 V	281	75.2	32.1
2	*2462.00	103.3 AV			2.30 V	281	71.2	32.1
3	2483.50	59.1 PK	74.0	-14.9	2.51 V	272	27.0	32.1
4	2483.50	46.5 AV	54.0	-7.5	2.51 V	272	14.4	32.1
5	4924.00	44.6 PK	74.0	-29.4	1.74 V	341	43.0	1.6
6	4924.00	33.1 AV	54.0	-20.9	1.74 V	341	31.5	1.6

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.

802.11g

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	64.0 PK	74.0	-10.0	2.52 H	244	31.8	32.2
2	2390.00	47.9 AV	54.0	-6.1	2.52 H	244	15.7	32.2
3	*2412.00	102.4 PK			2.59 H	242	70.3	32.1
4	*2412.00	92.1 AV			2.59 H	242	60.0	32.1
5	4824.00	43.3 PK	74.0	-30.7	1.93 H	224	42.3	1.0
6	4824.00	29.6 AV	54.0	-24.4	1.93 H	224	28.6	1.0
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	67.5 PK	74.0	-6.5	1.30 V	340	35.3	32.2
2	2390.00	51.2 AV	54.0	-2.8	1.30 V	340	19.0	32.2
3	*2412.00	108.2 PK			1.46 V	336	76.1	32.1
4	*2412.00	97.5 AV			1.46 V	336	65.4	32.1
5	4824.00	44.9 PK	74.0	-29.1	2.63 V	220	43.9	1.0
6	4824.00	29.7 AV	54.0	-24.3	2.63 V	220	28.7	1.0

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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	102.9 PK			2.51 H	247	70.9	32.0
2	*2437.00	92.4 AV			2.51 H	247	60.4	32.0
3	4874.00	43.0 PK	74.0	-31.0	1.99 H	219	41.7	1.3
4	4874.00	30.4 AV	54.0	-23.6	1.99 H	219	29.1	1.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	107.6 PK			2.52 V	251	75.6	32.0
2	*2437.00	97.3 AV			2.52 V	251	65.3	32.0
3	4874.00	44.1 PK	74.0	-29.9	2.66 V	231	42.8	1.3
4	4874.00	29.9 AV	54.0	-24.1	2.66 V	231	28.6	1.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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	101.7 PK			2.63 H	238	69.6	32.1
2	*2462.00	91.5 AV			2.63 H	238	59.4	32.1
3	2483.50	67.2 PK	74.0	-6.8	2.59 H	241	35.1	32.1
4	2483.50	48.3 AV	54.0	-5.7	2.59 H	241	16.2	32.1
5	4924.00	44.3 PK	74.0	-29.7	1.99 H	222	42.7	1.6
6	4924.00	29.8 AV	54.0	-24.2	1.99 H	222	28.2	1.6
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	*2462.00	107.9 PK			2.27 V	337	75.8	32.1
2	*2462.00	97.2 AV			2.27 V	337	65.1	32.1
3	2483.50	61.0 PK	74.0	-13.0	1.77 V	337	28.9	32.1
4	2483.50	47.1 AV	54.0	-6.9	1.77 V	337	15.0	32.1
5	4924.00	45.4 PK	74.0	-28.6	2.66 V	214	43.8	1.6
6	4924.00	30.2 AV	54.0	-23.8	2.66 V	214	28.6	1.6

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	62.3 PK	74.0	-11.7	1.03 H	244	30.1	32.2
2	2390.00	48.0 AV	54.0	-6.0	1.03 H	244	15.8	32.2
3	*2412.00	102.8 PK			1.00 H	241	70.7	32.1
4	*2412.00	93.0 AV			1.00 H	241	60.9	32.1
5	4824.00	44.4 PK	74.0	-29.6	1.88 H	127	43.4	1.0
6	4824.00	30.6 AV	54.0	-23.4	1.88 H	127	29.6	1.0
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	69.5 PK	74.0	-4.5	2.54 V	254	37.3	32.2
2	2390.00	52.5 AV	54.0	-1.5	2.54 V	254	20.3	32.2
3	*2412.00	108.1 PK			1.47 V	336	76.0	32.1
4	*2412.00	97.9 AV			1.47 V	336	65.8	32.1
5	4824.00	44.9 PK	74.0	-29.1	2.15 V	297	43.9	1.0
6	4824.00	31.2 AV	54.0	-22.8	2.15 V	297	30.2	1.0

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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	102.6 PK			1.04 H	243	70.6	32.0
2	*2437.00	92.7 AV			1.04 H	243	60.7	32.0
3	4874.00	44.5 PK	74.0	-29.5	1.83 H	131	43.2	1.3
4	4874.00	31.0 AV	54.0	-23.0	1.83 H	131	29.7	1.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	107.8 PK			1.92 V	243	75.8	32.0
2	*2437.00	97.9 AV			1.92 V	243	65.9	32.0
3	4874.00	44.5 PK	74.0	-29.5	2.10 V	300	43.2	1.3
4	4874.00	31.1 AV	54.0	-22.9	2.10 V	300	29.8	1.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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	102.9 PK			1.01 H	242	70.8	32.1
2	*2462.00	93.0 AV			1.01 H	242	60.9	32.1
3	2483.50	58.8 PK	74.0	-15.2	1.06 H	241	26.7	32.1
4	2483.50	45.6 AV	54.0	-8.4	1.06 H	241	13.5	32.1
5	4924.00	44.7 PK	74.0	-29.3	1.86 H	133	43.1	1.6
6	4924.00	31.4 AV	54.0	-22.6	1.86 H	133	29.8	1.6
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	*2462.00	108.0 PK			1.43 V	268	75.9	32.1
2	*2462.00	98.2 AV			1.43 V	268	66.1	32.1
3	2483.50	64.2 PK	74.0	-9.8	2.87 V	267	32.1	32.1
4	2483.50	49.5 AV	54.0	-4.5	2.87 V	267	17.4	32.1
5	4924.00	44.9 PK	74.0	-29.1	2.33 V	258	43.3	1.6
6	4924.00	31.7 AV	54.0	-22.3	2.33 V	258	30.1	1.6

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 (HT40)

CHANNEL	TX Channel 3	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	62.4 PK	74.0	-11.6	2.55 H	248	30.2	32.2
2	2390.00	48.1 AV	54.0	-5.9	2.55 H	248	15.9	32.2
3	*2422.00	98.4 PK			2.63 H	238	66.3	32.1
4	*2422.00	87.4 AV			2.63 H	238	55.3	32.1
5	4844.00	43.2 PK	74.0	-30.8	1.78 H	64	42.1	1.1
6	4844.00	27.8 AV	54.0	-26.2	1.78 H	64	26.7	1.1
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	66.2 PK	74.0	-7.8	1.92 V	240	34.0	32.2
2	**2390.00**	**53.5 AV**	**54.0**	**-0.5**	**1.92 V**	**240**	**21.3**	**32.2**
3	*2422.00	104.7 PK			2.05 V	243	72.6	32.1
4	*2422.00	93.3 AV			2.05 V	243	61.2	32.1
5	4844.00	43.1 PK	74.0	-30.9	1.78 V	46	42.0	1.1
6	4844.00	28.5 AV	54.0	-25.5	1.78 V	46	27.4	1.1

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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	98.2 PK			2.59 H	241	66.2	32.0
2	*2437.00	87.1 AV			2.59 H	241	55.1	32.0
3	4874.00	42.9 PK	74.0	-31.1	1.77 H	68	41.6	1.3
4	4874.00	28.1 AV	54.0	-25.9	1.77 H	68	26.8	1.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	104.4 PK			1.67 V	245	72.4	32.0
2	*2437.00	92.9 AV			1.67 V	245	60.9	32.0
3	4874.00	43.1 PK	74.0	-30.9	1.79 V	61	41.8	1.3
4	4874.00	28.0 AV	54.0	-26.0	1.79 V	61	26.7	1.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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) 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	*2452.00	98.5 PK			2.52 H	244	66.5	32.0
2	*2452.00	87.2 AV			2.52 H	244	55.2	32.0
3	2483.50	61.6 PK	74.0	-12.4	2.60 H	243	29.5	32.1
4	2483.50	45.9 AV	54.0	-8.1	2.60 H	243	13.8	32.1
5	4904.00	42.5 PK	74.0	-31.5	1.73 H	294	41.1	1.4
6	4904.00	27.5 AV	54.0	-26.5	1.73 H	294	26.1	1.4
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	*2452.00	104.7 PK			1.95 V	241	72.7	32.0
2	*2452.00	93.3 AV			1.95 V	241	61.3	32.0
3	2483.50	61.3 PK	74.0	-12.7	1.14 V	274	29.2	32.1
4	2483.50	48.1 AV	54.0	-5.9	1.14 V	274	16.0	32.1
5	4904.00	42.6 PK	74.0	-31.4	1.73 V	64	41.2	1.4
6	4904.00	27.8 AV	54.0	-26.2	1.73 V	64	26.4	1.4

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 worst-case data: 802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	197.81	38.4 QP	43.5	-5.1	1.25 H	228	49.3	-10.9
2	267.65	39.6 QP	46.0	-6.4	1.50 H	165	47.7	-8.1
3	372.41	39.4 QP	46.0	-6.6	2.00 H	111	45.1	-5.7
4	530.52	37.6 QP	46.0	-8.4	1.00 H	263	40.8	-3.2
5	743.92	40.3 QP	46.0	-5.7	1.50 H	263	38.8	1.5
6	850.62	41.6 QP	46.0	-4.4	1.25 H	165	38.4	3.2
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	152.22	38.0 QP	43.5	-5.5	1.25 V	262	46.2	-8.2
2	233.70	42.4 QP	46.0	-3.6	2.00 V	173	52.5	-10.1
3	389.87	40.9 QP	46.0	-5.1	1.50 V	114	46.3	-5.4
4	581.93	39.0 QP	46.0	-7.0	1.00 V	54	40.8	-1.8
5	796.30	40.2 QP	46.0	-5.8	1.25 V	335	38.2	2.0
6	992.24	36.9 QP	54.0	-17.1	1.00 V	294	31.3	5.6

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 of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz.

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.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 23, 2017	Nov. 22, 2018
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Sep. 05, 2017	Sep. 04, 2018
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 06, 2018	Mar. 05, 2019
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 15, 2017	Aug. 14, 2018
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 1.
3. The VCCI Site Registration No. is C-2040.

4.2.3 Test Procedures

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

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

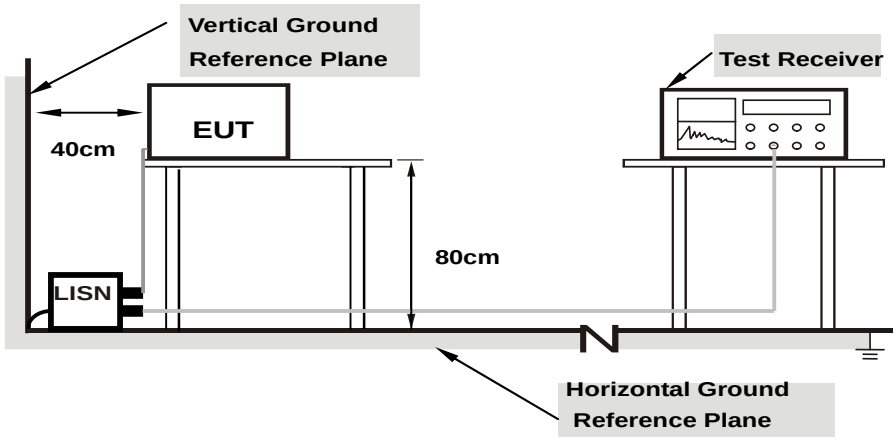
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

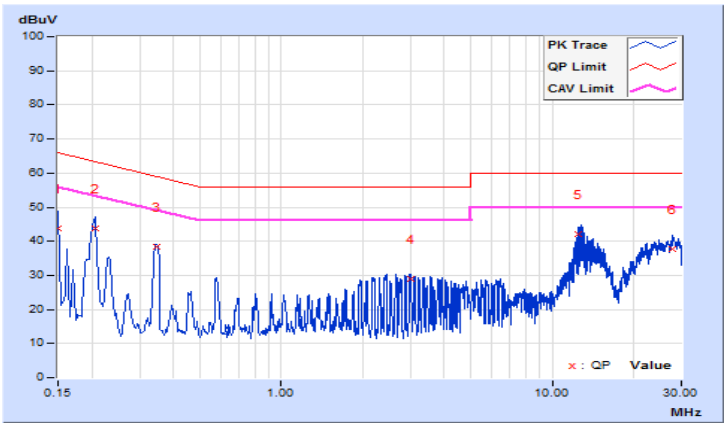
4.2.7 Test Results

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

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.16	33.70	11.30	43.86	21.46	66.00	56.00	-22.14	-34.54
2	0.20577	10.16	33.73	30.13	43.89	40.29	63.37	53.37	-19.48	-13.08
3	**0.34486**	**10.19**	**28.19**	**27.05**	**38.38**	**37.24**	**59.09**	**49.09**	**-20.71**	**-11.85**
4	3.00200	10.30	18.63	3.28	28.93	13.58	56.00	46.00	-27.07	-32.42
5	12.45800	10.80	31.17	24.45	41.97	35.25	60.00	50.00	-18.03	-14.75
6	27.96200	11.40	26.32	14.31	37.72	25.71	60.00	50.00	-22.28	-24.29

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.

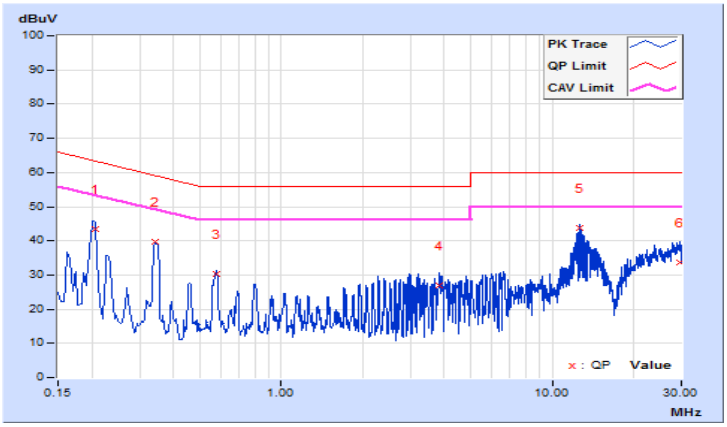


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	0.20600	10.16	33.13	29.62	43.29	39.78	63.37	53.37	-20.08	-13.59
2	0.34214	10.19	29.55	26.41	39.74	36.60	59.15	49.15	-19.41	-12.55
3	0.57493	10.20	20.20	17.57	30.40	27.77	56.00	46.00	-25.60	-18.23
4	3.85400	10.34	16.67	3.17	27.01	13.51	56.00	46.00	-28.99	-32.49
5	12.65800	10.69	32.98	26.78	43.67	37.47	60.00	50.00	-16.33	-12.53
6	29.45800	11.12	22.59	9.33	33.71	20.45	60.00	50.00	-26.29	-29.55

Remarks:

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

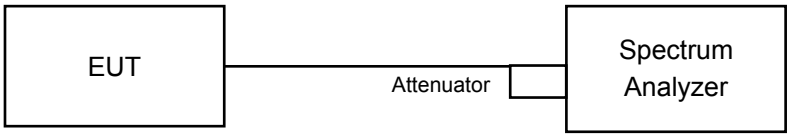


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

a. Set resolution bandwidth (RBW) = 100kHz.

b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = peak.

c. Trace mode = max hold.

d. Sweep = auto couple.

e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

4.3.5 Deviation fromTest Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	9.06	0.5	Pass
6	2437	9.08	0.5	Pass
11	2462	9.08	0.5	Pass

802.11g

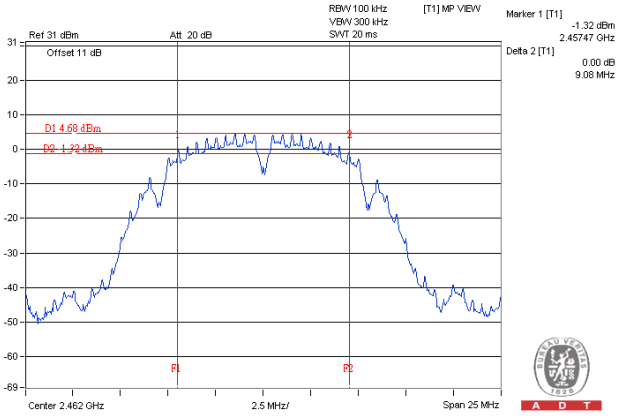
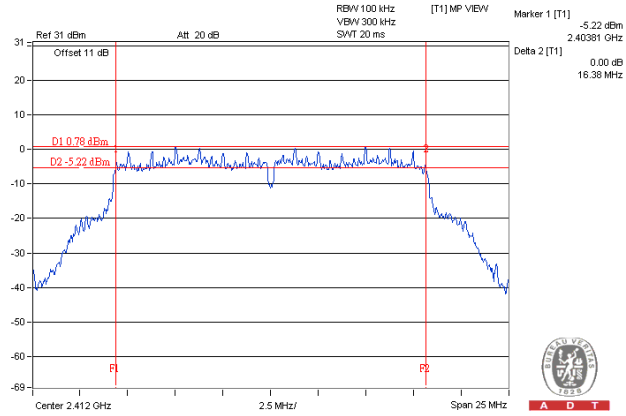
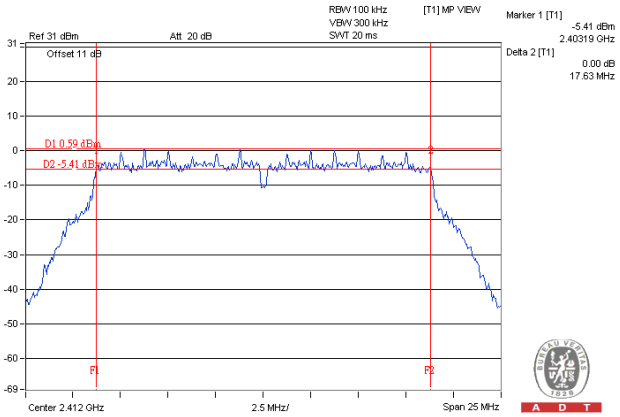
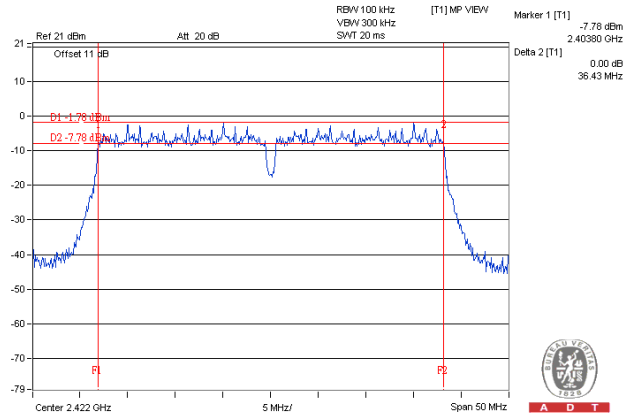
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	16.36	16.38	0.5	Pass
6	2437	16.37	16.36	0.5	Pass
11	2462	16.36	15.76	0.5	Pass

802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	17.63	17.62	0.5	Pass
6	2437	17.60	17.56	0.5	Pass
11	2462	17.57	17.35	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	36.20	36.43	0.5	Pass
6	2437	36.14	36.38	0.5	Pass
9	2452	36.16	36.37	0.5	Pass

Spectrum Plot of Worst Value	
802.11b	802.11g
	
802.11n (HT20)	802.11n (HT40)
	

4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

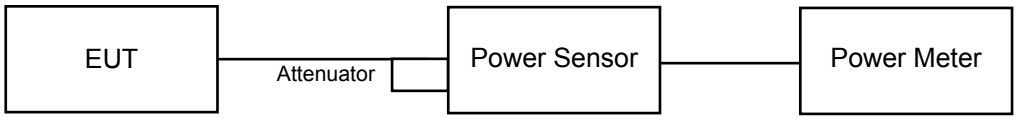
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

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

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	24.547	13.90	30.00	Pass
6	2437	26.002	14.15	30.00	Pass
11	2462	25.823	14.12	30.00	Pass

802.11g

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	11.45	11.82	29.169	14.65	30.00	Pass
6	2437	11.43	11.51	28.058	14.48	30.00	Pass
11	2462	11.43	11.73	28.794	14.59	30.00	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	11.66	11.61	29.143	14.65	30.00	Pass
6	2437	11.90	11.90	**30.976**	14.91	30.00	Pass
11	2462	11.89	11.70	30.244	14.81	30.00	Pass

802.11n (HT40)

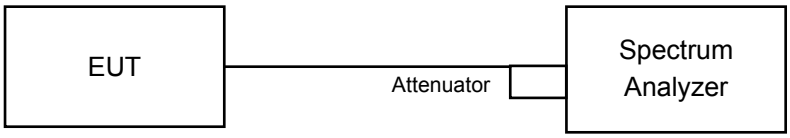
Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	11.36	11.44	27.609	14.41	30.00	Pass
6	2437	11.37	11.41	27.545	14.40	30.00	Pass
9	2452	11.46	11.42	27.864	14.45	30.00	Pass

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

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 Average Power (Duty cycle ≥ 98%)

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 Average Power (Duty cycle < 98%)

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/10kHz)	Limit (dBm/3kHz)	Pass / Fail
1	2412	-15.17	8.00	Pass
6	2437	-15.05	8.00	Pass
11	2462	-15.14	8.00	Pass

802.11g

TX chain	Channel	Frequency (MHz)	PSD (dBm/10kHz)	10 log (N=2) dB	Total PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass / Fail
0	1	2412	-18.31	3.01	-15.30	7.19	Pass
	6	2437	-18.10	3.01	-15.09	7.19	Pass
	11	2462	-17.55	3.01	-14.54	7.19	Pass
1	1	2412	-17.84	3.01	-14.83	7.19	Pass
	6	2437	-17.26	3.01	-14.25	7.19	Pass
	11	2462	-17.84	3.01	-14.83	7.19	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 3.8dBi + 10log(2) = 6.81dBi > 6dBi , so the power density limit shall be reduced to 8-(6.81-6) = 7.19dBm.

802.11n (HT20)

TX chain	Channel	Frequency (MHz)	PSD (dBm/10kHz)	10 log (N=2) dB	Total PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass / Fail
0	1	2412	-19.79	3.01	-16.78	7.19	Pass
	6	2437	-19.46	3.01	-16.45	7.19	Pass
	11	2462	-19.41	3.01	-16.40	7.19	Pass
1	1	2412	-19.50	3.01	-16.49	7.19	Pass
	6	2437	-18.82	3.01	-15.81	7.19	Pass
	11	2462	-19.31	3.01	-16.30	7.19	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 3.8dBi + 10log(2) = 6.81dBi > 6dBi , so the power density limit shall be reduced to 8-(6.81-6) = 7.19dBm.

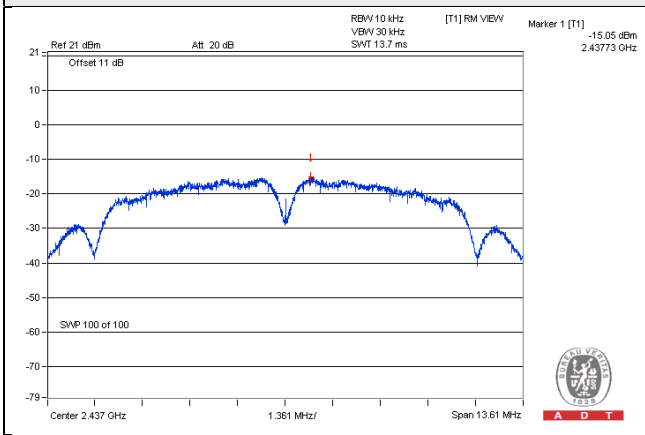
802.11n (HT40)

TX chain	Channel	Frequency (MHz)	PSD w/o Duty Factor (dBm/10kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/10kHz)	Limit (dBm/3kHz)	Pass / Fail
0	3	2422	-22.83	3.01	0.14	-19.68	7.19	Pass
	6	2437	-22.69	3.01	0.14	-19.54	7.19	Pass
	9	2452	-22.64	3.01	0.14	-19.49	7.19	Pass
1	3	2422	-21.67	3.01	0.14	-18.52	7.19	Pass
	6	2437	-21.72	3.01	0.14	-18.57	7.19	Pass
	9	2452	-21.89	3.01	0.14	-18.74	7.19	Pass

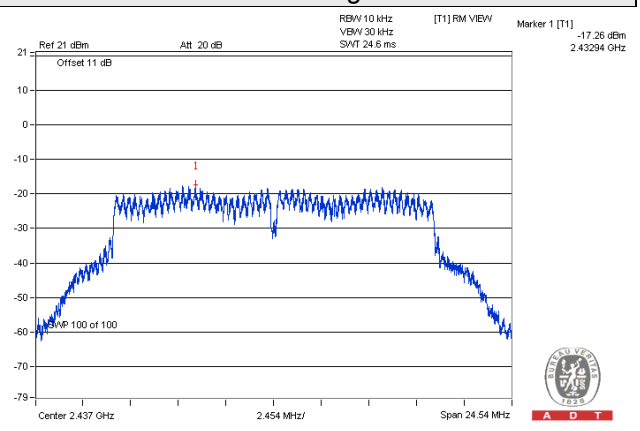
Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 3.8dBi + 10log(2) = 6.81dBi > 6dBi , so the power density limit shall be reduced to 8-(6.81-6) = 7.19dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

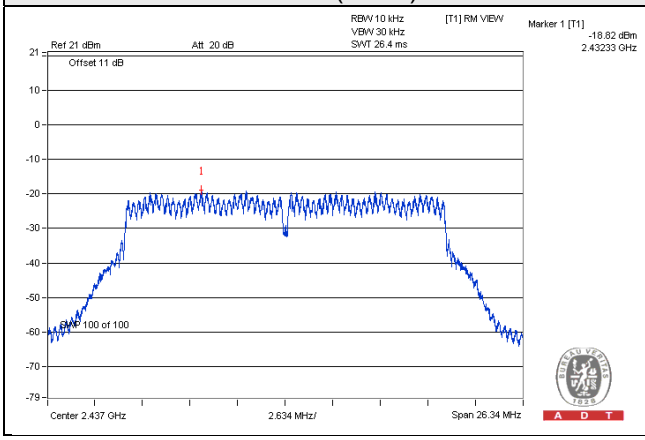
802.11b



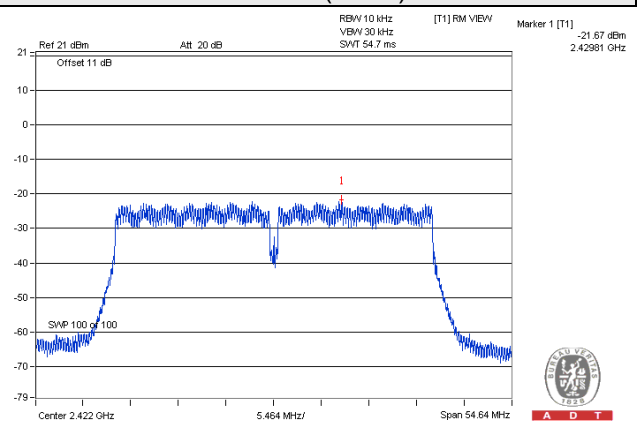
802.11g



802.11n (HT20)



802.11n (HT40)

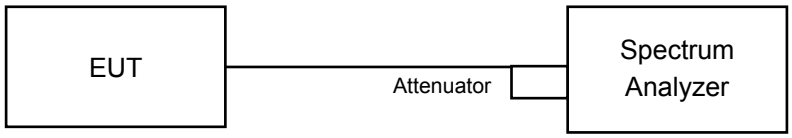


4.6 Conducted Out of Band Emission Measurement

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

a. Set the RBW = 100 kHz.
b. Set the VBW ≥ 300 kHz.
c. Detector = peak.
d. Sweep time = auto couple.
e. Trace mode = max hold.
f. Allow trace to fully stabilize.
g. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

a. Set RBW = 100 kHz.
b. Set VBW ≥ 300 kHz.
c. Detector = peak.
d. Sweep = auto couple.
e. Trace Mode = max hold.
f. Allow trace to fully stabilize.
g. 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

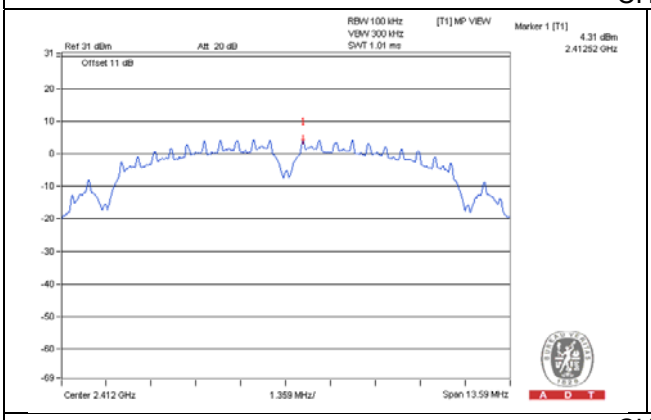
Same as item 4.3.6

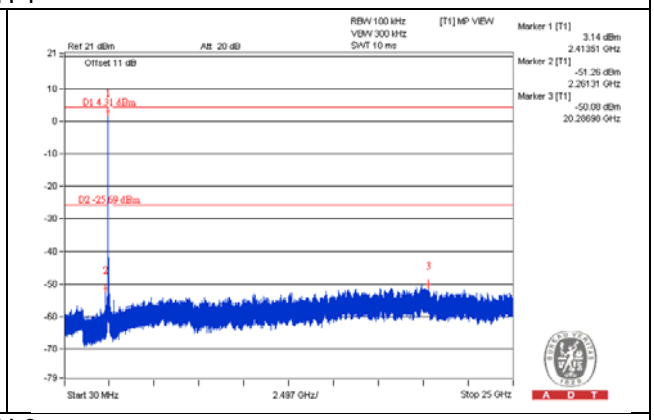
4.6.7 Test Results

The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

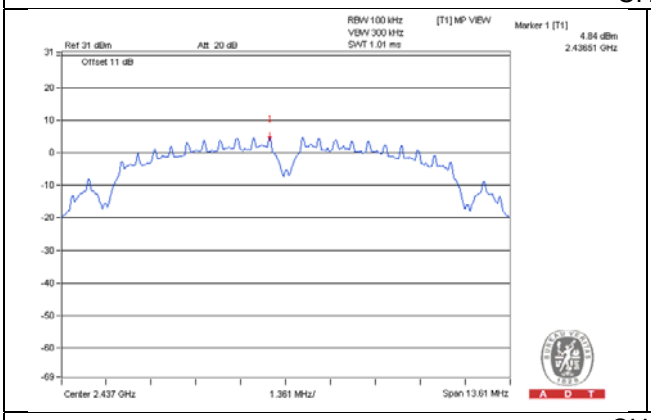
802.11b

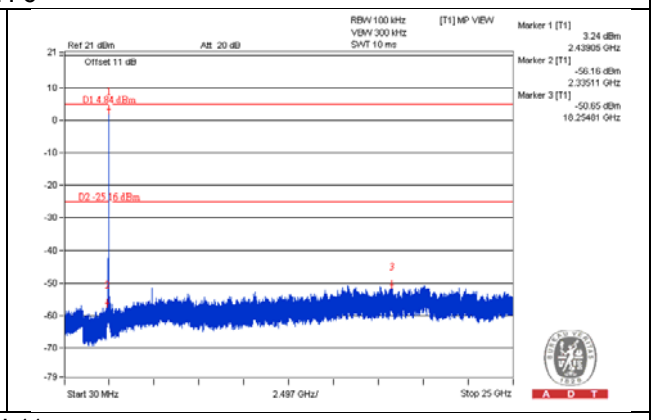
CH 1



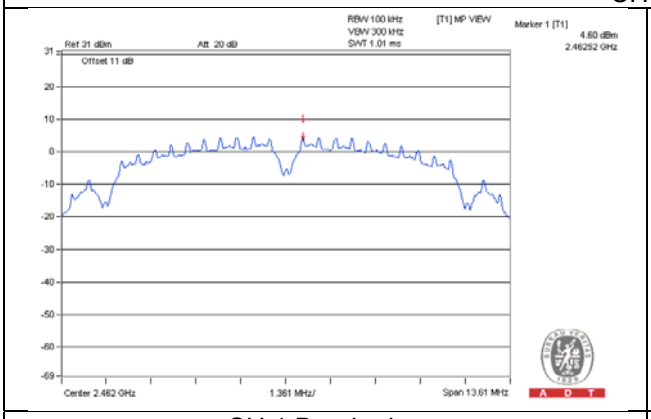


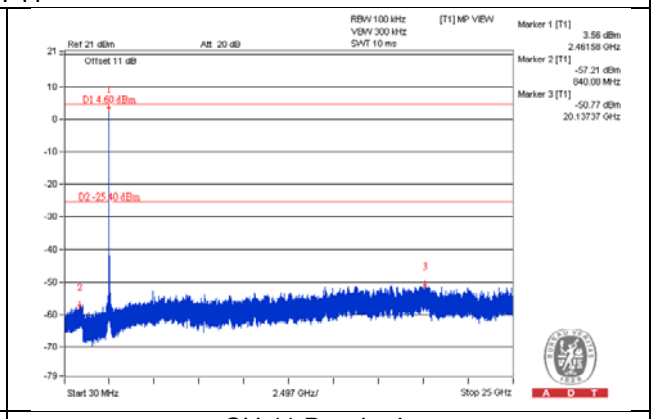
CH 6



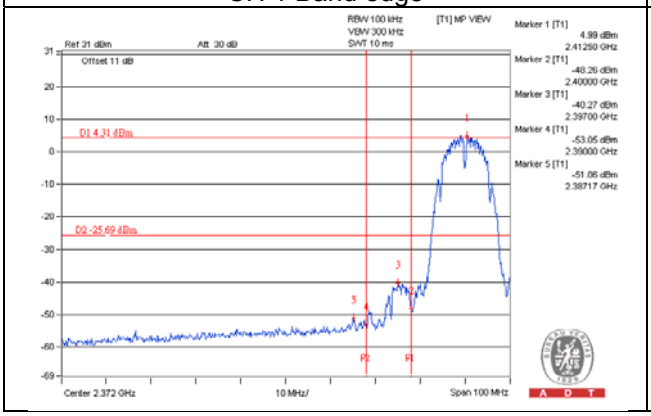


CH 11

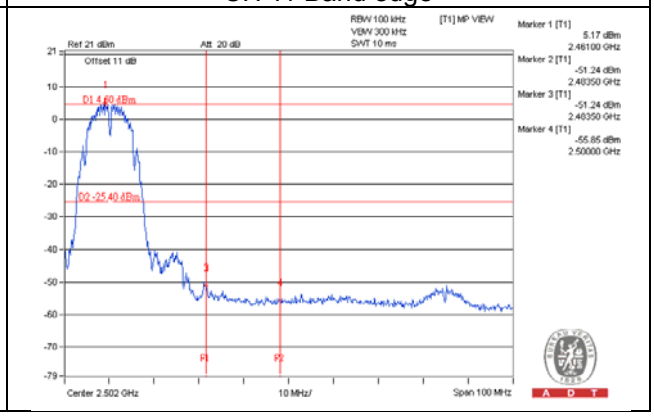




CH 1 Band edge

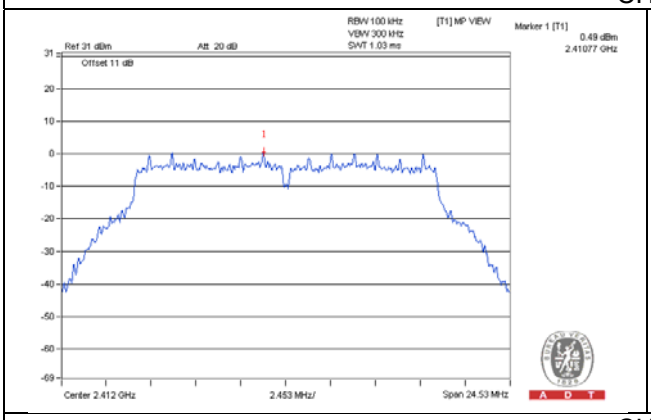


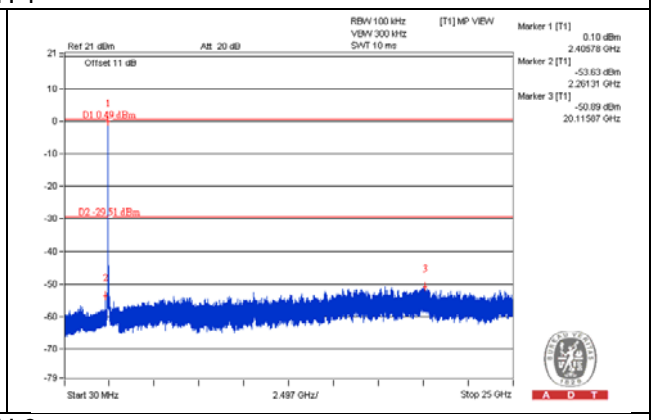
CH 11 Band edge



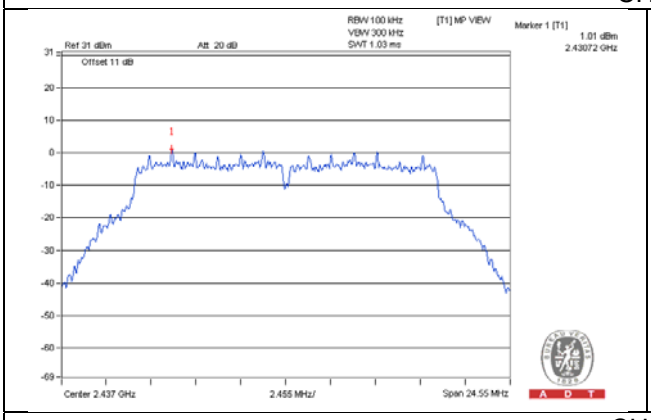
802.11g_Chain 0

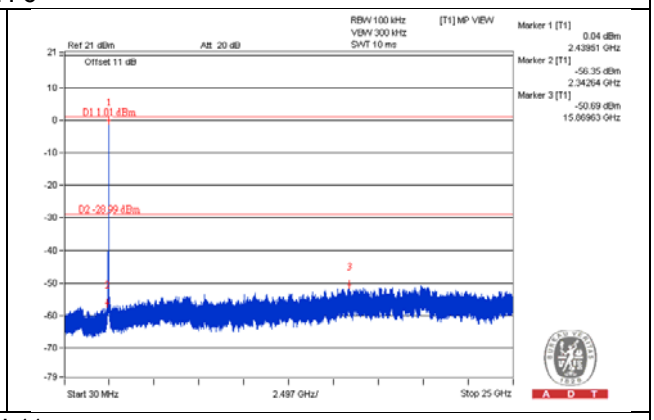
CH 1



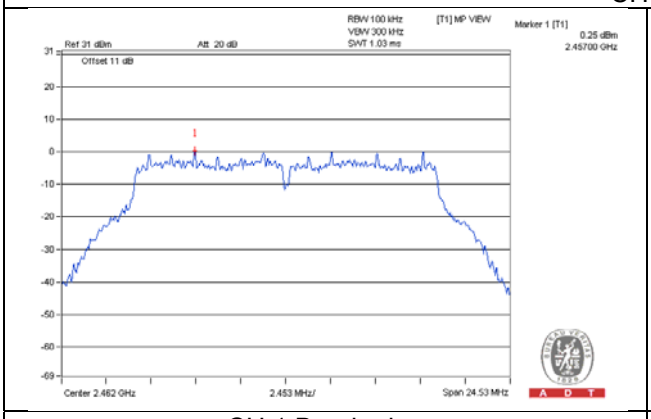


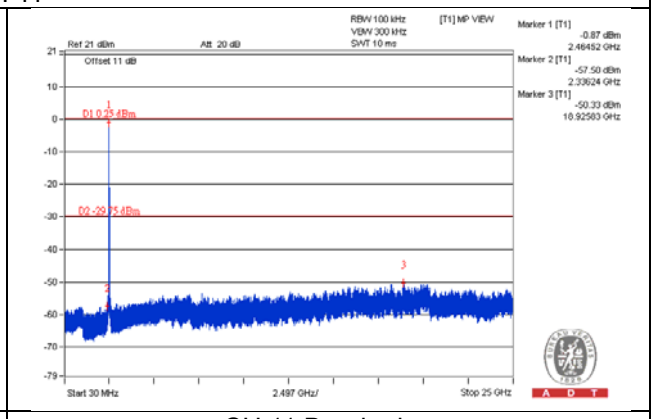
CH 6



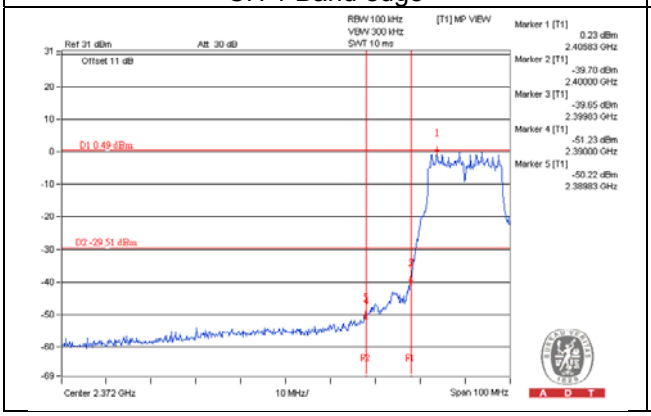


CH 11

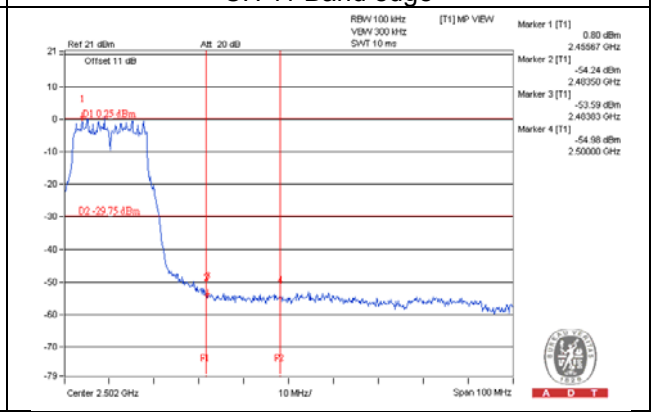




CH 1 Band edge

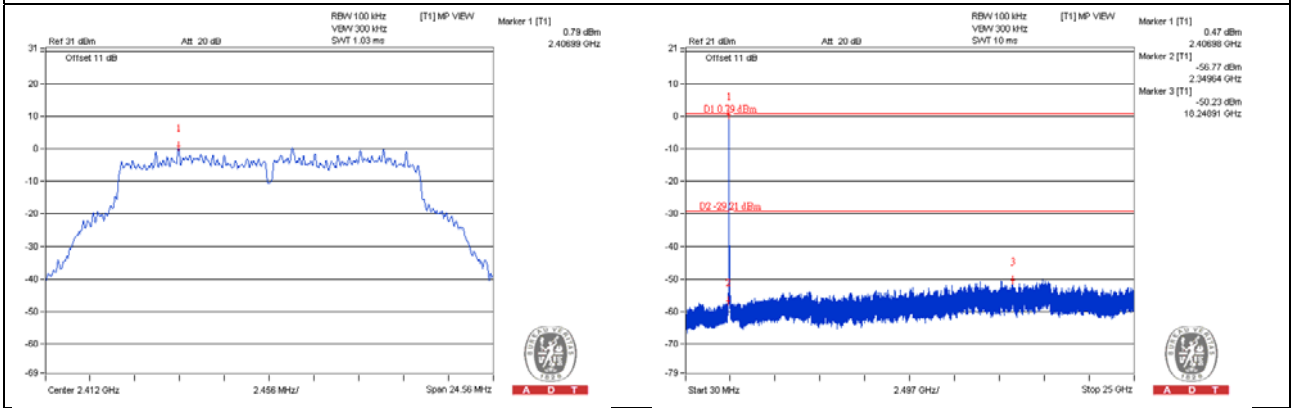


CH 11 Band edge

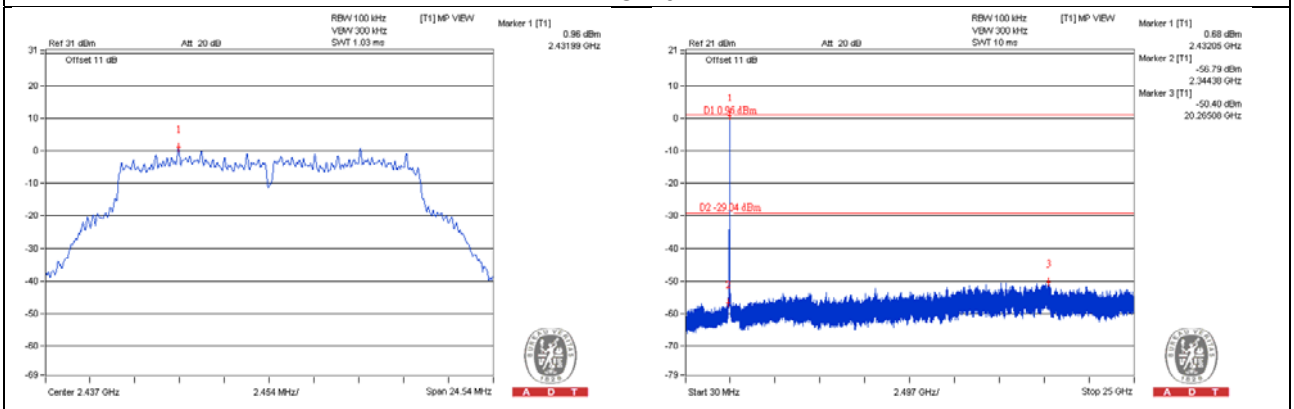


802.11g_Chain 1

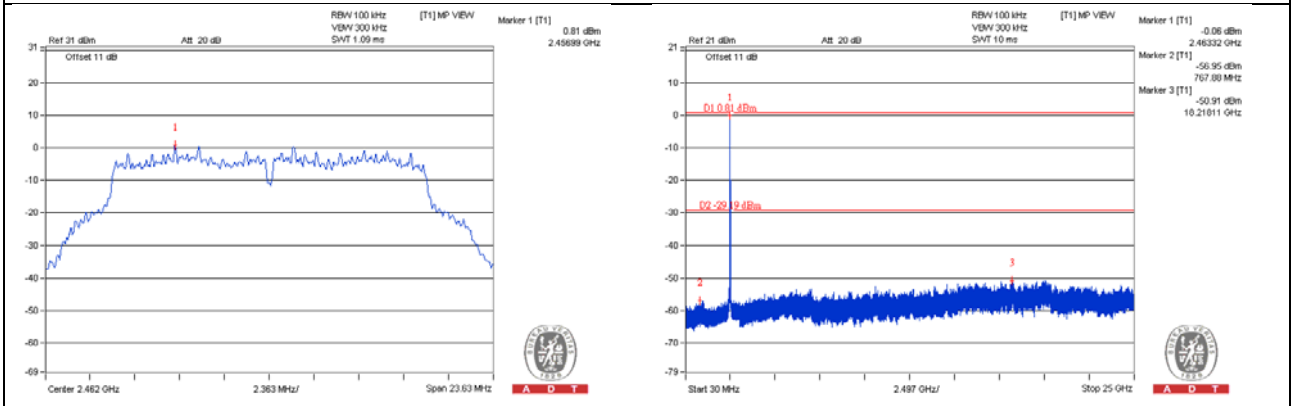
CH 1



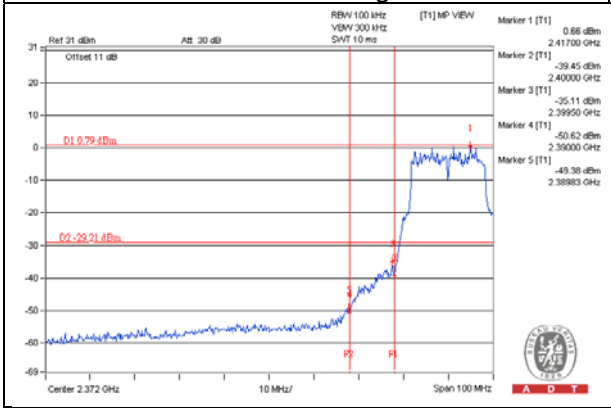
CH 6



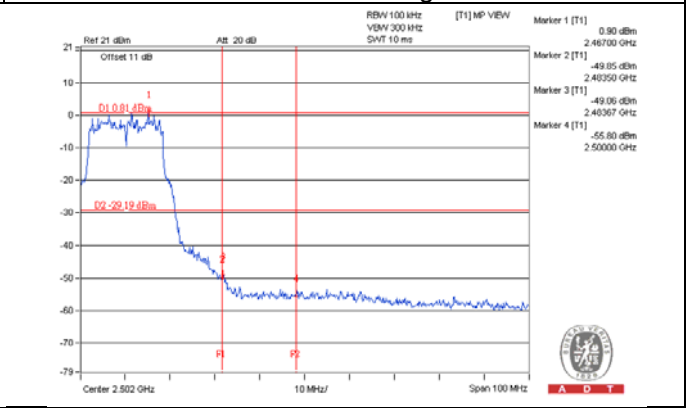
CH 11



CH 1 Band edge

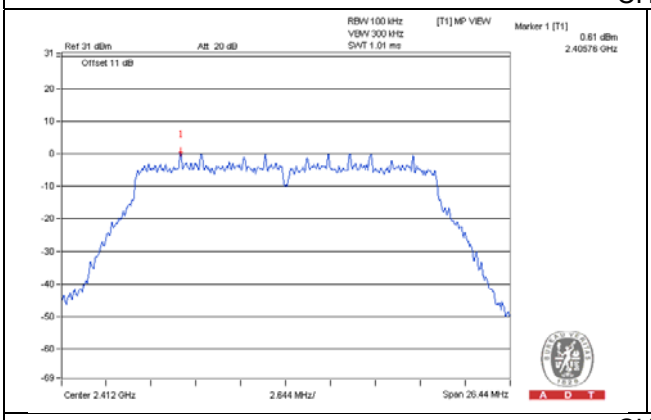


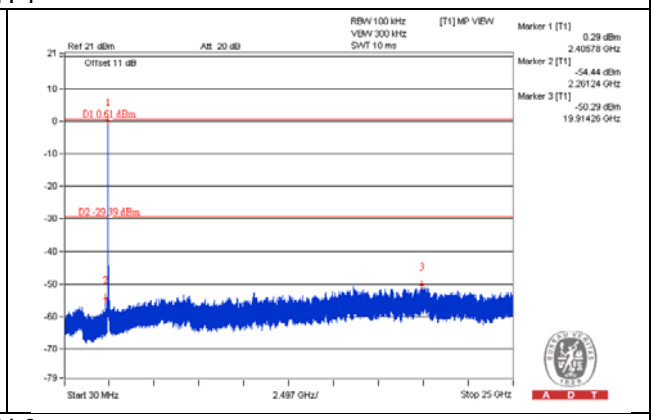
CH 11 Band edge



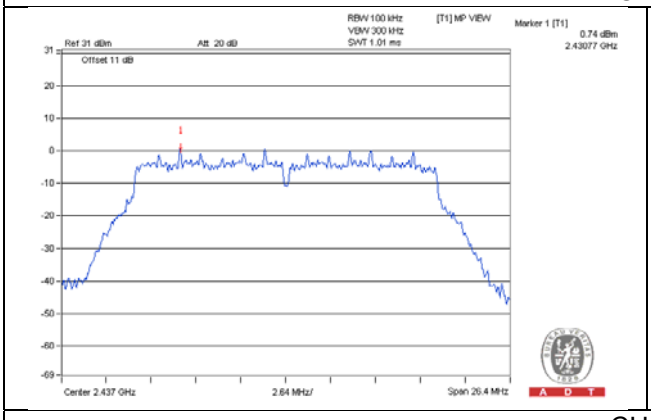
802.11n (HT20)_Chain 0

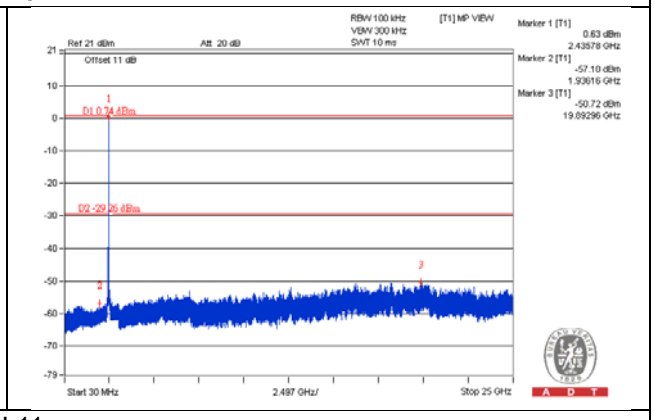
CH 1



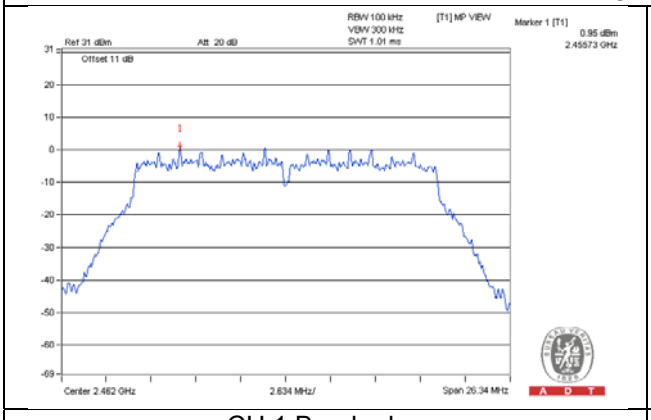


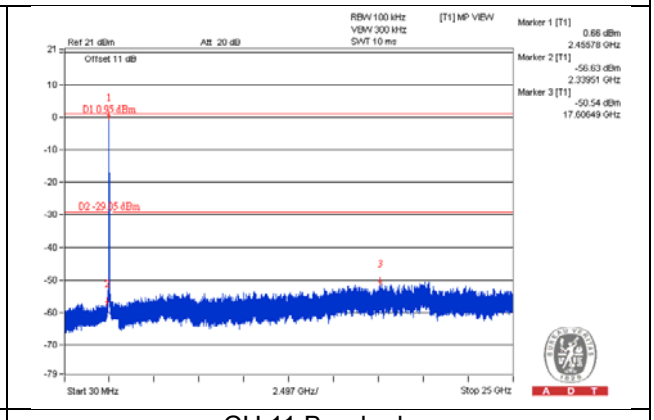
CH 6



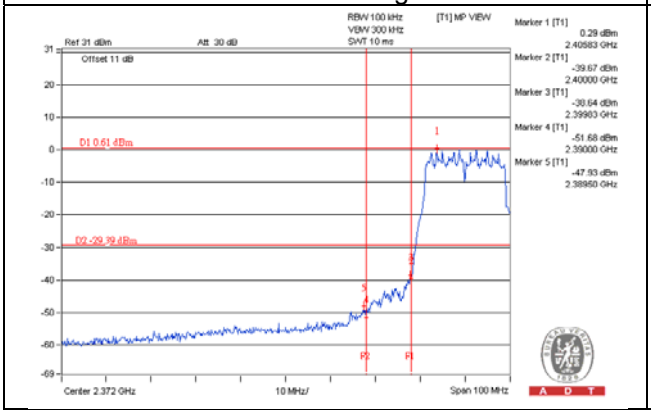


CH 11

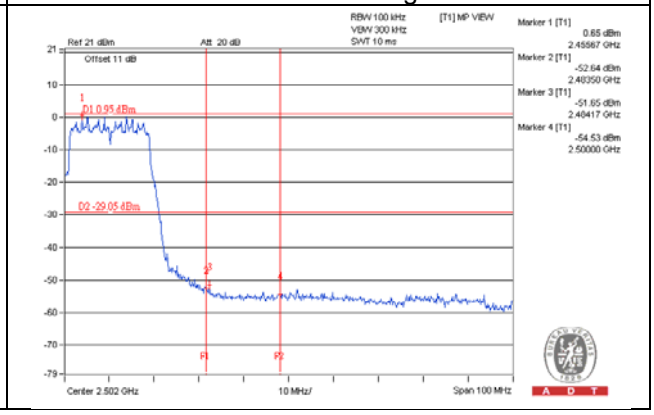




CH 1 Band edge

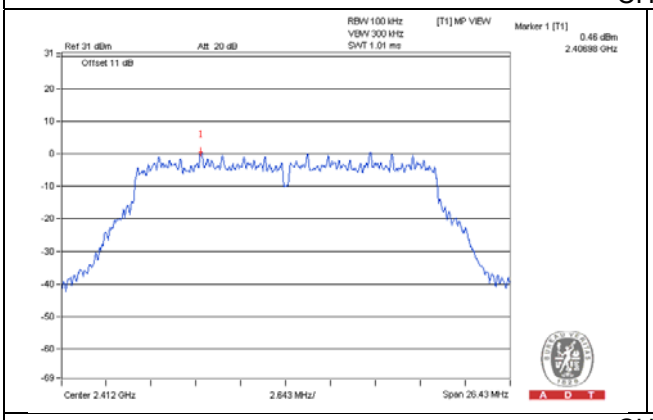


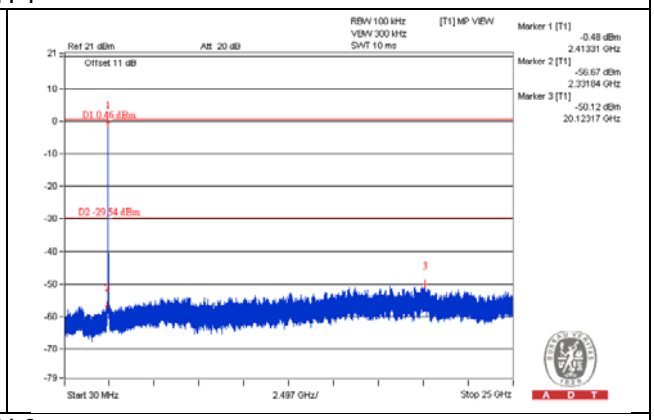
CH 11 Band edge



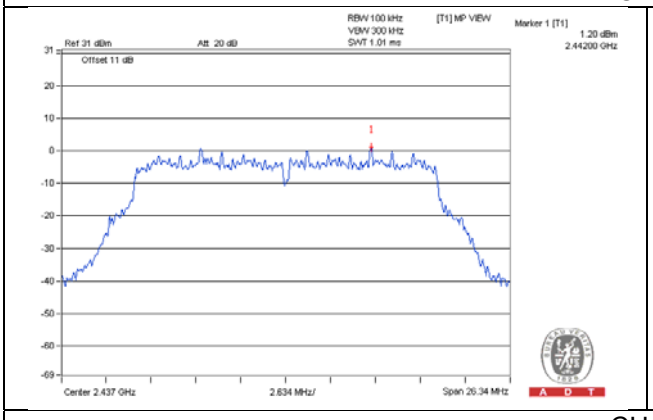
802.11n (HT20)_Chain 1

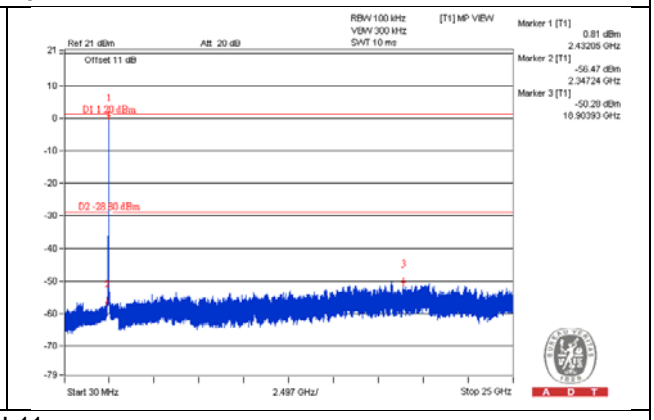
CH 1



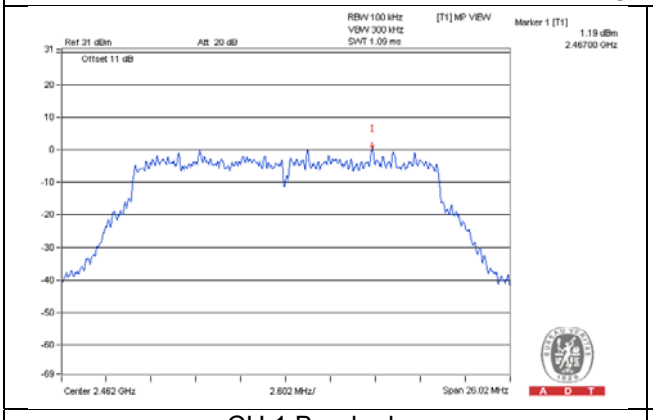


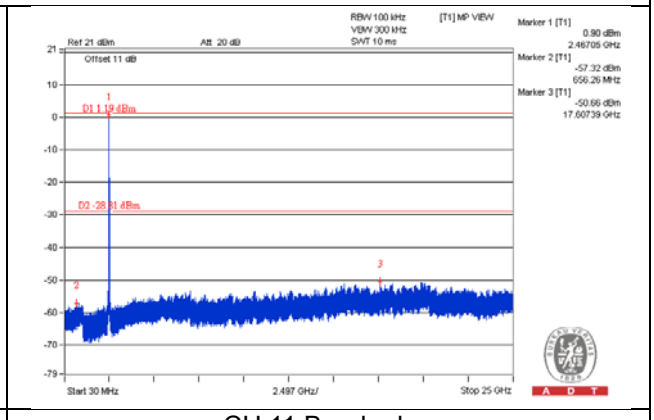
CH 6



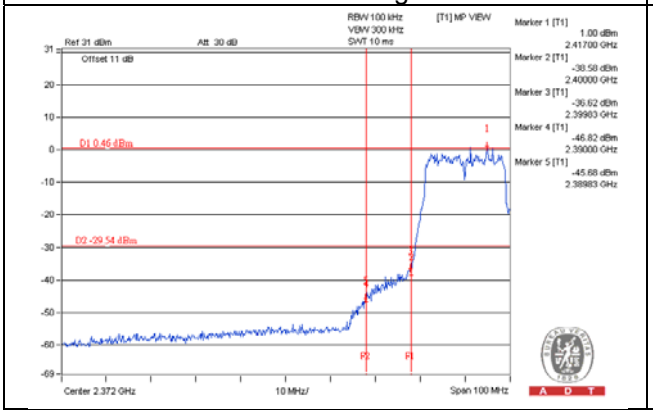


CH 11

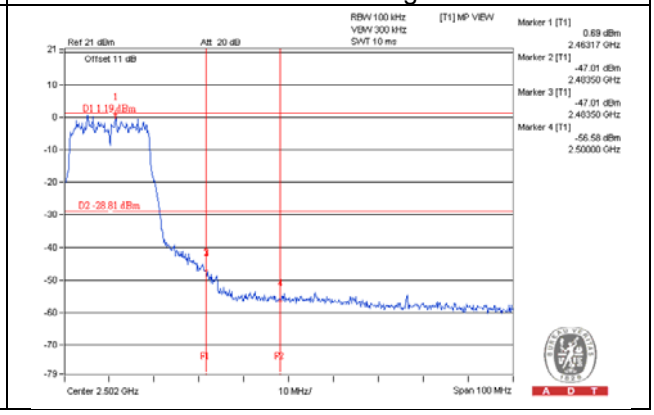




CH 1 Band edge

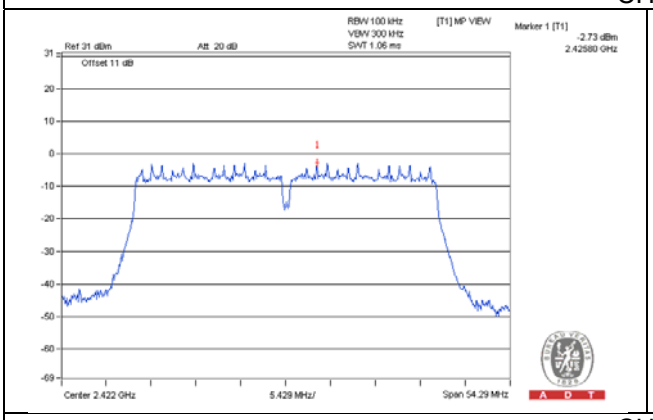


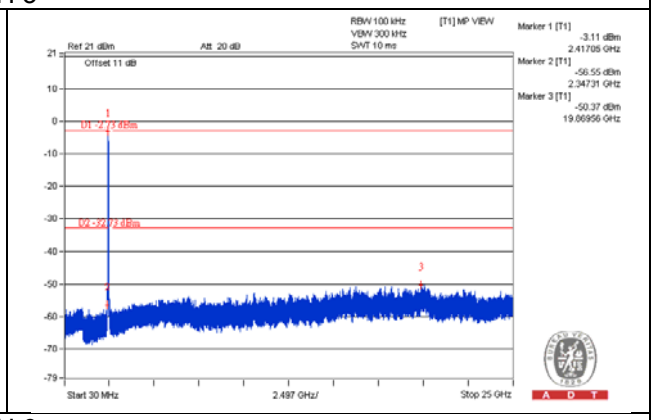
CH 11 Band edge



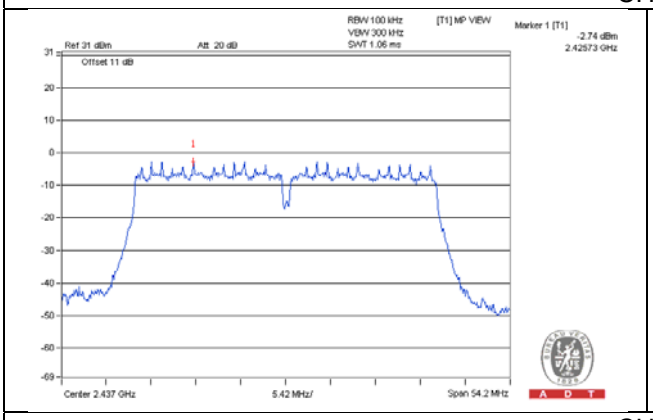
802.11n (HT40) _Chain 0

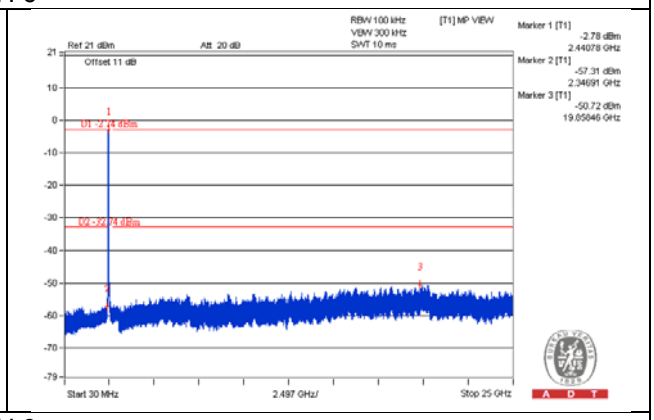
CH 3



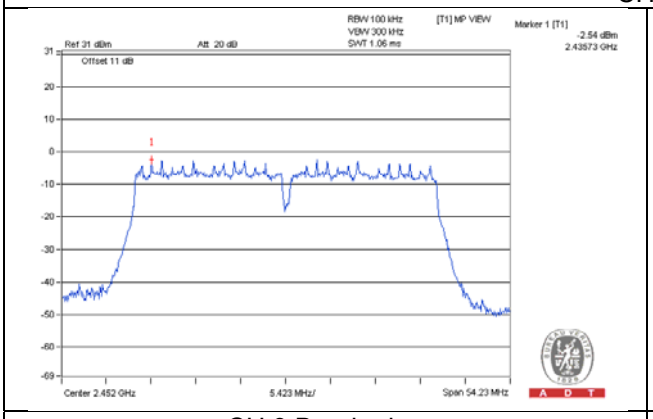


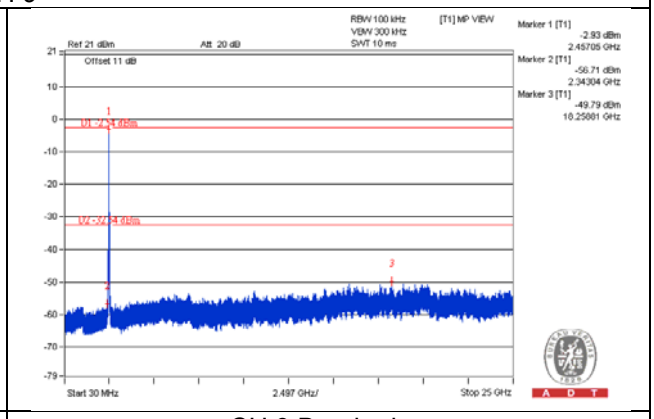
CH 6



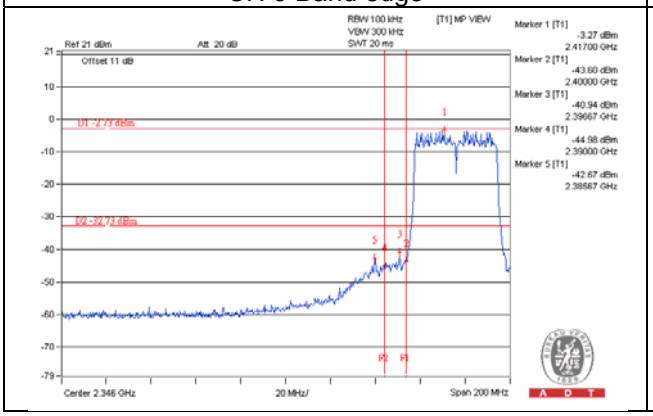


CH 9

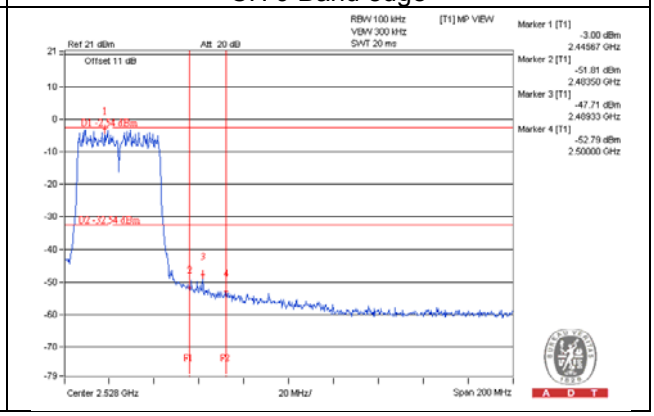




CH 3 Band edge

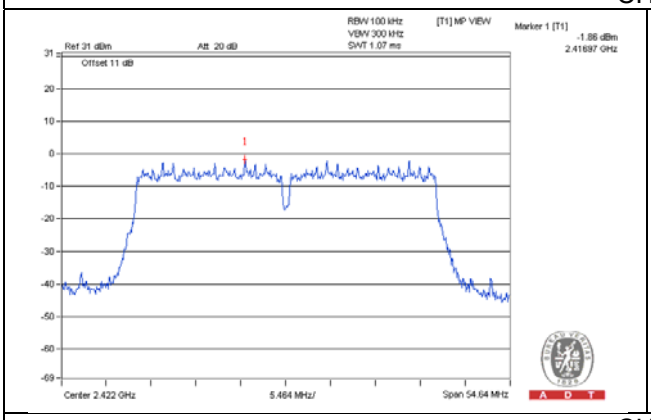


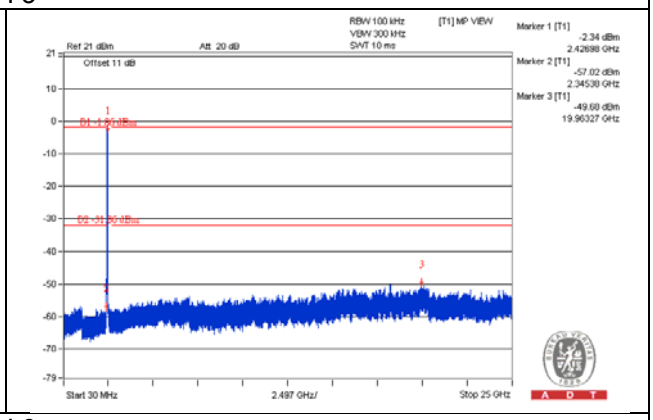
CH 9 Band edge



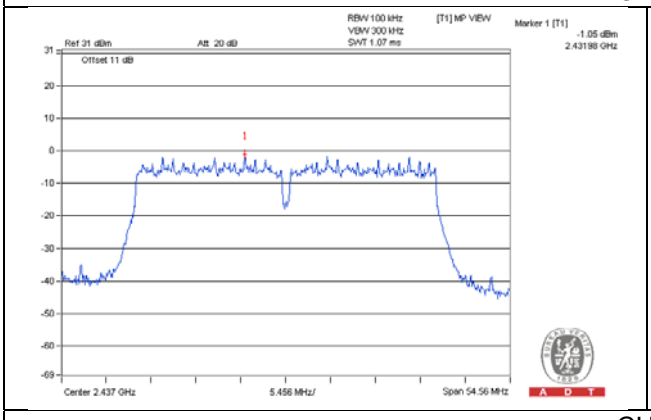
802.11n (HT40) _Chain 1

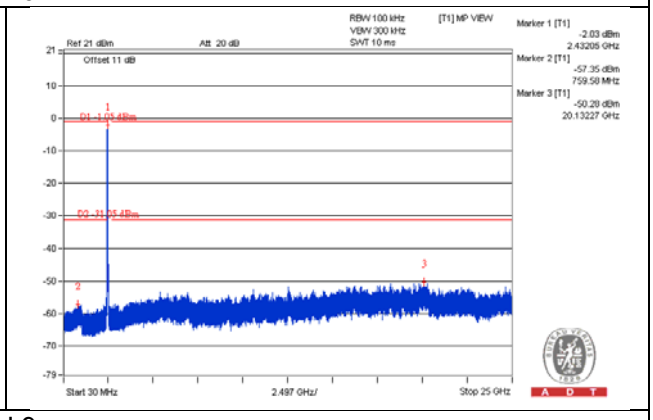
CH 3



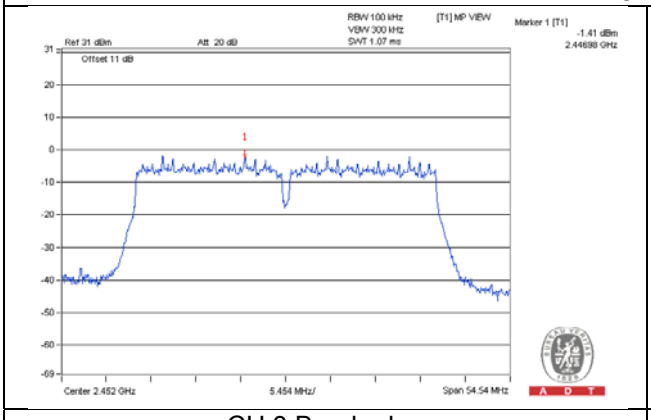


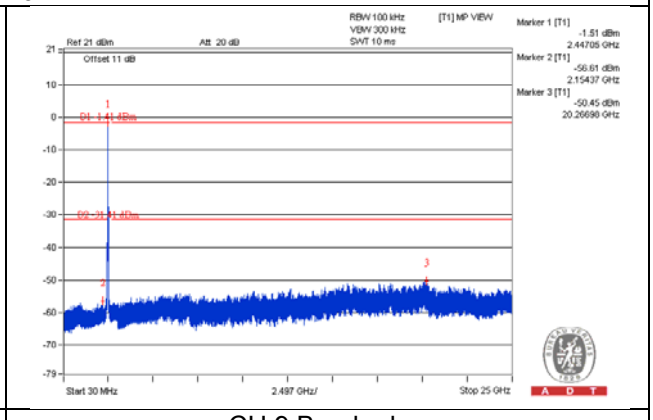
CH 6



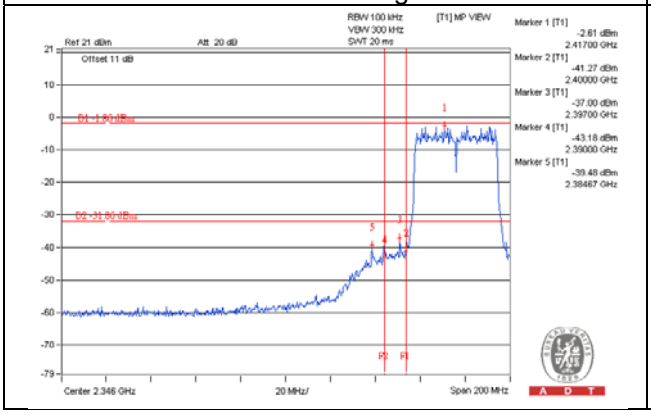


CH 9

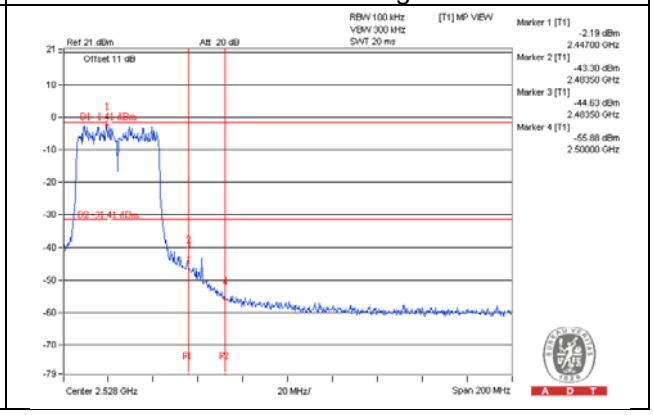




CH 3 Band edge



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 FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

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

Linko EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

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

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