

FCC Test Report

Report No.: RF110801C10J-1

FCC ID: PZWS1635-01

Test Model: S1635-01B

Series Model: S1635-01, S1635-01A, S1635-01U

Received Date: Aug. 01, 2011

Test Date: Mar. 05 ~ Mar. 10, 2015

Issued Date: Mar. 11, 2015

Applicant: DENSO WAVE INCORPORATED

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

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Release Control Record

Issue No.	Description	Date Issued
RF110801C10J-1	Original release.	Mar. 11, 2015

1 Certificate of Conformity

Product: Hand Held Terminal

Brand: NEC

Test Model: S1635-01B

Series Model: S1635-01, S1635-01A, S1635-01U

Sample Status: Engineering sample

Applicant: DENSO WAVE INCORPORATED

Test Date: Mar. 05 ~ Mar. 10, 2015

Standard: 47 CFR FCC Part 15, Subpart E (Section 15.407)
ANSI C63.10:2009

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

Prepared by :



Date: Mar. 11, 2015

Pettie Chen / Senior Specialist

Approved by :



Date: Mar. 11, 2015

Ken Liu / Senior Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (SECTION 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b)(6)	AC Power Conducted Emissions	NA	Power supply is 3.7Vdc from battery
15.407(b) (1/2/3/4/6)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -5.3dB at 10360.00MHz.
15.407(a)(1/2 /3)	Max Average Transmit Power	PASS	Meet the requirement of limit.
15.407(a)(1/2 /3)	Peak Power Spectral Density	PASS	Meet the requirement of limit.
15.407(e)	6dB bandwidth	PASS	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	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) ($\pm$)
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	2.93 dB
	200MHz ~ 1000MHz	2.95 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Hand Held Terminal
Brand	NEC
Test Model	S1635-01B
Series Model	S1635-01, S1635-01A, S1635-01U
Model Difference	Refer to NOTE
Status of EUT	Engineering sample
Power Supply Rating	3.7Vdc (from battery)
Modulation Type	64QAM, 16QAM, QPSK, BPSK
Modulation Technology	OFDM
Transfer Rate	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11 (HT20): up to 72.2Mbps
Operating Frequency	5180 ~ 5240MHz & 5745 ~ 5825MHz
Number of Channel	5180 ~ 5240MHz: 4 for 802.11a, 802.11n (HT20) 5745 ~ 5825MHz: 5 for 802.11a, 802.11n (HT20)
Output Power	3.162mW for 5180 ~ 5240MHz 12.303mW for 5745 ~ 5825MHz
Antenna Type	Refer to Note as below
Antenna Connector	Refer to Note as below
Accessory Device	Battery
Data Cable Supplied	NA

Note:

1. This report is prepared for FCC class II permissive change. This report is issued as a supplementary report to BV ADT report no. RF110801C10-1. The differences compared with the original report are adding a model and updating standard to new rule version. Therefore, all tests for 5GHz Band were retested.
2. The EUT provides one completed transmitter and one receiver.

Modulation Mode	TX Function
802.11a	1TX
802.11n (HT20)	1TX

3. The following models are provided to this EUT. (New model is marked in boldface.)

BRAND	MODEL	DESCRIPTION
NEC	S1635-01	All models are electrically identical, different model names are for marketing purpose.
	S1635-01A	
	S1635-01B	
	S1635-01U	

4. The following antenna used in this EUT is listed as below table:

TYPE	GAIN (dBi)		ANTENNA CONNECTOR
	FOR 2.4GHz	FOR 5.0GHz	
Printed PCB	1.86dBi	1.20dBi	NA

5. The EUT uses following battery:

MODEL	BT-110LA(BP06-00028C)
RATING	3.7Vdc Capacity 8.5Wh

6. 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

FOR 5180 ~ 5240MHz

4 channels are provided for 802.11a, 802.11n (HT20):

Channel	Frequency	Channel	Frequency
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

FOR 5745 ~ 5825MHz:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz		

3.2.1 Test Mode Applicability and Tested Channel Detail

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

Where **RE≥1G**: Radiated Emission above 1GHz

RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

NOTE 1: No need to concern of Conducted Emission due to the EUT is powered by battery.

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

Radiated Emission Test (Above 1GHz):

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

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.0
-	802.11n (HT20)		36 to 48	36, 40, 48	OFDM	BPSK	7.2
-	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (HT20)		149 to 165	149, 157, 165	OFDM	BPSK	7.2

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	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	5180-5240	36 to 48	149	OFDM	BPSK	6.0
-	802.11a	5745-5825	149 to 165		OFDM	BPSK	6.0

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	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.0
-	802.11n (HT20)		36 to 48	36, 40, 48	OFDM	BPSK	7.2
-	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (HT20)		149 to 165	149, 157, 165	OFDM	BPSK	7.2

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	19deg. C, 68%RH	3.7Vdc	Jones Chang
RE<1G	19deg. C, 68%RH	3.7Vdc	Jones Chang
APCM	25deg. C, 60%RH	3.7Vdc	Leo Chan

3.3 Duty Cycle of Test Signal

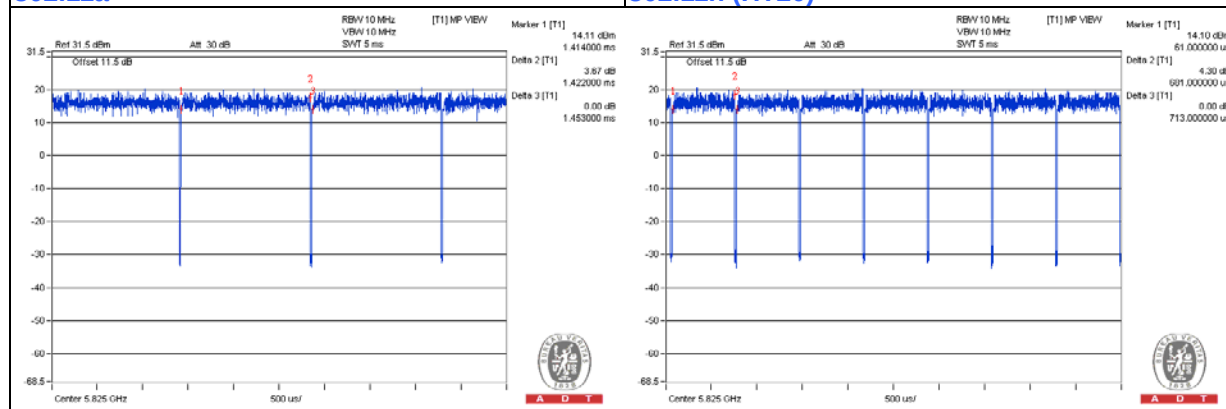
Duty cycle of test signal is < 98 %, duty factor is required

802.11a: Duty cycle = 1.422/1.453 = 0.979, Duty factor = $10 * \log(1/0.979) = 0.09$

802.11n (HT20): Duty cycle = 0.681/0.713 = 0.955, Duty factor = $10 * \log(1/0.955) = 0.20$

802.11a

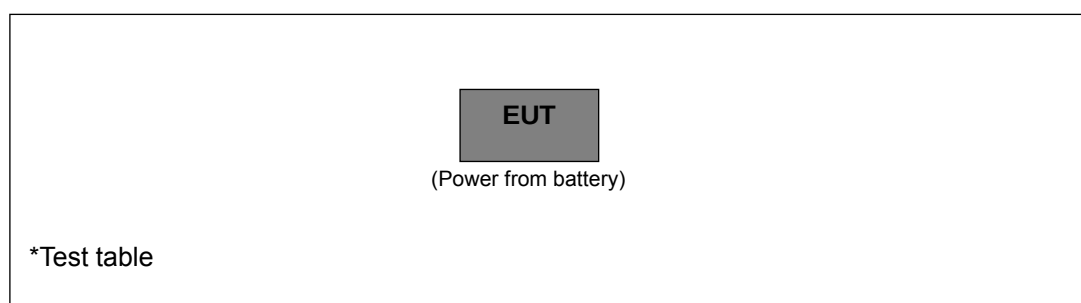
802.11n (HT20)



3.4 Description of Support Units

The EUT has been tested as an independent unit.

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standard

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 E (15.407)

789033 D02 General UNII Test Procedure New Rules v01

ANSI C63.10-2009

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

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

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:

- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) = 20 log Emission level (uV/m).
- 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.

LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

APPLICABLE TO	LIMIT	
789033 D02 General UNII Test Procedure New Rules v01	FIELD STRENGTH AT 3m	
	PK:74 (dBuV/m)	AV:54 (dBuV/m)
APPLICABLE TO	EIRP LIMIT	EQUIVALENT FIELD STRENGTH AT 3m
15.407(b)(1)	PK:-27 (dBm/MHz)	PK:68.2(dBuV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)	PK:-27 (dBm/MHz) ^{*1} PK:-17 (dBm/MHz) ^{*2}	PK: 68.2(dBuV/m) ^{*1} PK:78.2 (dBuV/m) ^{*2}

NOTE: ^{*1} beyond 10MHz of the band edge ^{*2} within 10 MHz of band edge

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts).}$$

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Oct. 06, 2014	Oct. 05, 2015
Spectrum Analyzer ROHDE & SCHWARZ	E4446A	MY51100039	Aug. 18, 2014	Aug. 17, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Feb. 05, 2015	Feb. 04, 2016
HORN Antenna SCHWARZBECK	9120D	209	Feb. 09, 2015	Feb. 08, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 09, 2015	Feb. 08, 2016
Preamplifier Agilent	8447D	2944A10738	Oct. 18, 2014	Oct. 17, 2015
Preamplifier Agilent	8449B	3008A01964	Aug. 22, 2014	Aug. 21, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	214378/4	Aug. 22, 2014	Aug. 21, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 106	12738/6 +309224/4	Aug. 22, 2014	Aug. 21, 2015
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	NA	NA
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100	SC93021703	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2014	Oct. 17, 2015
High Speed Peak Power Meter	ML2495A	0824011	Jul. 26, 2014	Jul. 25, 2015
Power Sensor	MA2411B	0738171	Jul. 26, 2014	Jul. 25, 2015
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 09, 2014	Jun. 08, 2015

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 3.

3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

4. The FCC Site Registration No. is 988962.

5. The IC Site Registration No. is IC 7450F-3.

4.1.3 Test Procedure

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

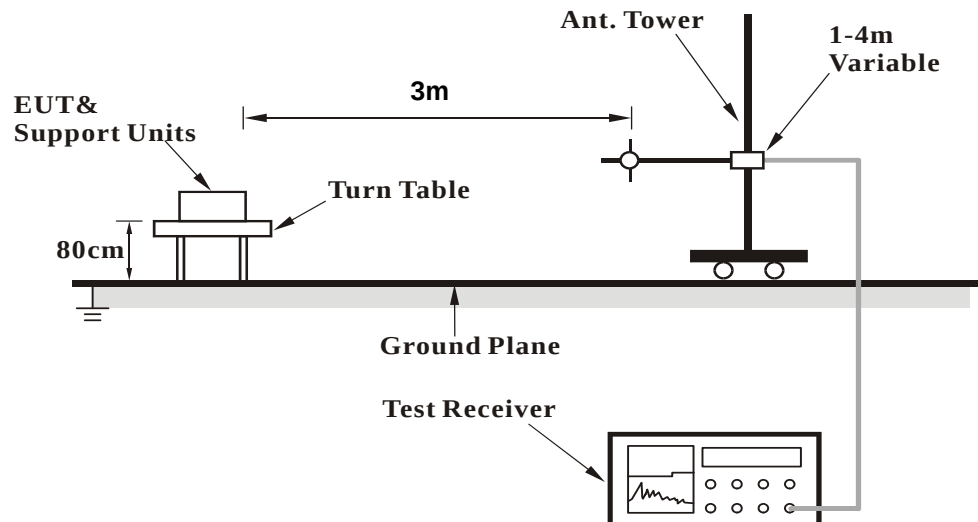
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

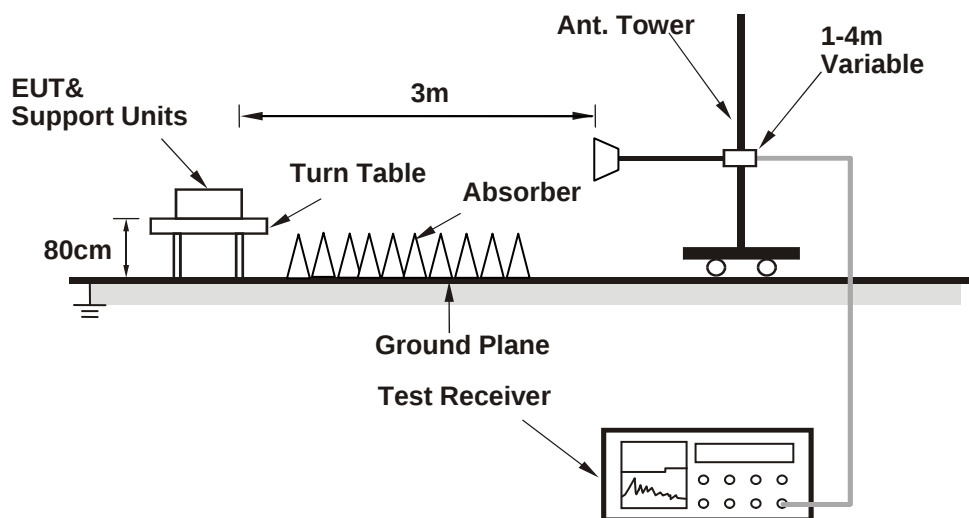
No deviation.

4.1.5 Test Setup

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

4.1.6 EUT Operating Conditions

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

4.1.7 Test Results

ABOVE 1GHz DATA :

802.11a

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	5150.00	58.0 PK	74.0	-16.0	1.01 H	300	52.00	6.00
2	5150.00	46.5 AV	54.0	-7.5	1.01 H	300	40.50	6.00
3	*5180.00	95.7 PK			1.00 H	296	56.20	39.50
4	*5180.00	85.0 AV			1.00 H	296	45.50	39.50
5	#10360.00	61.4 PK	74.0	-12.6	1.12 H	0	43.00	18.40
6	#10360.00	48.7 AV	54.0	-5.3	1.12 H	0	30.30	18.40
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	5150.00	57.5 PK	74.0	-16.5	1.10 V	40	51.50	6.00
2	5150.00	46.1 AV	54.0	-7.9	1.10 V	40	40.10	6.00
3	*5180.00	92.9 PK			1.00 V	340	53.40	39.50
4	*5180.00	82.5 AV			1.00 V	340	43.00	39.50
5	#10360.00	61.0 PK	74.0	-13.0	1.20 V	19	42.60	18.40
6	#10360.00	48.2 AV	54.0	-5.8	1.20 V	19	29.80	18.40

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	*5200.00	95.6 PK			1.01 H	325	56.00	39.60
2	*5200.00	84.7 AV			1.01 H	325	45.10	39.60
3	#10400.00	61.3 PK	74.0	-12.7	1.07 H	315	42.80	18.50
4	#10400.00	48.2 AV	54.0	-5.8	1.07 H	315	29.70	18.50
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	*5200.00	94.7 PK			1.05 V	163	55.10	39.60
2	*5200.00	84.2 AV			1.05 V	163	44.60	39.60
3	#10400.00	60.7 PK	74.0	-13.3	1.10 V	233	42.20	18.50
4	#10400.00	47.5 AV	54.0	-6.5	1.10 V	233	29.00	18.50

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	*5240.00	96.2 PK			1.00 H	323	56.60	39.60
2	*5240.00	85.5 AV			1.00 H	323	45.90	39.60
3	5350.00	57.7 PK	74.0	-16.3	1.00 H	325	51.60	6.10
4	5350.00	46.1 AV	54.0	-7.9	1.00 H	325	40.00	6.10
5	#10480.00	60.8 PK	74.0	-13.2	1.09 H	343	41.80	19.00
6	#10480.00	47.9 AV	54.0	-6.1	1.09 H	343	28.90	19.00
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	*5240.00	95.7 PK			1.06 V	164	56.10	39.60
2	*5240.00	85.0 AV			1.06 V	164	45.40	39.60
3	5350.00	57.9 PK	74.0	-16.1	1.06 V	164	51.80	6.10
4	5350.00	45.7 AV	54.0	-8.3	1.06 V	164	39.60	6.10
5	#10480.00	61.3 PK	74.0	-12.7	1.00 V	354	42.30	19.00
6	#10480.00	48.1 AV	54.0	-5.9	1.00 V	354	29.10	19.00

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

802.11n (20MHz)

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	5150.00	56.4 PK	74.0	-17.6	1.20 H	333	50.40	6.00
2	5150.00	45.5 AV	54.0	-8.5	1.20 H	333	39.50	6.00
3	*5180.00	94.8 PK			1.23 H	301	55.30	39.50
4	*5180.00	84.2 AV			1.23 H	301	44.70	39.50
5	#10360.00	60.1 PK	74.0	-13.9	1.16 H	288	41.70	18.40
6	#10360.00	47.2 AV	54.0	-6.8	1.16 H	288	28.80	18.40
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	5150.00	56.9 PK	74.0	-17.1	1.06 V	166	50.90	6.00
2	5150.00	45.9 AV	54.0	-8.1	1.06 V	166	39.90	6.00
3	*5180.00	92.8 PK			1.05 V	165	53.30	39.50
4	*5180.00	82.3 AV			1.05 V	165	42.80	39.50
5	#10360.00	60.5 PK	74.0	-13.5	1.00 V	199	42.10	18.40
6	#10360.00	47.7 AV	54.0	-6.3	1.00 V	199	29.30	18.40

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	*5200.00	94.4 PK			1.24 H	309	54.80	39.60
2	*5200.00	84.2 AV			1.24 H	309	44.60	39.60
3	#10400.00	61.0 PK	74.0	-13.0	1.18 H	311	42.50	18.50
4	#10400.00	47.9 AV	54.0	-6.1	1.18 H	311	29.40	18.50
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	*5200.00	93.5 PK			1.06 V	164	53.90	39.60
2	*5200.00	83.5 AV			1.06 V	164	43.90	39.60
3	#10400.00	61.4 PK	74.0	-12.6	1.10 V	179	42.90	18.50
4	#10400.00	48.2 AV	54.0	-5.8	1.10 V	179	29.70	18.50

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	*5240.00	96.3 PK			1.12 H	321	56.70	39.60
2	*5240.00	85.9 AV			1.12 H	321	46.30	39.60
3	5350.00	58.6 PK	74.0	-15.4	1.12 H	321	52.50	6.10
4	5350.00	47.5 AV	54.0	-6.5	1.12 H	321	41.40	6.10
5	#10480.00	61.5 PK	74.0	-12.5	1.16 H	350	42.50	19.00
6	#10480.00	48.3 AV	54.0	-5.7	1.16 H	350	29.30	19.00
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	*5240.00	94.0 PK			1.06 V	162	54.40	39.60
2	*5240.00	83.7 AV			1.06 V	162	44.10	39.60
3	5350.00	57.9 PK	74.0	-16.1	1.06 V	162	51.80	6.10
4	5350.00	46.7 AV	54.0	-7.3	1.06 V	162	40.60	6.10
5	#10480.00	61.0 PK	74.0	-13.0	1.11 V	19	42.00	19.00
6	#10480.00	47.9 AV	54.0	-6.1	1.11 V	19	28.90	19.00

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

802.11a

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	#5714.00	58.8 PK	74.0	-15.2	1.30 H	278	52.00	6.80
2	#5714.00	48.2 AV	54.0	-5.8	1.30 H	278	41.40	6.80
3	#5722.00	59.7 PK	78.2	-18.5	1.50 H	272	52.90	6.80
4	#5725.00	60.0 PK	78.2	-18.2	1.50 H	272	53.20	6.80
5	*5745.00	102.2 PK			1.50 H	272	61.80	40.40
6	*5745.00	92.0 AV			1.50 H	272	51.60	40.40
7	11490.00	60.7 PK	74.0	-13.3	1.25 H	300	42.30	18.40
8	11490.00	47.8 AV	54.0	-6.2	1.25 H	300	29.40	18.40
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	#5714.00	58.8 PK	74.0	-15.2	1.09 V	178	52.00	6.80
2	#5714.00	46.9 AV	54.0	-7.1	1.09 V	178	40.10	6.80
3	#5722.00	60.8 PK	78.2	-17.4	1.07 V	165	54.00	6.80
4	#5725.00	61.3 PK	78.2	-16.9	1.07 V	165	54.50	6.80
5	*5745.00	101.9 PK			1.07 V	165	61.50	40.40
6	*5745.00	91.1 AV			1.07 V	165	50.70	40.40
7	11490.00	60.6 PK	74.0	-13.4	1.13 V	123	42.20	18.40
8	11490.00	47.3 AV	54.0	-6.7	1.13 V	123	28.90	18.40

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	*5785.00	102.9 PK			1.49 H	270	62.40	40.50
2	*5785.00	92.6 AV			1.49 H	270	52.10	40.50
3	11570.00	61.3 PK	74.0	-12.7	1.29 H	303	42.90	18.40
4	11570.00	48.1 AV	54.0	-5.9	1.29 H	303	29.70	18.40
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	*5785.00	101.1 PK			1.05 V	164	60.60	40.50
2	*5785.00	89.8 AV			1.05 V	164	49.30	40.50
3	11570.00	60.4 PK	74.0	-13.6	1.13 V	183	42.00	18.40
4	11570.00	47.5 AV	54.0	-6.5	1.13 V	183	29.10	18.40

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

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	*5825.00	103.2 PK			1.48 H	244	62.70	40.50
2	*5825.00	92.8 AV			1.48 H	244	52.30	40.50
3	#5850.00	59.4 PK	78.2	-18.8	1.21 H	261	52.50	6.90
4	#5853.00	60.5 PK	78.2	-17.7	1.21 H	261	53.50	7.00
5	#5861.00	59.9 PK	74.0	-14.1	1.50 H	244	52.90	7.00
6	#5861.00	48.1 AV	54.0	-5.9	1.50 H	244	41.10	7.00
7	11650.00	60.9 PK	74.0	-13.1	1.23 H	261	42.00	18.90
8	11650.00	47.8 AV	54.0	-6.2	1.23 H	261	28.90	18.90
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	*5825.00	100.2 PK			1.04 V	160	59.70	40.50
2	*5825.00	89.8 AV			1.04 V	160	49.30	40.50
3	#5850.00	59.5 PK	78.2	-18.7	1.09 V	169	52.60	6.90
4	#5853.00	61.2 PK	78.2	-17.0	1.09 V	169	54.20	7.00
5	#5861.00	57.8 PK	74.0	-16.2	1.04 V	160	50.80	7.00
6	#5861.00	46.8 AV	54.0	-7.2	1.04 V	160	39.80	7.00
7	11650.00	60.4 PK	74.0	-13.6	1.00 V	298	41.50	18.90
8	11650.00	47.5 AV	54.0	-6.5	1.00 V	298	28.60	18.90

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

802.11n (20MHz)

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	#5714.00	59.5 PK	74.0	-14.5	1.50 H	27	52.70	6.80
2	#5714.00	48.6 AV	54.0	-5.4	1.50 H	27	41.80	6.80
3	#5722.00	64.5 PK	78.2	-13.7	1.49 H	280	57.70	6.80
4	#5725.00	59.8 PK	78.2	-18.4	1.49 H	280	53.00	6.80
5	*5745.00	102.2 PK			1.50 H	271	61.80	40.40
6	*5745.00	91.5 AV			1.50 H	271	51.10	40.40
7	11490.00	60.6 PK	74.0	-13.4	1.23 H	253	42.20	18.40
8	11490.00	47.4 AV	54.0	-6.6	1.23 H	253	29.00	18.40
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	#5714.00	58.8 PK	74.0	-15.2	1.08 V	158	52.00	6.80
2	#5714.00	46.3 AV	54.0	-7.7	1.08 V	158	39.50	6.80
3	#5722.00	59.5 PK	78.2	-18.7	1.06 V	166	52.70	6.80
4	#5725.00	59.7 PK	78.2	-18.5	1.06 V	166	52.90	6.80
5	*5745.00	101.3 PK			1.06 V	162	60.90	40.40
6	*5745.00	91.0 AV			1.06 V	162	50.60	40.40
7	11490.00	59.9 PK	74.0	-14.1	1.12 V	183	41.50	18.40
8	11490.00	46.9 AV	54.0	-7.1	1.12 V	183	28.50	18.40

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	*5785.00	103.3 PK			1.51 H	271	62.80	40.50
2	*5785.00	92.6 AV			1.51 H	271	52.10	40.50
3	11570.00	60.1 PK	74.0	-13.9	1.26 H	240	41.70	18.40
4	11570.00	47.0 AV	54.0	-7.0	1.26 H	240	28.60	18.40
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	*5785.00	99.6 PK			1.07 V	164	59.10	40.50
2	*5785.00	89.4 AV			1.07 V	164	48.90	40.50
3	11570.00	60.7 PK	74.0	-13.3	1.00 V	22	42.30	18.40
4	11570.00	47.4 AV	54.0	-6.6	1.00 V	22	29.00	18.40

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

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	*5825.00	101.9 PK			1.47 H	245	61.40	40.50
2	*5825.00	91.6 AV			1.47 H	245	51.10	40.50
3	#5850.00	59.4 PK	78.2	-18.8	1.50 H	250	52.50	6.90
4	#5853.00	61.0 PK	78.2	-17.2	1.50 H	250	54.00	7.00
5	#5861.00	58.6 PK	74.0	-15.4	1.48 H	255	51.60	7.00
6	#5861.00	47.3 AV	54.0	-6.7	1.48 H	255	40.30	7.00
7	11650.00	61.5 PK	74.0	-12.5	1.29 H	266	42.60	18.90
8	11650.00	48.3 AV	54.0	-5.7	1.29 H	266	29.40	18.90
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	*5825.00	99.9 PK			1.05 V	163	59.40	40.50
2	*5825.00	89.3 AV			1.05 V	163	48.80	40.50
3	#5850.00	59.3 PK	78.2	-18.9	1.09 V	156	52.40	6.90
4	#5853.00	60.5 PK	78.2	-17.7	1.09 V	156	53.50	7.00
5	#5861.00	59.6 PK	74.0	-14.4	1.09 V	156	52.60	7.00
6	#5861.00	48.6 AV	54.0	-5.4	1.09 V	156	41.60	7.00
7	11650.00	60.4 PK	74.0	-13.6	1.12 V	180	41.50	18.90
8	11650.00	47.3 AV	54.0	-6.7	1.12 V	180	28.40	18.90

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

BELOW 1GHz WORST-CASE DATA

802.11a

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 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	29.90	17.8 QP	40.0	-22.2	2.00 H	142	33.50	-15.70
2	57.12	32.5 QP	40.0	-7.5	2.00 H	16	47.10	-14.60
3	70.73	20.6 QP	40.0	-19.4	2.00 H	274	36.80	-16.20
4	86.28	18.8 QP	40.0	-21.2	2.00 H	125	38.40	-19.60
5	142.67	15.0 QP	43.5	-28.5	1.01 H	300	29.60	-14.60
6	422.65	18.5 QP	46.0	-27.5	1.01 H	298	28.50	-10.00
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	29.90	15.0 QP	40.0	-25.0	2.00 V	73	30.70	-15.70
2	57.12	20.5 QP	40.0	-19.5	1.00 V	334	35.10	-14.60
3	154.33	14.1 QP	43.5	-29.4	1.49 V	11	28.00	-13.90
4	358.48	16.9 QP	46.0	-29.1	1.49 V	212	28.40	-11.50
5	463.48	19.4 QP	46.0	-26.6	2.00 V	70	28.50	-9.10
6	494.58	23.1 QP	46.0	-22.9	1.49 V	212	31.70	-8.60

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

4.2 Transmit Power Measurement

4.2.1 Limits of Transmit Power Measurement

Operation Band	EUT Category		LIMIT
U-NII-1		Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p $\leq$ 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
		Fixed point-to-point Access Point	1 Watt (30 dBm)
		Indoor Access Point	1 Watt (30 dBm)
	√	Mobile and Portable client device	250mW (24 dBm)
U-NII-2A	---		250mW (24 dBm) or 11 dBm+10 log B*
U-NII-2C	---		250mW (24 dBm) or 11 dBm+10 log B*
U-NII-3	√		1 Watt (30 dBm)

*B is the 26 dB emission bandwidth in megahertz

Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

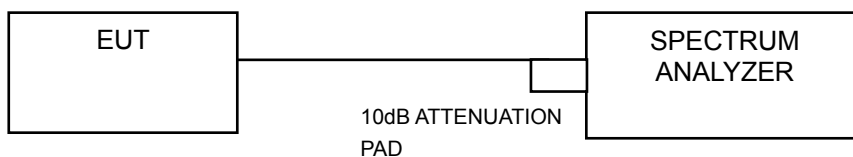
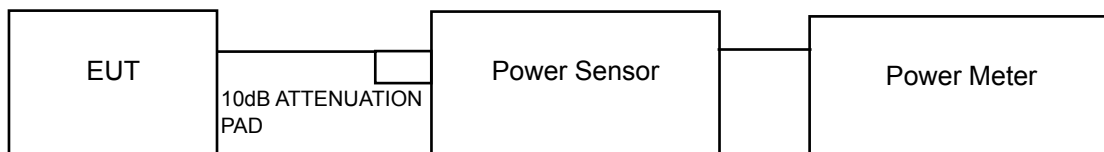
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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.

4.2.2 Test Setup



4.2.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.2.4 Test Procedure

FOR AVERAGE POWER MEASUREMENT

For 802.11a, 802.11n (HT20)

Method PM is 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.

4.2.5 Deviation from Test Standard

No deviation.

4.2.6 EUT Operating Conditions

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

4.2.7 Test Result

POWER OUTPUT:

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	MAXIMUM CONDUCTED POWER (mW)	MAXIMUM CONDUCTED POWER (dBm)	POWER LIMIT (dBm)	PASS/FAIL
36	5180	2.951	4.70	24	PASS
40	5200	3.162	5.00	24	PASS
48	5240	2.818	4.50	24	PASS
149	5745	12.303	10.90	30	PASS
157	5785	12.023	10.80	30	PASS
165	5825	12.023	10.80	30	PASS

802.11n (HT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	MAXIMUM CONDUCTED POWER (mW)	MAXIMUM CONDUCTED POWER (dBm)	POWER LIMIT (dBm)	PASS/FAIL
36	5180	2.884	4.60	24	PASS
40	5200	3.020	4.80	24	PASS
48	5240	2.818	4.50	24	PASS
149	5745	11.749	10.70	30	PASS
157	5785	11.749	10.70	30	PASS
165	5825	11.749	10.70	30	PASS

26dB BANDWIDTH:

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)	PASS / FAIL
36	5180	23.08	PASS
40	5200	23.32	PASS
48	5240	23.21	PASS

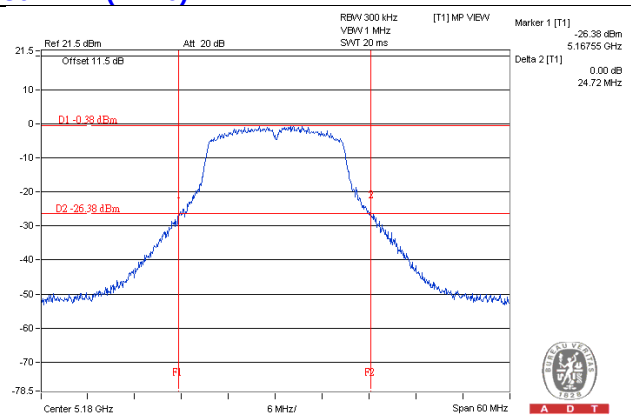
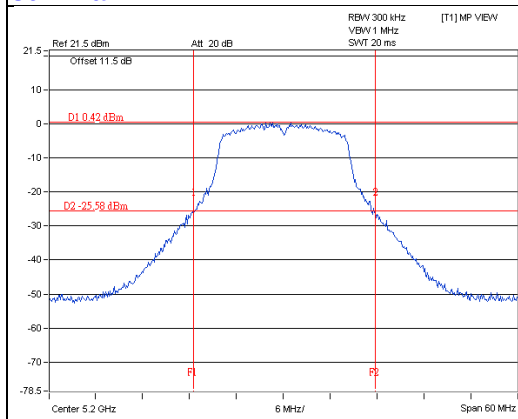
802.11n (HT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)	PASS / FAIL
36	5180	24.72	PASS
40	5200	24.16	PASS
48	5240	24.24	PASS

SPECTRUM PLOT OF WORST VALUE

802.11a

802.11n (HT20)

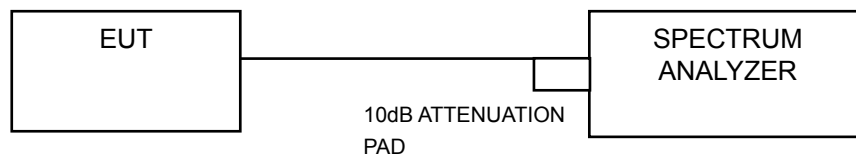


4.3 Peak Power Spectral Density Measurement

4.3.1 Limits of Peak Power Spectral Density Measurement

Operation Band	EUT Category		LIMIT
U-NII-1		Outdoor Access Point	17dBm/ MHz
		Fixed point-to-point Access Point	
		Indoor Access Point	
	√	Mobile and Portable client device	11dBm/ MHz
U-NII-2A	---		11dBm/ MHz
U-NII-2C	---		11dBm/ MHz
U-NII-3	√		30dBm/ 500kHz

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

For U-NII-1 band:

Using method SA-2

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 30 kHz, Set VBW ≥ 1 MHz, Detector = RMS
- 3) Set Channel power measure = 1MHz
- 4) Sweep time = auto, trigger set to "free run".
- 5) Trace average at least 100 traces in power averaging mode.
- 6) Record the max value and add 10 log (1/duty cycle)

For U-NII-3 band:

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 300 kHz, Set VBW ≥ 3 RBW, Detector = RMS
- 3) Sweep time = auto, trigger set to "free run".
- 4) Trace average at least 100 traces in power averaging mode.
- 5) Record the max value and add 10 log (1/duty cycle)
- 6) Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(500 kHz/300kHz)

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Condition

Same as Item 4.2.6.

4.3.7 Test Results

802.11a

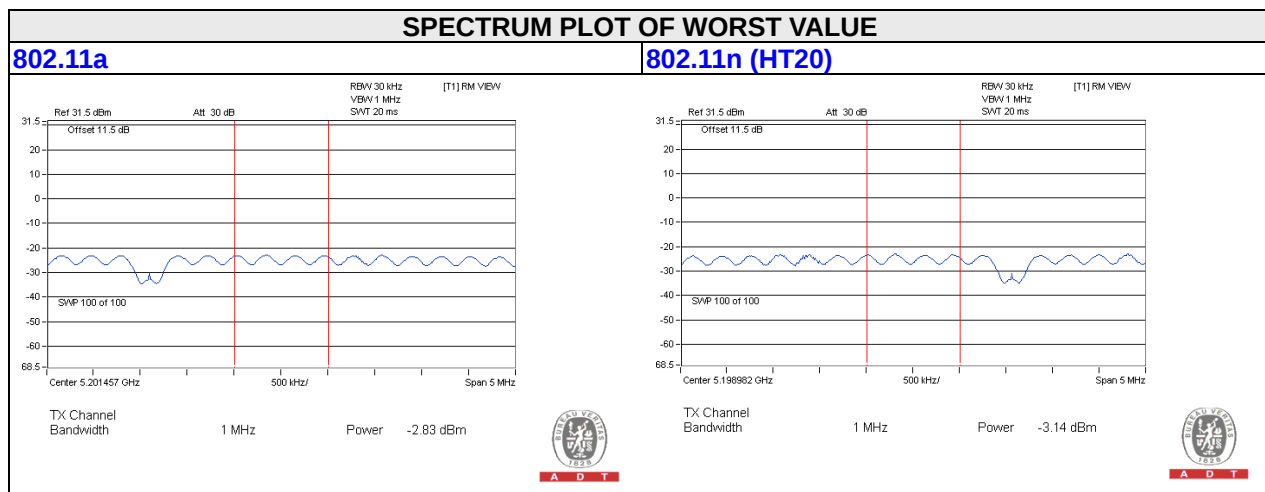
CHANNEL	FREQUENCY (MHz)	PSD W/O DUTY FACTOR (dBm)	DUTY FACTOR	PSD WITH DUTY FACTOR (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
36	5180	-2.88	0.09	-2.79	11	PASS
40	5200	-2.83	0.09	-2.74	11	PASS
48	5240	-3.68	0.09	-3.59	11	PASS

NOTE: Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	PSD W/O DUTY FACTOR (dBm)	DUTY FACTOR	PSD WITH DUTY FACTOR (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
36	5180	-3.79	0.20	-3.59	11	PASS
40	5200	-3.14	0.20	-2.94	11	PASS
48	5240	-3.96	0.20	-3.76	11	PASS

NOTE: Refer to section 3.3 for duty cycle spectrum plot.



For U-NII-3 Band

802.11a

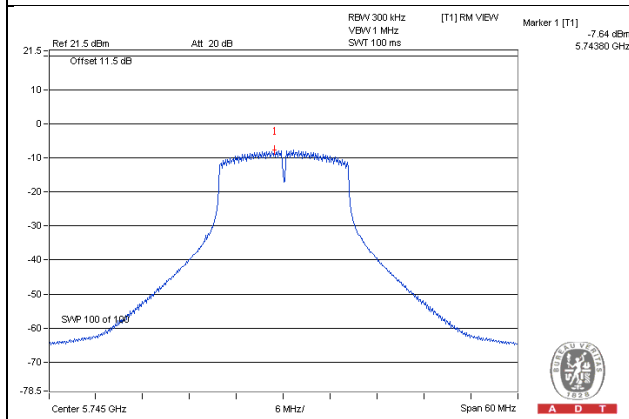
Chan.	Freq. (MHz)	PSD (dBm /300kHz)	PSD (dBm /500kHz)	Duty Factor	Total PSD with Duty Factor (dBm/500kHz)	Limit (dBm /500kHz)	PASS /FAIL
149	5745	-7.64	-5.42	0.09	-5.33	30.00	PASS
157	5785	-7.78	-5.56	0.09	-5.47	30.00	PASS
165	5825	-7.70	-5.48	0.09	-5.39	30.00	PASS

802.11n (HT20)

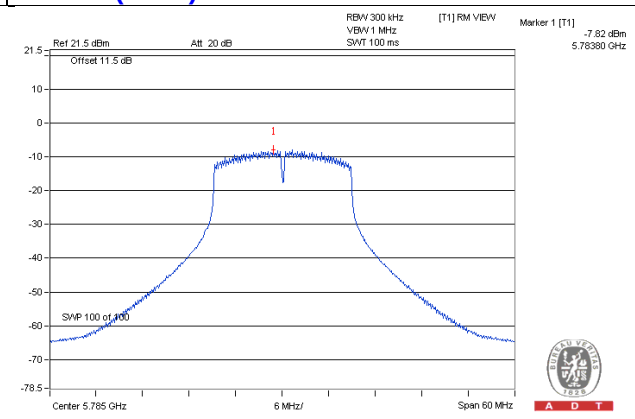
Chan.	Freq. (MHz)	PSD (dBm /300kHz)	PSD without Duty Factor (dBm/500kHz)	Duty Factor	PSD with Duty Factor (dBm/500kHz)	Limit (dBm /500kHz)	PASS /FAIL
149	5745	-7.98	-5.76	0.20	-5.56	30.00	PASS
157	5785	-7.82	-5.60	0.20	-5.40	30.00	PASS
165	5825	-7.89	-5.67	0.20	-5.47	30.00	PASS

SPECTRUM PLOT OF WORST VALUE

802.11a



802.11n (HT20)

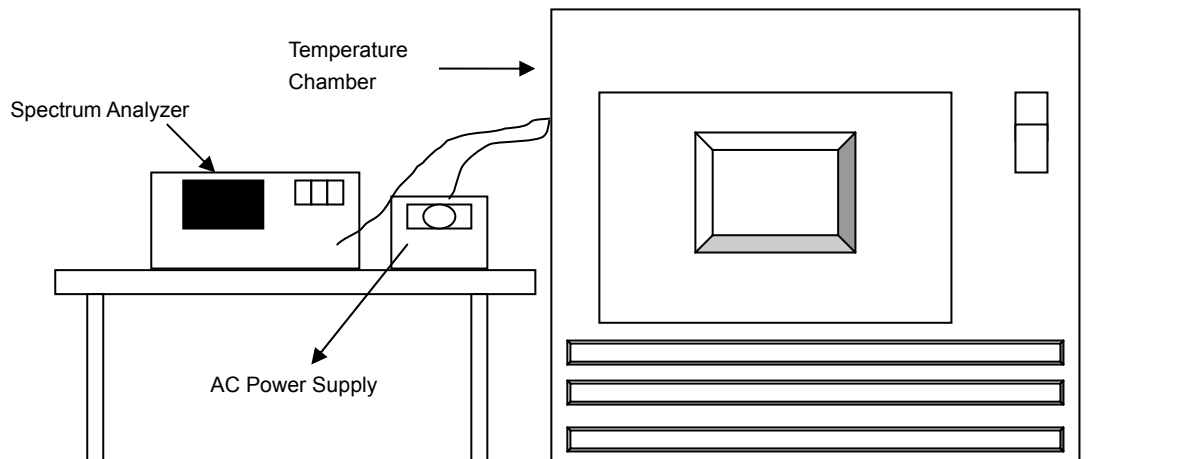


4.4 Frequency Stability

4.4.1 Limits of Frequency Stability Measurement

The frequency of the carrier signal shall be maintained within band of operation

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 Procedure

- The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
- Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Condition

Set the EUT transmit at un-modulation mode to test frequency stability.

4.4.7 Test Results

FREQUENCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5240MHz									
TEMP. (°C)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
50	120	5239.9764	-0.00045	5239.9749	-0.00048	5239.9762	-0.00045	5239.9724	-0.00053
40	120	5239.9988	-0.00002	5239.9996	-0.00001	5240.0012	0.00002	5240.0022	0.00004
30	120	5240.0036	0.00007	5240.0069	0.00013	5240.0052	0.00010	5240.005	0.00010
20	120	5240.0109	0.00021	5240.0078	0.00015	5240.011	0.00021	5240.0091	0.00017
10	120	5240.0019	0.00004	5239.9985	-0.00003	5240.0003	0.00001	5239.9999	0.00000
0	120	5239.9938	-0.00012	5239.9944	-0.00011	5239.9955	-0.00009	5239.9962	-0.00007
-10	120	5239.9760	-0.00046	5239.9782	-0.00042	5239.9778	-0.00042	5239.9749	-0.00048
-20	120	5239.9809	-0.00036	5239.9831	-0.00032	5239.9808	-0.00037	5239.9793	-0.00040
-30	120	5240.0246	0.00047	5240.0237	0.00045	5240.0253	0.00048	5240.0252	0.00048

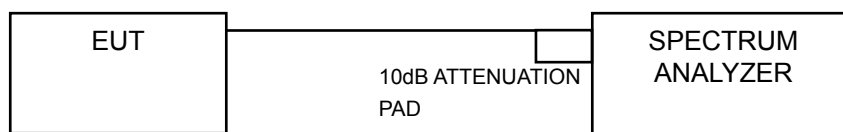
FREQUENCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5240MHz									
TEMP. (°C)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5240.0110	0.00021	5240.0080	0.00015	5240.0111	0.00021	5240.0082	0.00016
	120	5240.0109	0.00021	5240.0078	0.00015	5240.0110	0.00021	5240.0091	0.00017
	102	5240.0119	0.00023	5240.0068	0.00013	5240.0105	0.00020	5240.0085	0.00016

4.5 6dB Bandwidth Measurement

4.5.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

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

MEASUREMENT PROCEDURE REF

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

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

4.5.7 Test Results

802.11a

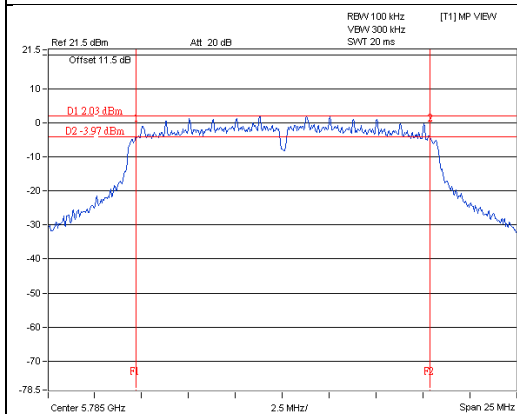
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
149	5745	15.57	0.5	PASS
157	5785	15.73	0.5	PASS
165	5825	15.65	0.5	PASS

802.11n (HT20)

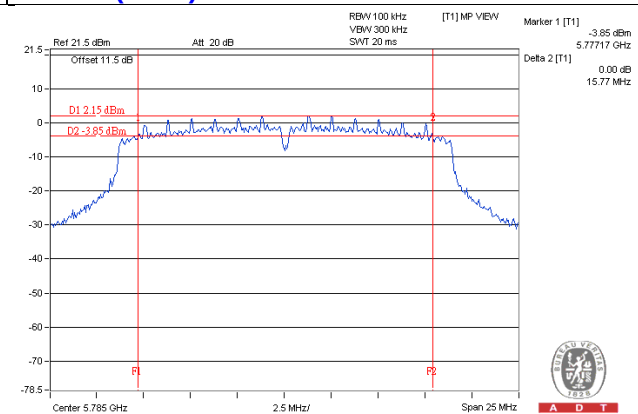
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
149	5745	15.49	0.5	PASS
157	5785	15.77	0.5	PASS
165	5825	15.53	0.5	PASS

SPECTRUM PLOT OF WORST VALUE

802.11a



802.11n (HT20)



5 Pictures of Test Arrangements

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

Appendix – Information on the Testing Laboratories

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

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

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Fax: 886-2-26051924

Hsin Chu EMC/RF Lab/Telecom Lab

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Web Site: www.bureauveritas-adt.com

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

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