RF TEST REPORT for UNII device
No. 160502089SHA-001

Applicant	:	Hansong(Nanjing) Technology Ltd 8th Kangping Road, Jiangning Economy&Technology Development Zone, Nanjing, 211106, China
Manufacturer	:	Hansong(Nanjing) Technology Ltd 8th Kangping Road, Jiangning Economy&Technology Development Zone, Nanjing, 211106, China
Product Name	:	Wireless module
Type/Model	:	HSDWAM83

SUMMARY

The equipment complies with the requirements according to the following standard(s):

47CFR Part 15 (2015): Radio Frequency Devices

RSS-247 Issue 1 (May 2015): Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

RSS-Gen Issue 4 (November 2014): General Requirements for Compliance of Radio Apparatus

ANSI C63.10 (2013): American National Standard for Testing Unlicensed Wireless Devices

Date of issue: June 24, 2016

Prepared by:

Wade Zhang (*Project Engineer*)

Reviewed by:

Daniel Zhao (*Reviewer*)

Description of Test Facility

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Content

1. General Information

1.1 Applicant Information

Applicant	:	Hansong(Nanjing) Technology Ltd 8th Kangping Road, Jiangning Economy&Technology Development Zone, Nanjing, 211106, China
Name of contact	:	Anya Sun
Tel	:	0086-025-66604242
Fax	:	0086-025-66612098
Manufacturer	:	Hansong(Nanjing) Technology Ltd 8th Kangping Road, Jiangning Economy&Technology Development Zone, Nanjing, 211106, China

1.2 Identification of the EUT

Product Name	:	Wireless module
Type/model	:	HSDWAM83
FCC ID	:	XCO-HSDWAM83
IC	:	7756A-HSDWAM83

1.3 Technical specification

Operation Frequency Band	:	5180 ~ 5240 MHz 5736 ~ 5814MHz
Type of Modulation	:	QPSK
Channel Number	:	6 channels in this two bands: 5180 MHz, 5210 MHz, 5240 MHz, 5736 MHz, 5762 MHz, 5814 MHz
Description of EUT	:	The EUT is wireless module(1TX,2RX) for data transmission which support band 2412-2464 MHz&5180-5240 MHz&5736-5814 MHz and have 9 channels total(2412MHz, 2438 MHz, 2464 MHz, 5736 MHz, 5762MHz, 5814, MHz 5180 MHz, 5210 MHz, 5240 MHz).We tested it and listed the5180 ~ 5240 MHz and 5736 ~ 5814MHz band results in this report.
Port identification	:	NA
Antenna	:	

Model	Type	Gain (dBi)	Frequency band(GHz)
Integral	PIFA	1.5	2.4-2.5
		1.5	5.1-5.9
RC8WFI10042A	mono antenna	3.6	2.4-2.5
		3.8	5.1-5.9
RC1WFI0901A	PIFA	4.2	2.4-2.5
		4.5	5.1-5.9

Rating	:	DC 3.5V
Declared Temperature range	:	0°C ~ 50°C
Category of EUT	:	Class B
EUT type	:	☒ Table top ☐ Floor standing
Sample received date	:	2016.05.18
Sample Identification No	:	/
Date of test	:	2016.05.18 ~ 2016.06.06

2. Test Specification

2.1 Instrument list

Selected	Equipment	Type	Manu.	Internal no.	Cal. Date	Due date
☒	PXA Analyzer	N9030A	Agilent	EC5338	2016/3/4	2017/3/3
☒	Vector SG	N5182B	Agilent	EC5175	2016/3/4	2017/3/3
☒	Power sensor	U2021XA	Agilent	EC5338-1	2016/3/4	2017/3/3
☒	MXG Analog SG	N5181A	Agilent	EC5338-2	2016/3/4	2017/3/3
☒	Power meter	N1911A/N1921A	Agilent	EC4318	2016/4/10	2017/4/9
☒	EMI Receiver	ESCS 30	R&S	EC 2107	2015/10/20	2016/10/19
☒	A.M.N.	ESH2-Z5	R&S	EC 3119	2015/12/16	2017/12/15
☒	I.S.N.	FCC-TLISN-T8-02	FCC	EC3756	2016/2/16	2017/2/15
☒	EMI chamber	3m	Albatross	EC 3048	2016/5/5	2017/5/4
☒	Test Receiver	ESIB 26	R&S	EC 3045	2015/10/20	2016/10/19
☒	Test Receiver	ESCI 7	R&S	EC4501	2016/2/24	2017/2/23
☒	Bilog Antenna	CBL 6112D	TESEQ	EC 4206	2015/6/1	2016/5/30
☒	Horn antenna	HF 906	R&S	EC 3049	2015/9/12	2016/9/11
☒	Horn antenna	HAP18-26W	TOYO	EC 4792-3	2014/6/12	2017/6/11
☒	Pre-amplifier	Pre-amp 18	R&S	EC 5262	2014/5/25	2016/5/24
☒	Pre-amplifier	Tpa0118-40	R&S	EC 4792-2	2016/4/11	2017/4/10
☒	Shielded room	-	Zhongyu	EC 2838	2016/1/9	2017/1/8

2.2 Test Standard

47CFR Part 15 (2015): Radio Frequency Devices

ANSI C63.10 (2013): American National Standard for Testing Unlicensed Wireless Devices

RSS-247 Issue 1 (May 2015): Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

RSS-Gen Issue 4 (November 2014): General Requirements for Compliance of Radio Apparatus

789033 D02 General UNII Test Procedures New Rules v01r02

2.3 Mode of operation during the test / Test peripherals used

Within this test report, EUT was tested under 120V/60Hz (supplied by a control board with AC-DC adaptor). The EUT has transmitting as well as receiving modes, so both were assessed.

While testing transmitting mode of EUT, the internal modulation was used.

While testing receiving mode of EUT, the signal generator was employed to generate continuous answer signal.

Radiated emission testing was performed for three different antennas

Test peripherals used:

Item No	Description	Band and Model	S/No
1	Mini-PCI control board	HanSang	NA
2	Adaptor	GPE	NA
Note: NA			

2.4 Test Summary

This report applies to tested sample only. This report shall not be reproduced in part without written approval of Intertek Testing Service Shanghai Limited.

TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
Maximum Conducted Output Power	15.407(a)	RSS-247 Issue 1 Clause 6	Pass
Power spectral density	15.407(a)	RSS-247 Issue 1 Clause 6	Pass
Minimum 6dB Bandwidth	15.407(e)	RSS-247 Issue 1 Clause 6	Pass
Radiated emission	15.407 (b) 15.205, 15.209	RSS-247 Issue 1 Clause 6	Pass
Power line conducted emission	15.207	RSS-Gen Issue 4 Clause 8.8	Pass
26 dB Bandwidth & Emission Bandwidth (99%)	15.403(i)	RSS-247 Issue 1 Clause 6	Tested

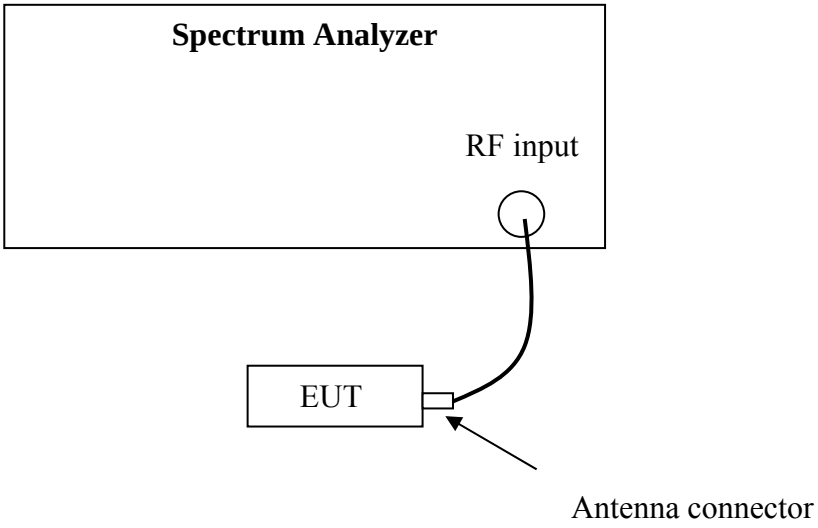
3 Occupied Bandwidth & 26dB Emission Bandwidth

Test Status: Tested

3.1 Test limit

None

3.2 Test Configuration



3.3 Test procedure and test setup

The bandwidth was measured from the antenna port of the EUT according to the measurement method refer to KDB 789033D02 v01r02: section C.

Emission Bandwidth (EBW)

a) Set RBW = approximately 1% of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

99 Percent Occupied Bandwidth

The following procedure shall be used for measuring (99 %) power bandwidth:
1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW ≥ 3 · RBW
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
6. Use the 99 % power bandwidth function of the instrument (if available).
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

3.4 Test protocol

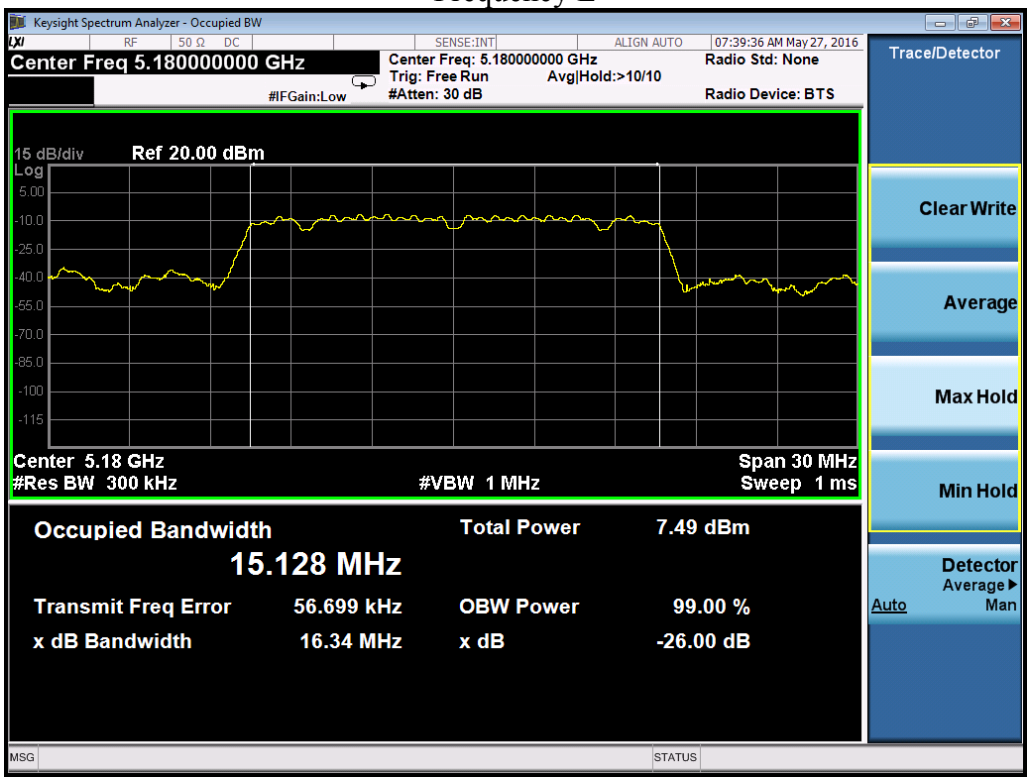
Temperature : 25 °C
Relative Humidity : 55 %

Frequency (MHz)	99% Bandwidth (MHz)	
	Port A	Port B
5180	15.128	15.122
5210	15.129	15.126
5240	15.132	15.132

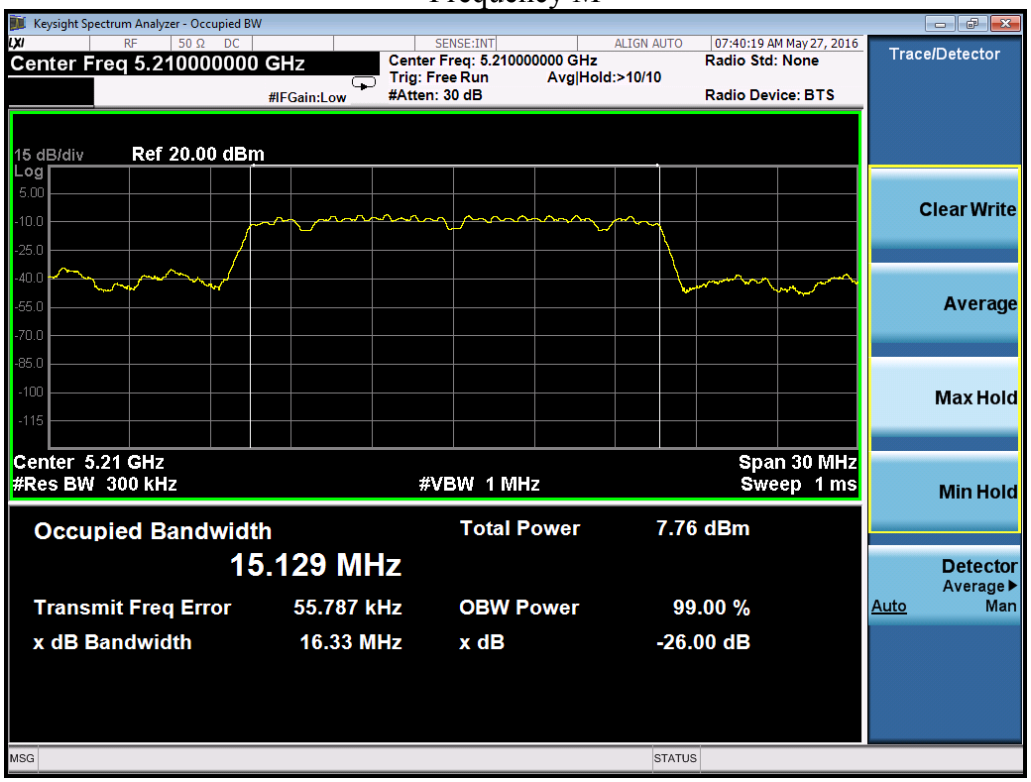
Test plots see below:

Port A

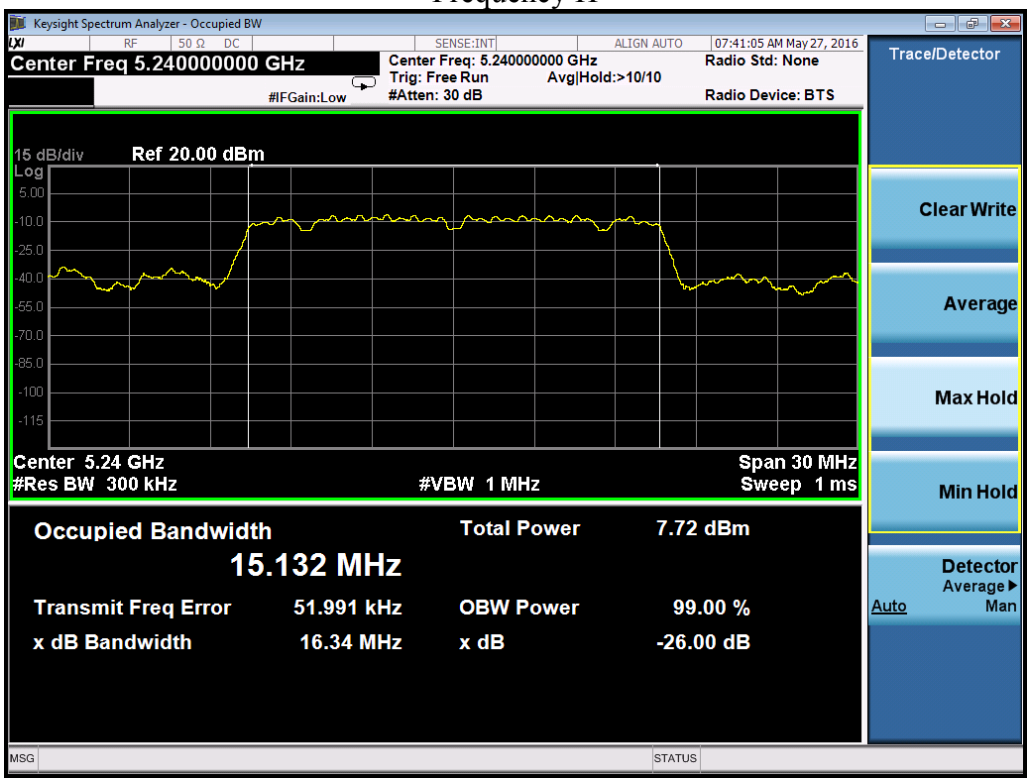
Frequency L



Frequency M

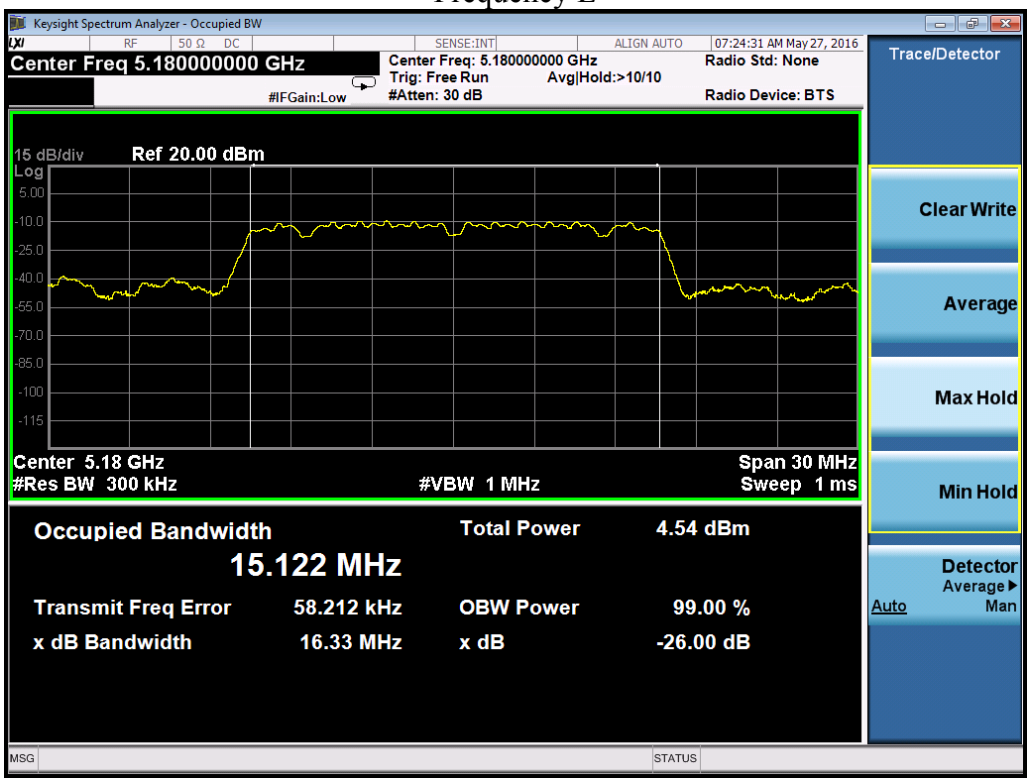


Frequency H

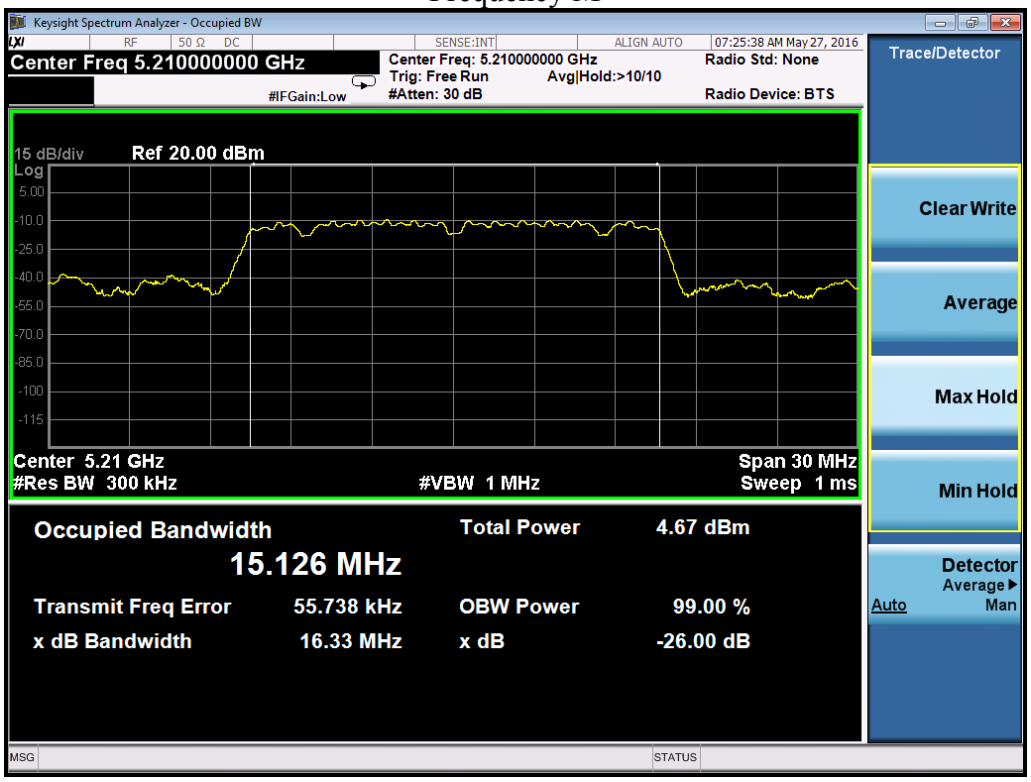


Port B

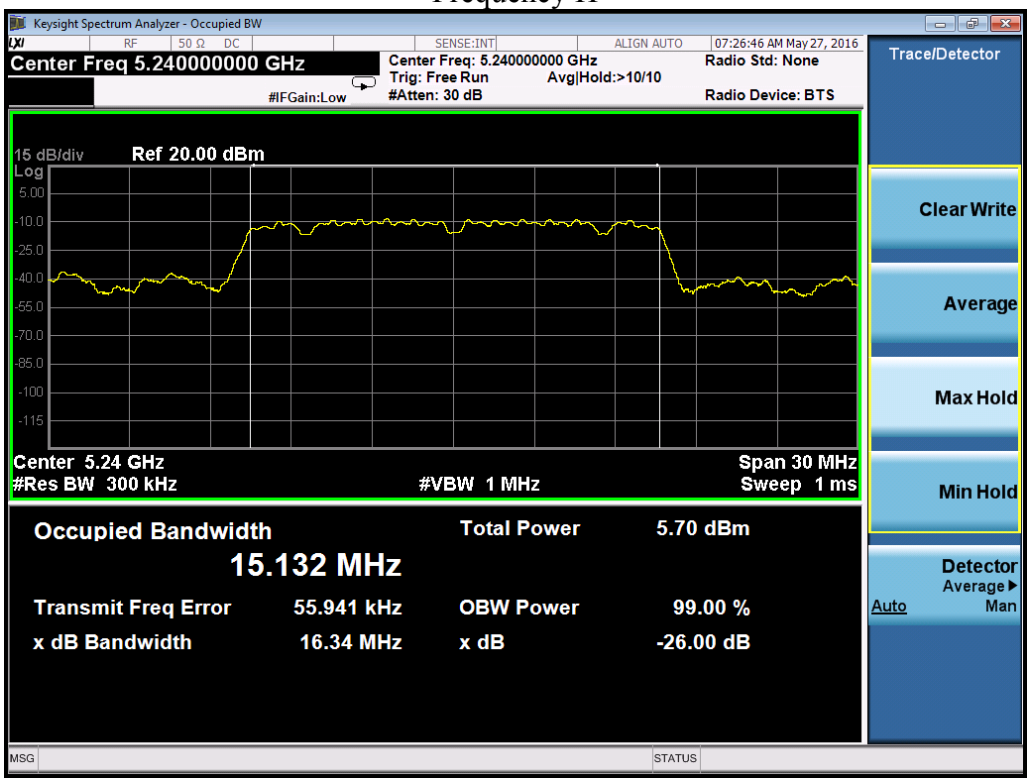
Frequency L



Frequency M



Frequency H



4 Maximum Conducted Output Power&EIRP

Test result: Pass

4.1 Test limit

☐ For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi.

☐ For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi.

☐ For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

☒ For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.

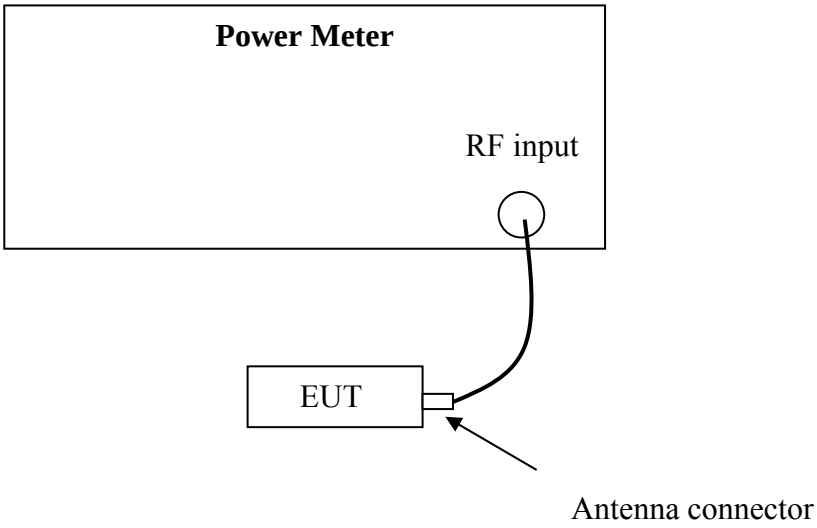
☒ For Frequency Band 5150-5250 MHz, The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10B, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz.

☐ For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.

☒ For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

If transmitting antennas of directional gain greater than 6dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.2 Test Configuration



4.3 Test procedure and test setup

The power output per FCC §15.407(a) was measured from the antenna port of the EUT according to the measurement method refer to KDB 789033D02 v01r02: Method PM.

4.4 Test protocol

Temperature : 25 °C
Relative Humidity : 55 %

5180 – 5240 Band:

Frequency (MHz)	Conducted Power (dBm)		Limit (dBm)
	Port A	Port B	
5180	6.38	6.80	24.00
5210	6.53	6.98	24.00
5240	6.63	7.44	24.00

EIRP limit calculation:

Frequency range (MHz)	Min 99% bandwidth (MHz)	10+10log B (dBm)	Chosen Limit (dBm)
5180 - 5240	15.122	21.80	21.80
Note: 1. Chosen limit is 23dBm or 10dBm + 10logB(99% OBW) which is lesser;			

Frequency (MHz)	Max Antenna Gain (dBi)	EIRP (dBm)		Limit (dBm)
		Port A	Port B	
5180	4.5	10.88	11.30	21.80
5210	4.5	11.03	11.48	21.80
5240	4.5	11.13	11.94	21.80

5736 – 5814 Band:

Frequency (MHz)	Conducted Power (dBm)		Limit (dBm)
	Port A	Port B	
5736	16.84	16.32	30.00
5762	16.54	16.27	30.00
5814	16.31	16.02	30.00

5 Power spectral density

Test result: Pass

5.1 Test limit

☐ For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band.

☐ For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band.

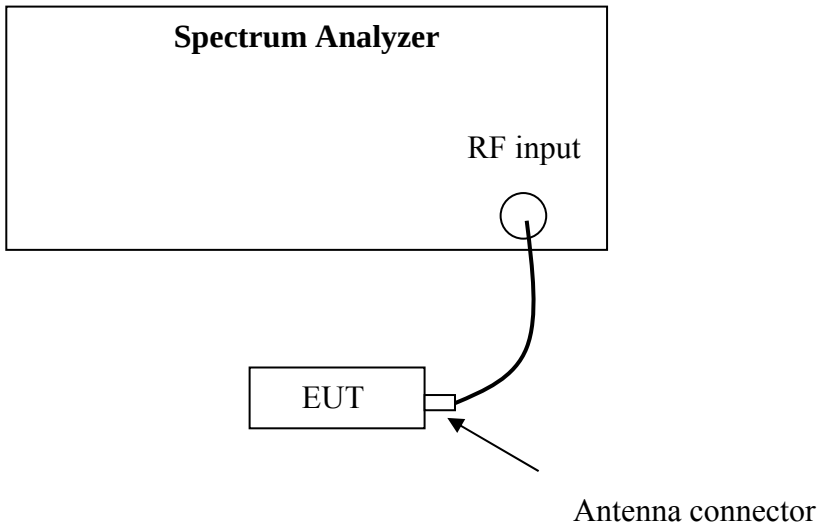
☒ For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

☒For the 5.15-5.25 GHz The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

☐ For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

☒ For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

5.2 Test Configuration



5.3 Test procedure and test setup

The power spectral density per FCC §15.407(a) was measured from the antenna port of the EUT according to the measurement method refer to KDB 789033D02 v01r02: section F.

1. Create an average power spectrum for the EUT operating mode being tested by following the instructions in section II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, "Compute power…". (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)

2. Use the peak search function on the instrument to find the peak of the spectrum and record its value.

3. Make the following adjustments to the peak value of the spectrum, if applicable:
a) If Method SA-2 or SA-2 Alternative was used, add 10 log(1/x), where x is the duty cycle, to the peak of the spectrum.
b) If Method SA-3 Alternative was used and the linear mode was used in step II.E.2.g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.

4. The result is the Maximum PSD over 1 MHz reference bandwidth.

5. For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, "provided that the measured power is integrated over the full reference bandwidth" to show the total power over the specified measurement bandwidth (*i.e.,* 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 KHz bandwidth, the following adjustments to the procedures apply:
a) Set RBW ≥ 1/*T*, where *T* is defined in section II.B.l.a).
b) Set VBW ≥ 3 RBW.
c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10log(1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the sections 5.c) and 5.d) above, since RBW=100 kHZ is available on nearly all spectrum analyzers.

5.4 Test Protocol

Temperature : 25 °C
Relative Humidity : 55 %

Frequency (MHz)	PSD (dBm/MHz)		Limit (dBm/MHz)
	Port A	Port B	
5180	-3.309	-2.693	11.00
5210	-3.792	-2.387	11.00
5240	-3.660	-2.996	11.00

Frequency (MHz)	Max Antenna Gain (dBi)	EIRP PSD (dBm/MHz)		Limit (dBm/MHz)
		Port A	Port B	
5180	4.5	1.19	1.81	10.00
5210	4.5	0.71	2.11	10.00
5240	4.5	0.84	1.50	10.00

Test Plots as bellow:

Port A

Frequency L

Frequency M

Frequency H

Port B

Frequency L

Frequency M

Frequency H

Frequency (MHz)	PSD (dBm/500KHz)		Limit (dBm/500KHz)
	Port A	Port B	
5736	0.063	1.359	30.00
5762	-0.077	0.961	30.00
5814	-1.572	0.083	30.00

Test Plots as bellow:

Port A

Frequency L

Frequency M

Frequency H

Port B

Frequency L

Frequency M

Frequency H

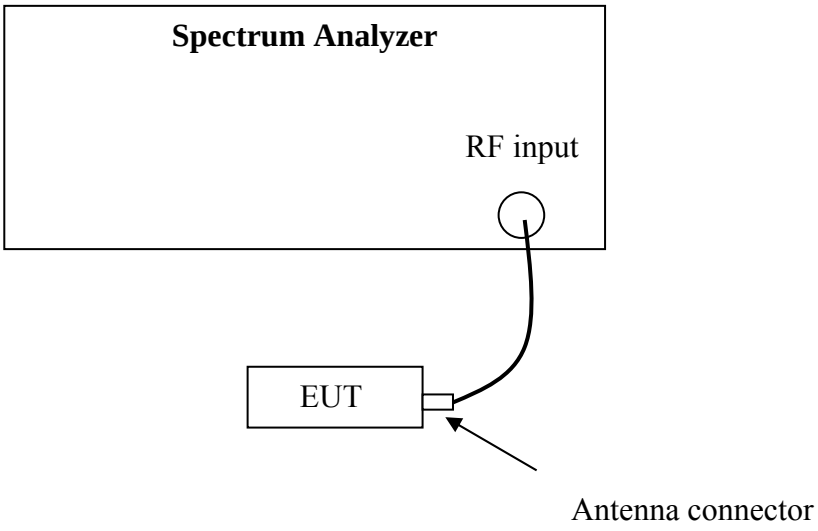
6 Minimum 6dB Bandwidth

Test result: PASS

6.1 Limit

For systems using digital modulation techniques that may operate in the 5725 - 5850 MHz band, the minimum 6 dB bandwidth shall be at least 500 kHz.

6.2 Test Configuration



6.3 Test Procedure and test setup

The minimum 6dB Bandwidth was measured from the antenna port of the EUT according to the measurement method refers to KDB 789033D02 v01r02: Section C.

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

Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

6.4 Test Protocol

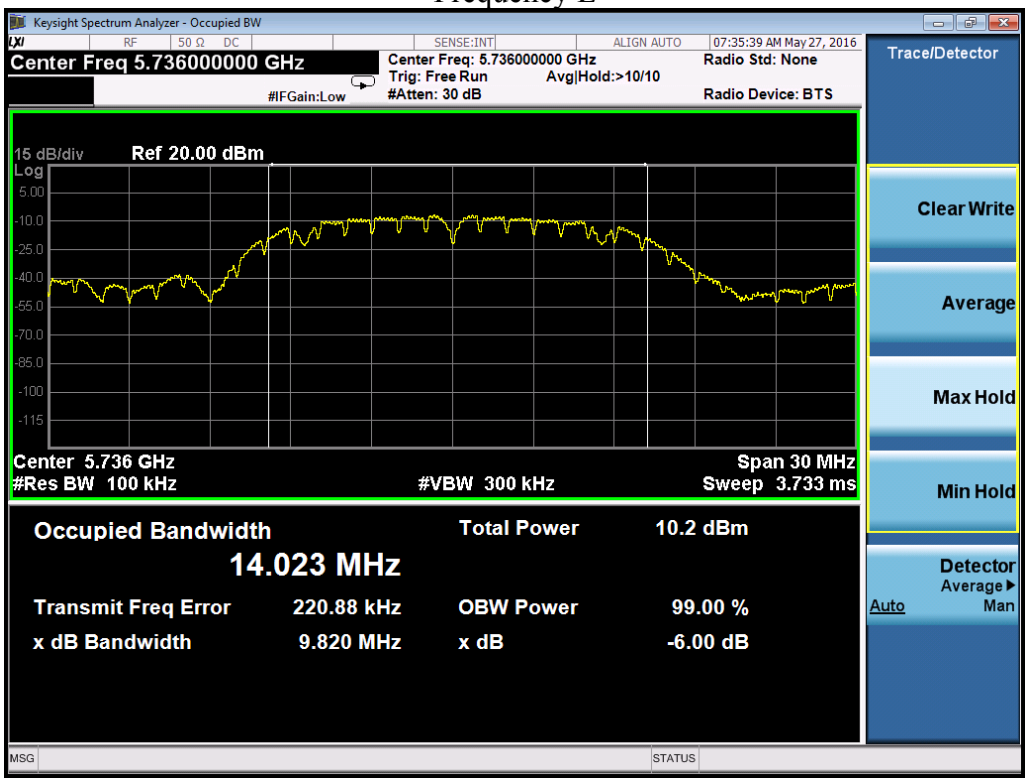
Temperature : 25 °C
Relative Humidity : 55 %

Frequency (MHz)	Minimum 6dB Bandwidth (MHz)		Limits (MHz)
	Port A	Port B	
5736	9.820	9.816	≥0.5
5762	9.822	9.819	≥0.5
5814	9.820	9.822	≥0.5

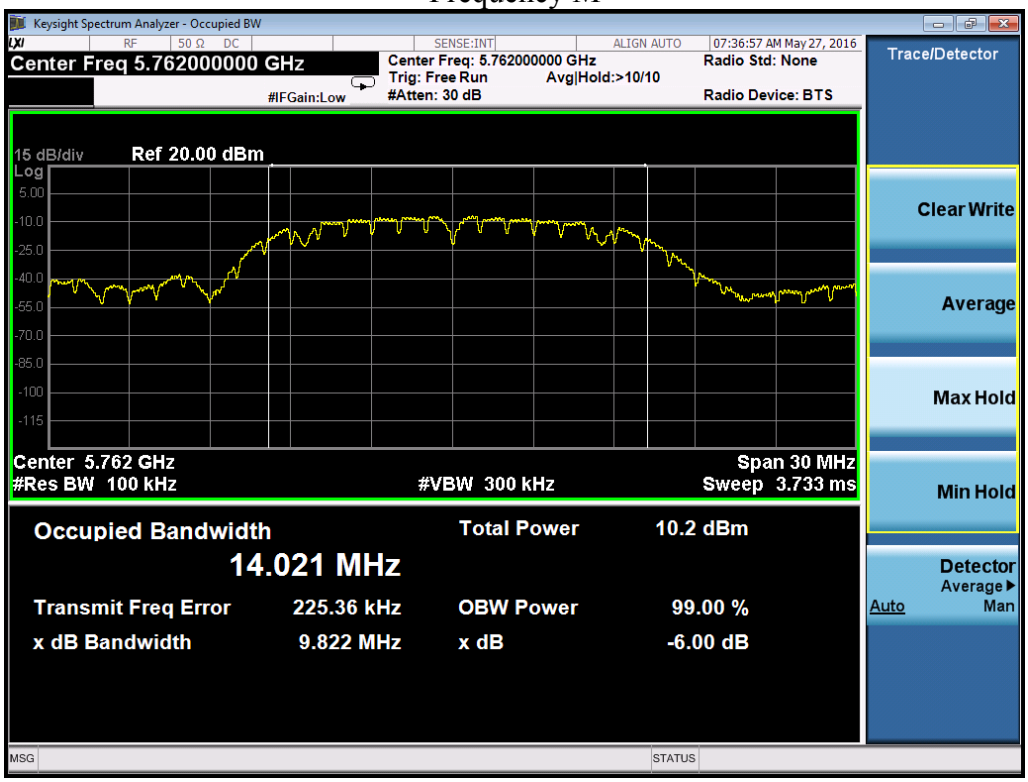
Test Plots as bellow:

Port A

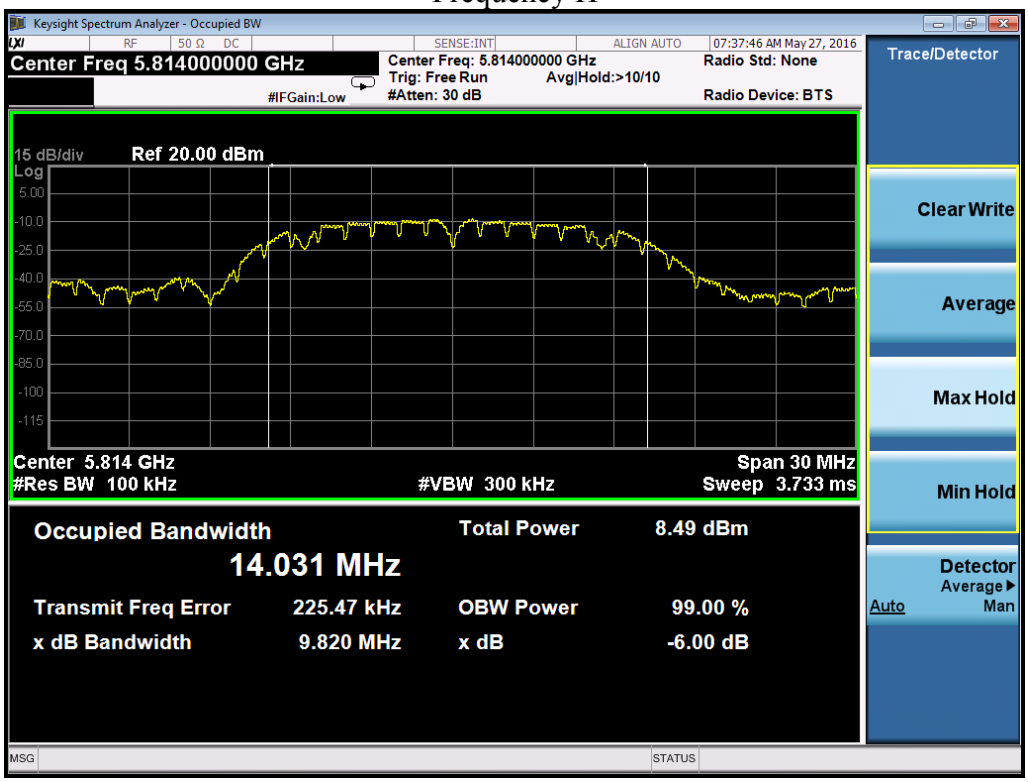
Frequency L



Frequency M

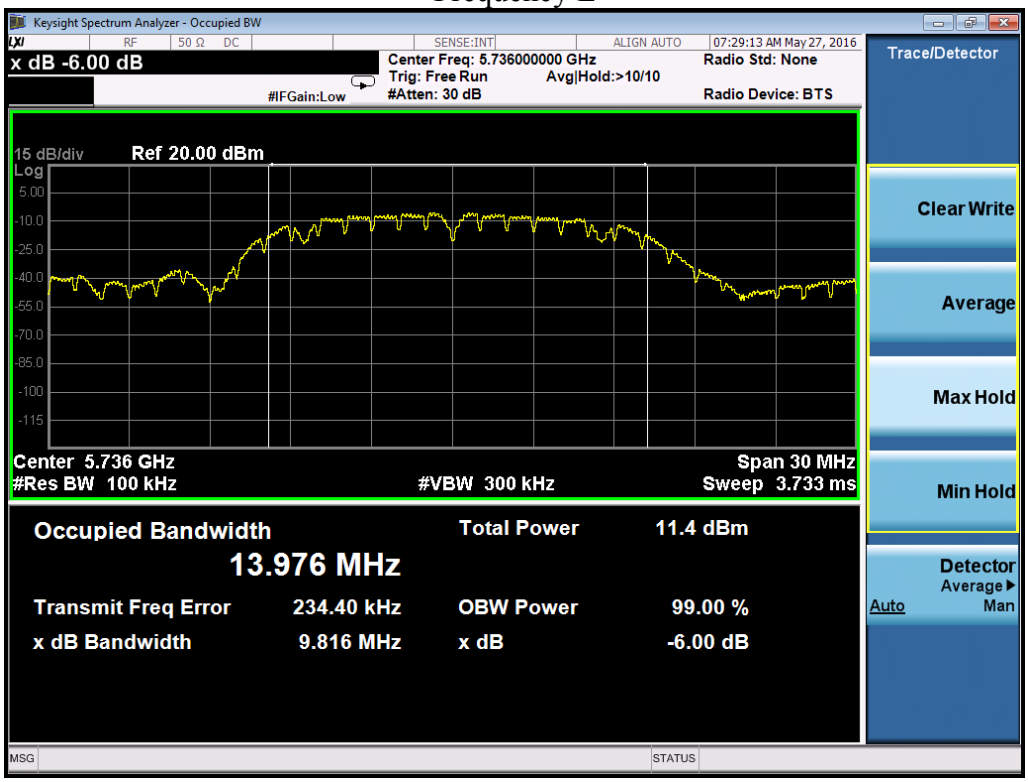


Frequency H

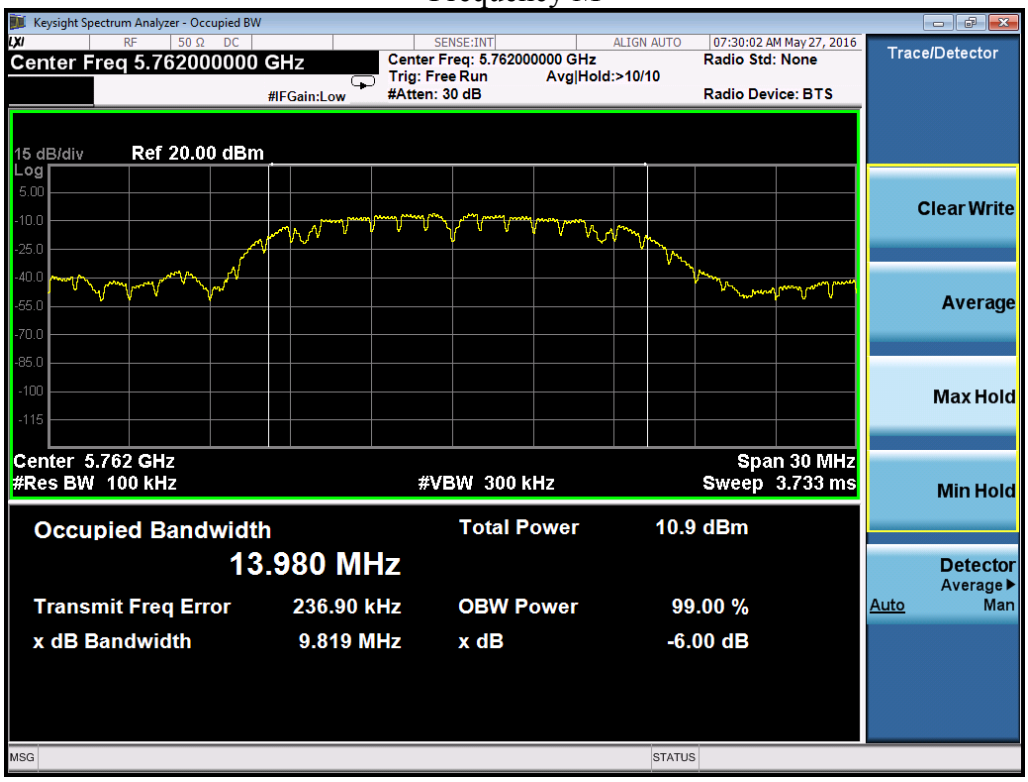


Port B

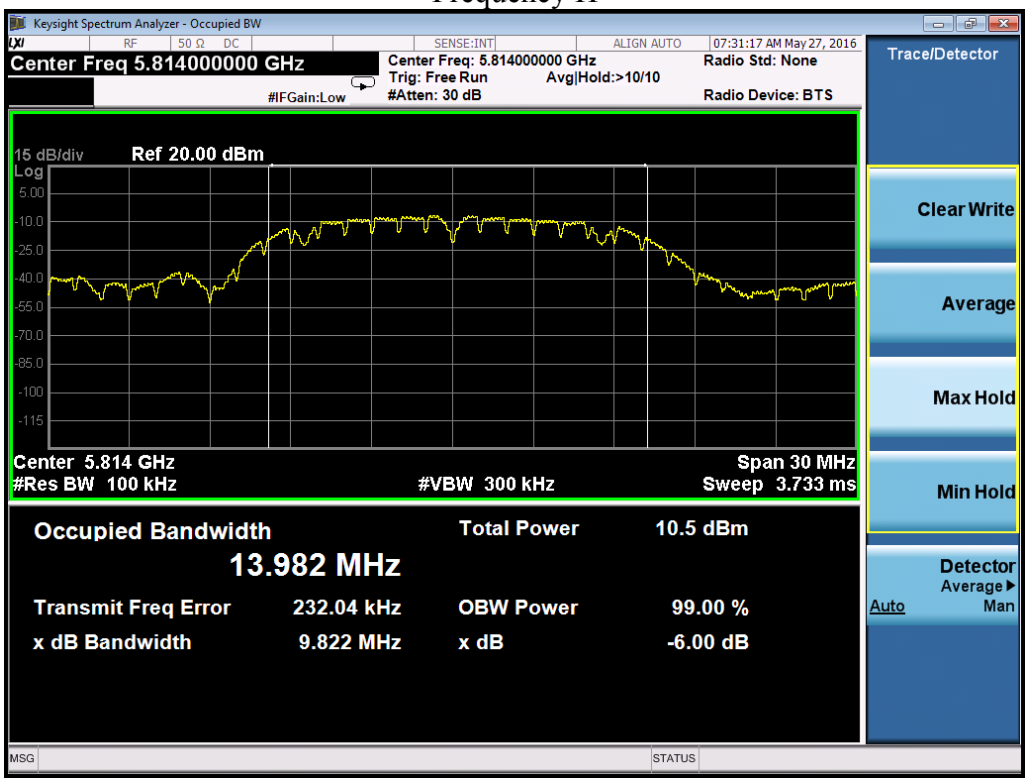
Frequency L



Frequency M



Frequency H



7 Radiated emission

Test result: PASS

7.1 Test limit

7.1.1 The radiated emissions which are lower than 1GHz or fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) showed as below:

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

7.1.2 The emission which is outside the restrict bands, should comply with the EIRP limit as below:

For transmitters operating in the 5.15–5.25 / 5.25 – 5.35 / 5.47 – 5.725 GHz band: all emissions outside of the 5.15 – 5.35 / 5.47 – 5.725 GHz band shall not exceed an EIRP of -27dBm/MHz.

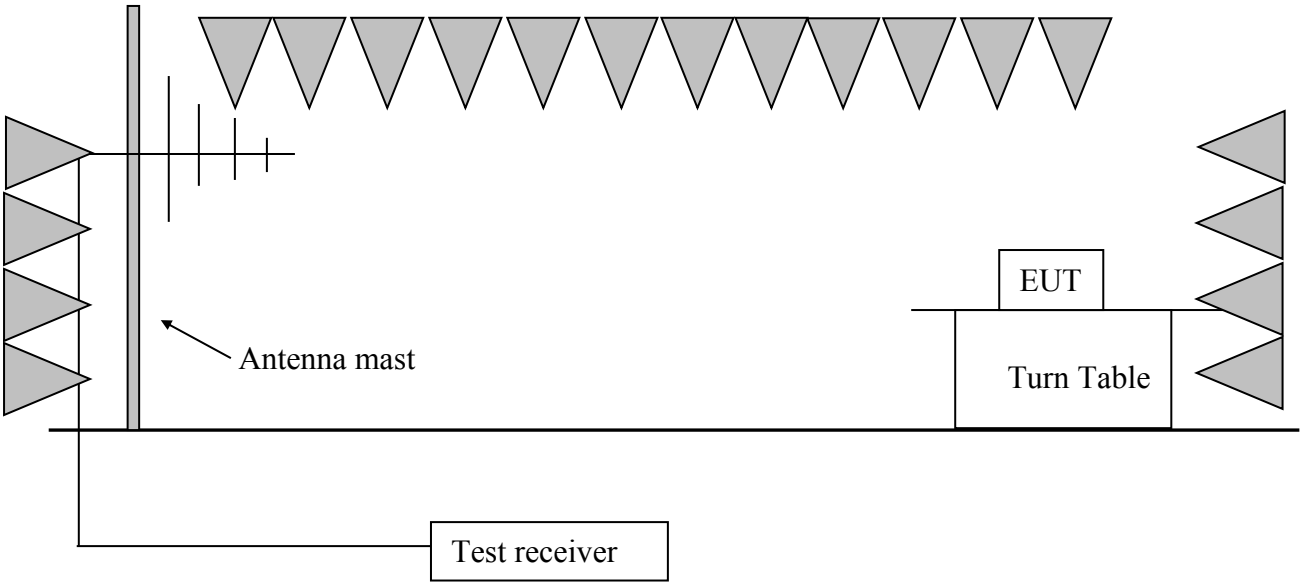
EIRP Limit (dBm)	Equivalent Field Strength (3m) (dBµV/m)
-27	68.20

For transmitters operating in the 5.725-5.85 GHz band:
All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Assessed with 15.209(a):

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

7.2 Test Configuration



7.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, if applied, the pre-amplifier would be equipped just at the output terminal of the antenna.
The EUT and simulators were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.
The EUT was tested according to KDB 789033D02 v01r02: Section G.

The radiated emission was measured using the Spectrum Analyzer with the resolutions bandwidth set as:

RBW = 100kHz, VBW = 300kHz (30MHz~1GHz)
RBW = 1MHz, VBW = 3MHz (>1GHz);

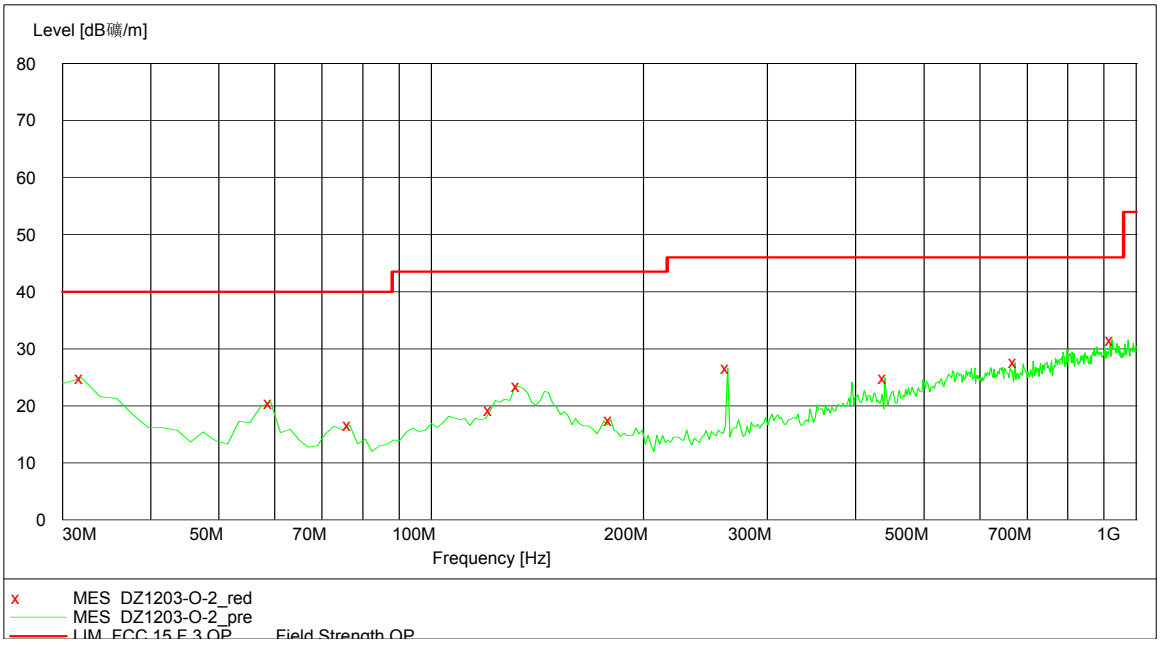
7.4 Test protocol

Temperature	:	25 °C
Relative Humidity	:	55 %

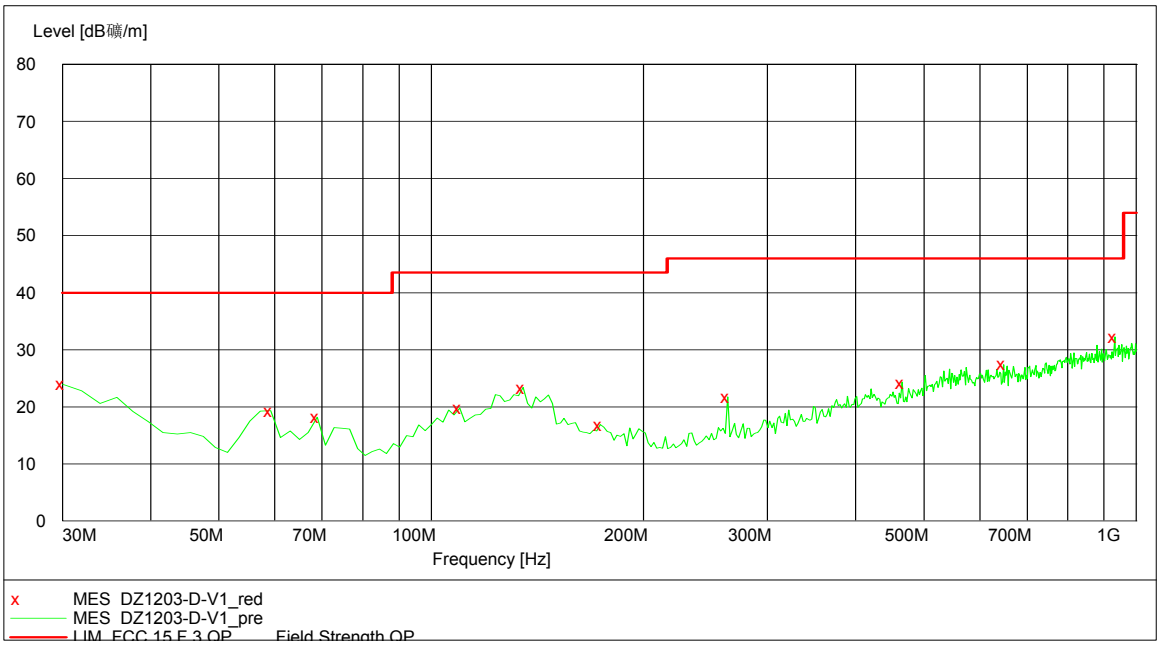
Test result below 1GHz:

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

Horizontal



Vertical



30MHz~1GHz, Test data:

Worst case (With PCBA (RC1WFI0901A)):

Polarization	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
V	37.78	14.00	20.00	40.00	20.00	PK
H	133.03	25.50	15.70	43.50	18.00	PK
H	263.27	24.40	25.20	46.00	20.80	PK
H	440.16	18.90	24.90	46.00	21.10	PK
H	673.43	22.60	27.60	46.00	18.40	PK
H	924.19	25.20	31.60	46.00	14.40	PK

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (-Amplifier, is employed)
2. Corrected Reading = Original Receiver Reading + Correct Factor
3. Margin = limit – Corrected Reading
4. If the PK reading is lower than QP limit, the QP test can be elided.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10dBuV.
Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m; Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m
Assuming limit = 54dBuV/m, Corrected Reading = 10.20dBuV/m, then Margin = 54 -10.20 = 43.80dBuV/m

Test result above 1GHz:

With integral antenna:

Chan. Fre. (MHz)	Polarization	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
5180	V	5180.00	43.10	97.80	Fundamental	/	PK
	V	37.78	14.00	20.00	40.00	20.00	QP
	H	133.03	25.50	15.70	43.50	18.00	PK
	H	263.27	24.40	25.20	46.00	20.80	PK
	V	5150.00	32.10	59.30	74.00	14.70	PK
	V	5150.00	32.10	48.30	54.00	3.70	AV
	V	6283.17	-0.30	43.00	68.23	25.23	PK
	V	8541.60	4.20	46.00	68.23	22.23	PK
	V	10360.28	10.20	63.60	74.00	10.40	PK
	V	10360.28	10.20	41.70	54.00	12.30	AV
5210	V	5210.00	43.10	98.20	Fundamental	/	PK
	V	37.78	14.00	20.00	40.00	20.00	QP
	H	133.03	25.50	15.70	43.50	18.00	PK
	H	263.27	14.40	25.20	46.00	20.80	PK
	V	5350.00	32.70	56.60	74.00	17.40	PK
	V	5350.00	32.70	42.70	54.00	11.30	AV
	V	6283.17	-0.30	43.00	68.23	25.23	PK
	V	8541.60	4.20	46.00	68.23	22.23	PK
	V	10425.43	10.40	63.90	74.00	10.10	PK
	V	10425.43	10.40	42.50	54.00	11.50	AV
5240	V	5240.00	43.10	97.50	Fundamental	/	PK
	V	37.78	14.00	20.00	40.00	20.00	QP
	H	133.03	25.50	15.70	43.50	18.00	PK
	H	263.27	14.40	25.20	46.00	20.80	PK
	V	5350.00	32.70	56.60	74.00	17.40	PK
	V	5350.00	32.70	42.70	54.00	11.30	AV
	V	6283.17	-0.30	43.00	68.23	25.23	PK
	V	8541.60	4.20	46.00	68.23	22.23	PK
	V	10485.00	10.40	63.90	74.00	10.10	PK
	V	10485.00	10.40	42.50	54.00	11.50	AV

Channel	Polarity	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H&V	5736	32.10	100.10	Fundamental	/	PK
	H&V	5720	32.10	51.50	110.80	59.30	PK
	H&V	5700	32.10	43.30	105.20	61.90	PK
	H&V	5650	32.10	44.20	68.20	24.00	PK
	H&V	11472	7.30	47.60	74.00	26.40	PK
	H&V	11472	7.30	42.50	54.00	11.50	AV
M	H&V	5762	32.10	99.90	Fundamental	/	PK
	H&V	11524	7.30	47.10	74.00	26.90	PK
	H&V	11524	7.30	42.30	54.00	11.70	AV
H	H&V	5814	32.70	97.80	Fundamental	/	PK
	H&V	5855	32.70	48.60	110.80	62.20	PK
	H&V	5875	32.70	45.30	105.20	59.90	PK
	H&V	5925	32.70	44.80	68.20	23.40	PK
	H&V	11524	7.30	47.40	74.00	26.60	PK
	H&V	11524	7.30	42.30	54.00	11.70	AV

Remark:
1. For fundamental & restrict emission test, no amplifier is employed.
2. Factor = Antenna Factor + Cable Loss (-Amplifier, is employed);
3. Measure level = Reading Level + Factor;
4. Over Limit = Measure level – limit;
5. If the PK reading is lower than AV limit, the AV test can be elided.

Example:

Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading level = 10dBuV.
Then Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;
Measure level = 10dBuV + 0.20dB/m = 10.20dBuV/m
Assuming limit = 54dBuV/m, Measure level = 10.20dBuV/m,
then Over Limit = 10.20 - 54= -43.80dBuV/m

With mono-antenna (RC8WFI10042A):

Chan. Fre. (MHz)	Polarization	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
5180	V	5180.00	32.10	99.60	Fundamental	/	PK
	V	37.78	14.00	20.00	40.00	20.00	QP
	H	133.03	25.50	15.70	43.50	18.00	PK
	H	263.27	14.40	25.20	46.00	20.80	PK
	V	5150.00	32.10	60.70	74.00	13.30	PK
	V	5150.00	32.10	50.40	54.00	3.60	AV
	V	6283.17	-0.30	43.00	68.23	25.23	PK
	V	8541.60	4.20	46.00	68.23	22.23	PK
	V	10360.28	10.20	63.60	74.00	10.40	PK
	V	10360.28	10.20	41.70	54.00	12.30	AV
5210	V	5210.00	32.10	98.80	Fundamental	/	PK
	V	37.78	14.00	20.00	40.00	20.00	QP
	H	133.03	25.50	15.70	43.50	18.00	PK
	H	263.27	14.40	25.20	46.00	20.80	PK
	V	5350.00	32.70	56.60	74.00	17.40	PK
	V	5350.00	32.70	42.70	54.00	11.30	AV
	V	6283.17	-0.30	43.00	68.23	25.23	PK
	V	8541.60	4.20	46.00	68.23	22.23	PK
	V	10425.43	10.40	63.90	74.00	10.10	PK
	V	10425.43	10.40	42.50	54.00	11.50	AV
5240	V	5240.00	32.10	100.40	Fundamental	/	PK
	V	37.78	14.00	20.00	40.00	20.00	QP
	H	133.03	25.50	15.70	43.50	18.00	PK
	H	263.27	14.40	25.20	46.00	20.80	PK
	V	5350.00	32.70	56.60	74.00	17.40	PK
	V	5350.00	32.70	42.70	54.00	11.30	AV
	V	6283.17	-0.30	43.00	68.23	25.23	PK
	V	8541.60	4.20	46.00	68.23	22.23	PK
	V	10485.00	10.40	63.90	74.00	10.10	PK
	V	10485.00	10.40	42.50	54.00	11.50	AV

Channel	Polarity	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H&V	5736	32.10	103.20	Fundamental	/	PK
	H&V	5720	32.10	52.50	110.80	58.30	PK
	H&V	5700	32.10	43.60	105.20	61.60	PK
	H&V	5650	32.10	43.20	68.20	25.00	PK
	H&V	11472	7.30	47.30	74.00	26.70	PK
	H&V	11472	7.30	41.50	54.00	12.50	AV
M	H&V	5762	32.10	102.50	Fundamental	/	PK
	H&V	11524	7.30	48.40	74.00	25.60	PK
	H&V	11524	7.30	40.60	54.00	13.40	AV
H	H&V	5814	32.70	101.80	Fundamental	/	PK
	H&V	5855	32.70	48.90	110.80	61.90	PK
	H&V	5875	32.70	45.70	105.20	59.50	PK
	H&V	5925	32.70	44.30	68.20	23.90	PK
	H&V	11524	7.30	47.20	74.00	26.80	PK
	H&V	11524	7.30	39.90	54.00	14.10	AV

Remark:
1. For fundamental & restrict emission test, no amplifier is employed.
2. Factor = Antenna Factor + Cable Loss (-Amplifier, is employed);
3. Measure level = Reading Level + Factor;
4. Over Limit = Measure level – limit;
5. If the PK reading is lower than AV limit, the AV test can be elided.

Example:

Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading level = 10dBuV.
Then Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;
Measure level = 10dBuV + 0.20dB/m = 10.20dBuV/m
Assuming limit = 54dBuV/m, Measure level = 10.20dBuV/m,
then Over Limit = 10.20 - 54= -43.80dBuV/m

With PIFA antenna (RC1WFI0901A):

Chan. Fre. (MHz)	Polarization	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
5180	V	5180.00	32.10	101.90	Fundamental	/	PK
	V	37.78	14.00	20.00	40.00	20.00	QP
	H	133.03	25.50	15.70	43.50	18.00	PK
	H	263.27	14.40	25.20	46.00	20.80	PK
	V	5150.00	32.10	62.50	74.00	11.50	PK
	V	5150.00	32.10	51.30	54.00	2.70	AV
	V	6283.17	-0.30	43.00	68.23	25.23	PK
	V	8541.60	4.20	46.00	68.23	22.23	PK
	V	10360.28	10.20	63.60	74.00	10.40	PK
	V	10360.28	10.20	41.70	54.00	12.30	AV
5210	V	5210.00	32.10	101.60	Fundamental	/	PK
	V	37.78	14.00	20.00	40.00	20.00	QP
	H	133.03	25.50	15.70	43.50	18.00	PK
	H	263.27	14.40	25.20	46.00	20.80	PK
	V	5350.00	32.70	56.60	74.00	17.40	PK
	V	5350.00	32.70	42.70	54.00	11.30	AV
	V	6283.17	-0.30	43.00	68.23	25.23	PK
	V	8541.60	4.20	46.00	68.23	22.23	PK
	V	10425.43	10.40	63.90	74.00	10.10	PK
	V	10425.43	10.40	42.50	54.00	11.50	AV
5240	V	5240.00	32.10	103.20	Fundamental	/	PK
	V	37.78	14.00	20.00	40.00	20.00	QP
	H	133.03	25.50	15.70	43.50	18.00	PK
	H	263.27	14.40	25.20	46.00	20.80	PK
	V	5350.00	32.70	56.60	74.00	17.40	PK
	V	5350.00	32.70	42.70	54.00	11.30	AV
	V	6283.17	-0.30	43.00	68.23	25.23	PK
	V	8541.60	4.20	46.00	68.23	22.23	PK
	V	10485.00	10.40	63.90	74.00	10.10	PK
	V	10485.00	10.40	42.50	54.00	11.50	AV

Channel	Polarity	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H&V	5736	32.10	104.70	Fundamental	/	PK
	H&V	5720	32.10	52.20	110.80	58.60	PK
	H&V	5700	32.10	44.70	105.20	60.50	PK
	H&V	5650	32.10	44.10	68.20	24.10	PK
	H&V	11472	7.30	47.40	74.00	26.60	PK
	H&V	11472	7.30	41.80	54.00	12.20	AV
M	H&V	5762	32.10	104.50	Fundamental	/	PK
	H&V	11524	7.30	48.50	74.00	25.50	PK
	H&V	11524	7.30	40.70	54.00	13.30	AV
H	H&V	5814	32.70	105.20	Fundamental	/	PK
	H&V	5855	32.70	48.90	110.80	61.90	PK
	H&V	5875	32.70	45.30	105.20	59.90	PK
	H&V	5925	32.70	46.30	68.20	21.90	PK
	H&V	11524	7.30	47.50	74.00	26.50	PK
	H&V	11524	7.30	39.50	54.00	14.50	AV

Remark:
1. For fundamental & restrict emission test, no amplifier is employed.
2. Factor = Antenna Factor + Cable Loss (-Amplifier, is employed);
3. Measure level = Reading Level + Factor;
4. Over Limit = Measure level – limit;
5. If the PK reading is lower than AV limit, the AV test can be elided.

Example:

Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading level = 10dBuV.
Then Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;
Measure level = 10dBuV + 0.20dB/m = 10.20dBuV/m
Assuming limit = 54dBuV/m, Measure level = 10.20dBuV/m,
then Over Limit = 10.20 - 54= -43.80dBuV/m

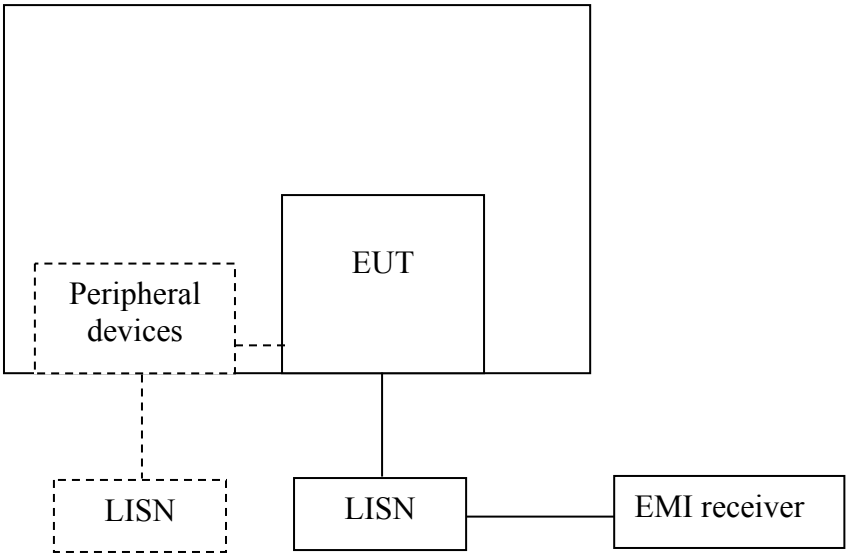
8 Power line conducted emission

Test result: **Pass**

8.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
0.15-0.5	66 to 56*	56 to 46 *
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

8.2 Test configuration



☒ For table top equipment, wooden support is 0.8m height table

☐ For floor standing equipment, wooden support is 0.1m height rack.

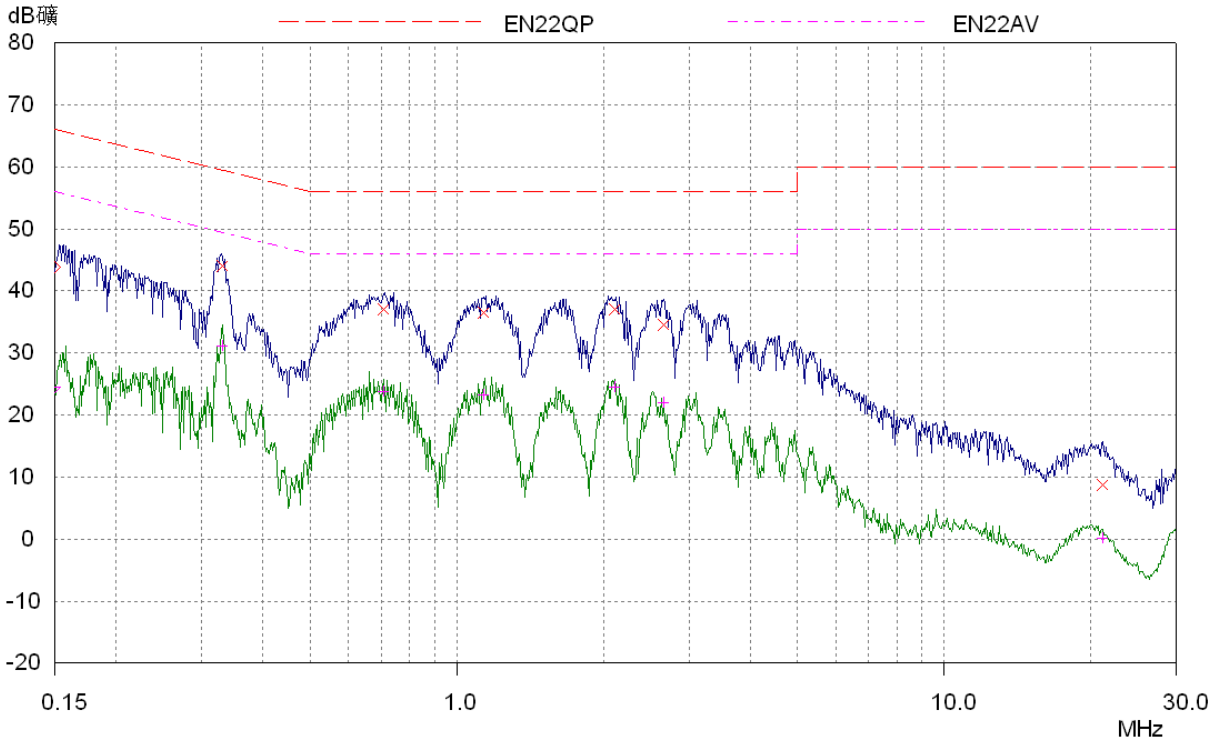
8.3 Test procedure and test set up

The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50Ω/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50Ω/50uH coupling impedance with 50Ω termination.
Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4 on conducted measurement.
The bandwidth of the test receiver is set at 9 kHz.

8.4 Test protocol

Temperature : 25 °C
Relative Humidity : 55 %

L&N line



Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(μV)	Limit dB(μV)	Margin (dB)	level dB(μV)	limit dB(μV)	Margin (dB)
0.33	43.95	59.44	15.49	31.05	49.44	18.39
0.71	36.98	56.00	19.02	23.73	46.00	22.27
1.14	36.44	56.00	19.56	23.17	46.00	22.83
2.11	37.07	56.00	18.93	24.48	46.00	21.52
2.66	34.47	56.00	21.53	22.05	46.00	23.95
21.18	8.76	60.00	51.24	0.14	50.00	49.86