



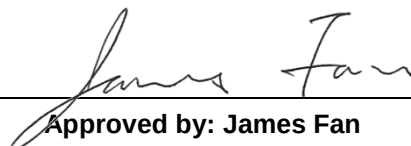
NCC RADIO TEST REPORT

Equipment : Active Loud Speaker
Brand Name : Marshall
Model Name : ACTON MULTI-ROOM
Applicant : 百滋國際股份有限公司
台北市松山區寶清街 17 號 5 樓之 1
Manufacturer : Zound Industries International AB
Room 411-412, 4th Floor, Main Building,
No. 99 Qiao Cheng East Road, Nanshan
District, Shenzhen City, China
Standard : NCC LP0002 (2018-01-10)

The product was received on May. 09, 2018, and testing was started from Jun. 28, 2018 and completed on Jul. 05, 2018. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in NCC LP0002 (2018-01-10) and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.


Approved by: James Fan

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issue Date
TR850940B	01	Initial issue of report	Jul. 13, 2018

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	LP0002 4.7.3 4.7.5	6dB, 26dB and 99% Occupied Bandwidth	Pass	-
3.2	LP0002 4.7.3	Maximum Conducted Output Power	Pass	-
3.3	LP0002 4.7.3	Power Spectral Density	Pass	-
3.4	LP0002 4.7.4	Unwanted Emissions	Pass	Under limit -4.00 dB at 5650.00 MHz
3.5	LP0002 2.11	Receiver Radiated Emission	Pass	Under limit -5.64 dB at 934.14 MHz
3.6	LP0002 2.3	AC Conducted Emission	Pass	Under limit -13.07 dB at 0.273 MHz
3.7	LP0002 4.7.6	Automatically Discontinue Transmission	Pass	-
3.8	LP0002 2.2 4.7.8	Antenna Requirement	Pass	-
3.9	LP0002 2.2 5.20.2	Maximum Power Density	Pass	-

Reviewed by: Along Chen

Report Producer: Jing Chen



1 General Description

1.1 Product Feature of Equipment Under Test

Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, Wi-Fi 5GHz 802.11a/n/ac.

Product Specification subjective to this standard	
Antenna Type	WLAN: FPCB Antenna Bluetooth: FPCB Antenna

1.2 Modification of EUT

No modifications are made to the EUT during all test items.

1.3 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1190 and TW0007 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site No.	Sporton Site No.		
	TH05-HY	CO05-HY	03CH15-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

1.4 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- NCC LP0002 (2018-01-10)
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01
- ANSI C63.10-2013

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2 Test Configuration of Equipment Under Test

- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).
- b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5725-5850 MHz Band 4 (U-NII-3)	149	5745	157	5785
	151*	5755	159*	5795
	153	5765	161	5805
	155 [#]	5775	165	5825

Note:

1. The above Frequency and Channel in "*" were 802.11n HT40 and 802.11ac VHT40.
2. The above Frequency and Channel in "[#]" were 802.11ac VHT80.

2.2 Test Mode

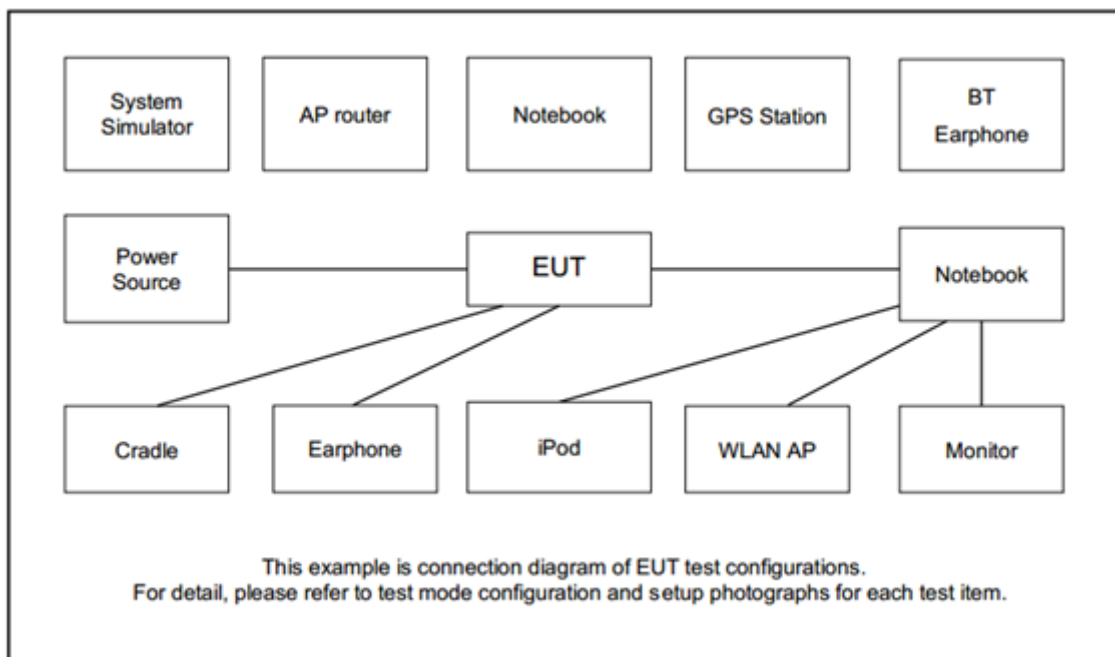
Final test modes are considering the modulation and worse data rates as below table.

Modulation	Data Rate
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT80	MCS0

Test Cases	
AC Conducted Emission	Mode 1: 802.11a Tx CH165_5825 MHz_6 Mbps Mode 2: 802.11a Rx CH165_5825 MHz_6 Mbps
Receiver Radiated Emission	Mode 1: 802.11a Rx CH165_5825 MHz_6 Mbps

Ch. #		Band IV : 5725-5850 MHz			
		802.11a	802.11n HT20	802.11n HT40	802.11ac VHT80
L	Low	149	149	151	-
M	Middle	157	157	-	155
H	High	165	165	159	-

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	DELL	Latitude E6430	FCC DoC	N/A	N/A
2.	iPod Nano	Apple	A1446	FCC DoC	Shielded, 1.5 m	N/A

Note: The support notebook is disconnected from EUT and removed from test table when EUT is set to transmit continuously.

2.5 EUT Operation Test Setup

The RF test items, utility "PuTTY" was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

2.6 Duty Cycle

Mode	Duty Cycle (%)	Duty Cycle On (ms)	Duty Factor (dB)	VBW
802.11a	99.01%	1.44	0.04	1 kHz
802.11n HT20	99.47%	1.36	0.02	1 kHz
802.11n HT40	97.88%	0.67	0.09	3 kHz
802.11ac VHT80	95.89%	0.34	0.18	3 kHz

2.7 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 4.2 + 10 = 14.2 \text{ (dB)}\end{aligned}$$

3 Test Result

3.1 6dB and 26dB and 99% Occupied Bandwidth Measurement

3.1.1 Description of 6dB and 26dB and 99% Occupied Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

26dB and 99% Occupied bandwidth are reporting only.

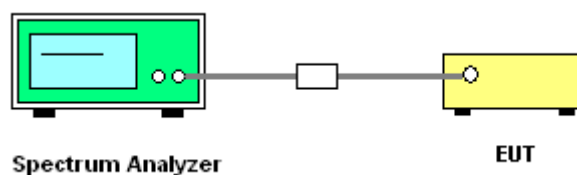
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
Section C) Emission bandwidth for the band 5.725-5.85GHz
2. Set RBW = 100kHz.
3. Set the VBW $\geq 3 \times$ RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.
7. Measure and record the results in the test report.

3.1.4 Test Setup



3.1.5 Test Result of 6dB and 26dB and 99% Occupied Bandwidth

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
5.725-5.85GHz	-	-	-	-	-
802.11a_Nss1,(6Mbps)_1TX	16.377M	16.643M	16M6D1D	16.377M	16.57M
802.11n HT20_Nss1,(MCS0)_1TX	17.609M	17.583M	17M6D1D	17.029M	17.583M
802.11n HT40_Nss1,(MCS0)_1TX	35.507M	36.179M	36M2D1D	35.507M	36.179M
802.11ac VHT80_Nss1,(MCS0)_1TX	76.522M	76.7M	76M7D1D	76.522M	76.7M

Max-N dB = Maximum 6dB down bandwidth

Max-OBW = Maximum 99% occupied bandwidth;

Min-N dB = Minimum 6dB down bandwidth;

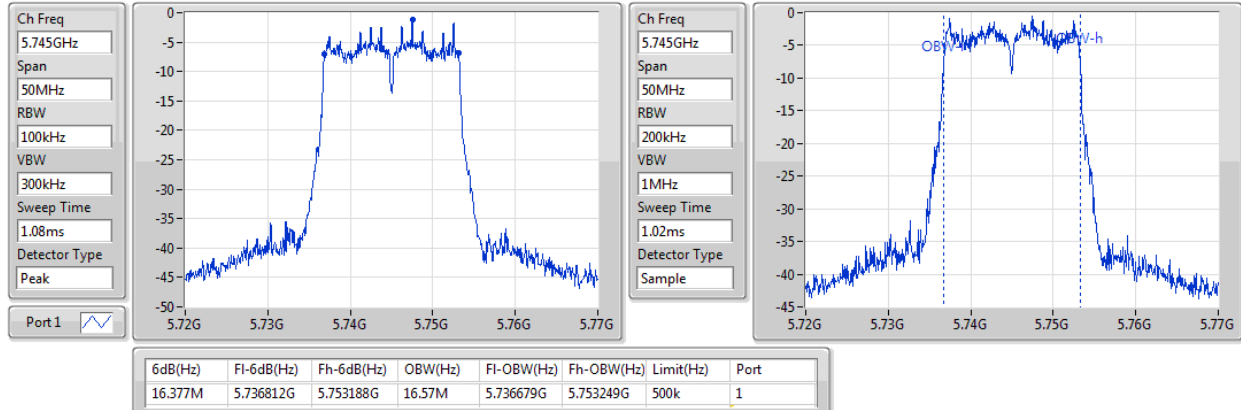
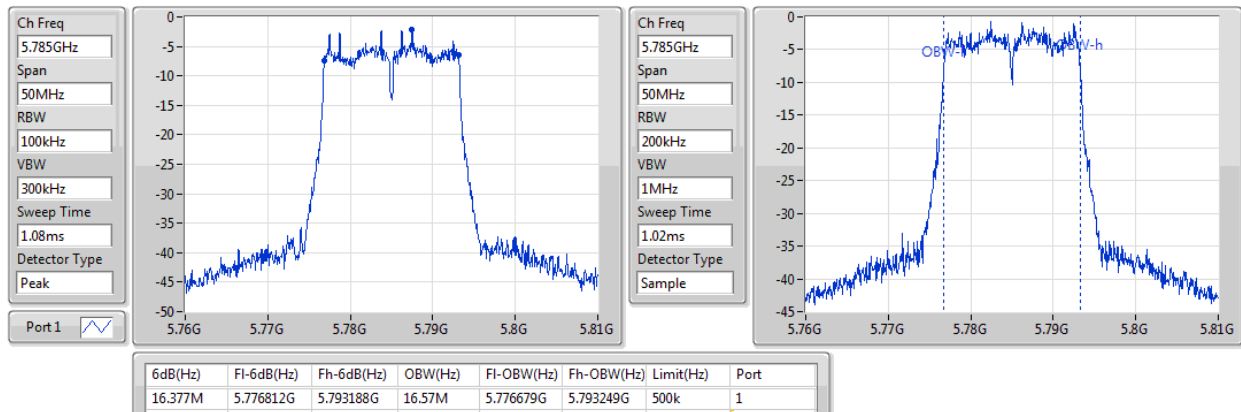
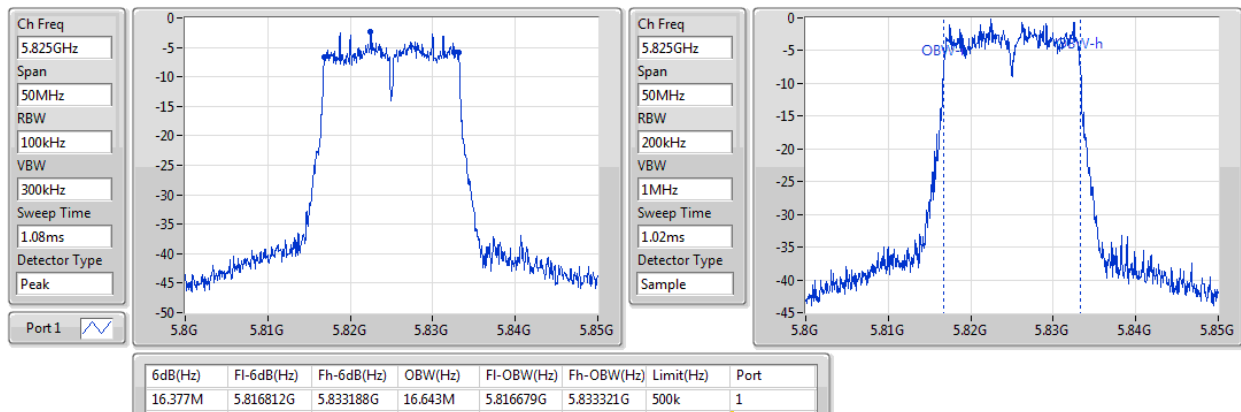
Min-OBW = Minimum 99% occupied bandwidth;

Result

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
802.11a_Nss1,(6Mbps)_1TX	-	-	-	-
5745MHz	Pass	500k	16.377M	16.57M
5785MHz	Pass	500k	16.377M	16.57M
5825MHz	Pass	500k	16.377M	16.643M
802.11n HT20_Nss1,(MCS0)_1TX	-	-	-	-
5745MHz	Pass	500k	17.029M	17.583M
5785MHz	Pass	500k	17.609M	17.583M
5825MHz	Pass	500k	17.536M	17.583M
802.11n HT40_Nss1,(MCS0)_1TX	-	-	-	-
5755MHz	Pass	500k	35.507M	36.179M
5795MHz	Pass	500k	35.507M	36.179M
802.11ac VHT80_Nss1,(MCS0)_1TX	-	-	-	-
5775MHz	Pass	500k	76.522M	76.7M

Port X-N dB = Port X 6dB down bandwidth

Port X-OBW = Port X 99% occupied bandwidth;

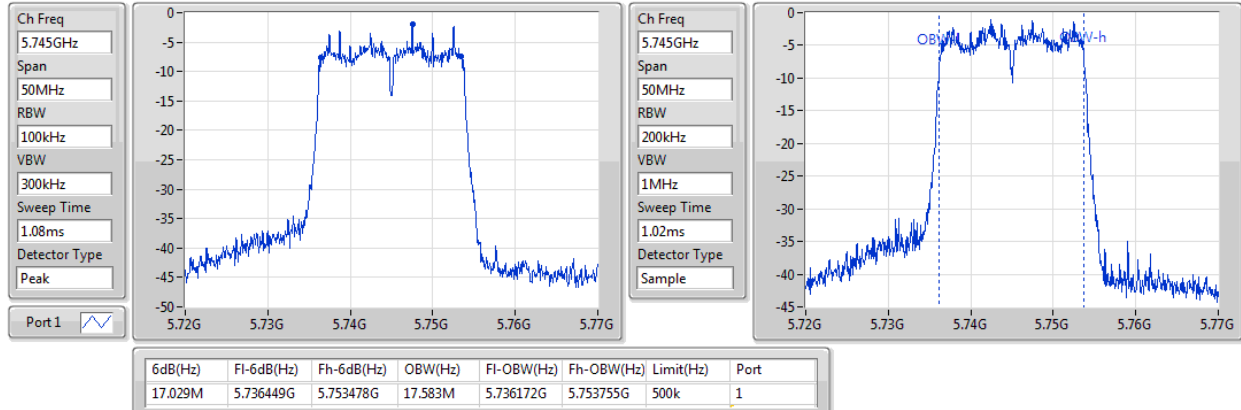
802.11a_Nss1,(6Mbps)_1TX
EBW
5745MHz

802.11a_Nss1,(6Mbps)_1TX
EBW
5785MHz

802.11a_Nss1,(6Mbps)_1TX
EBW
5825MHz




802.11n HT20_Nss1,(MCS0)_1TX

EBW

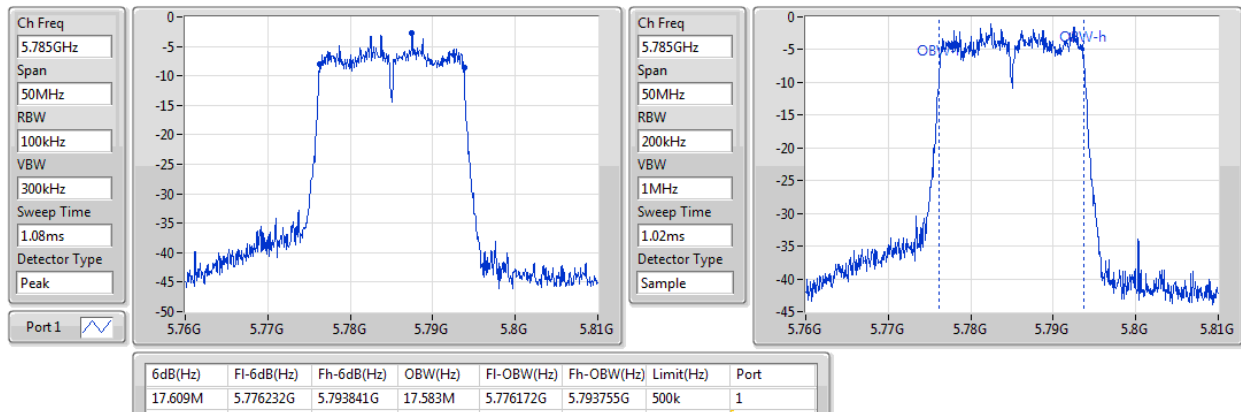
5745MHz



802.11n HT20_Nss1,(MCS0)_1TX

EBW

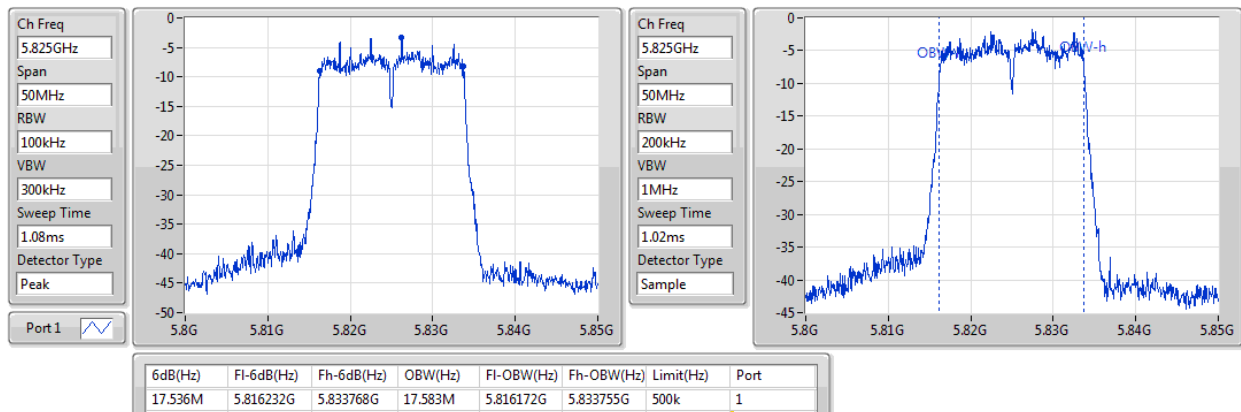
5785MHz



802.11n HT20_Nss1,(MCS0)_1TX

EBW

5825MHz

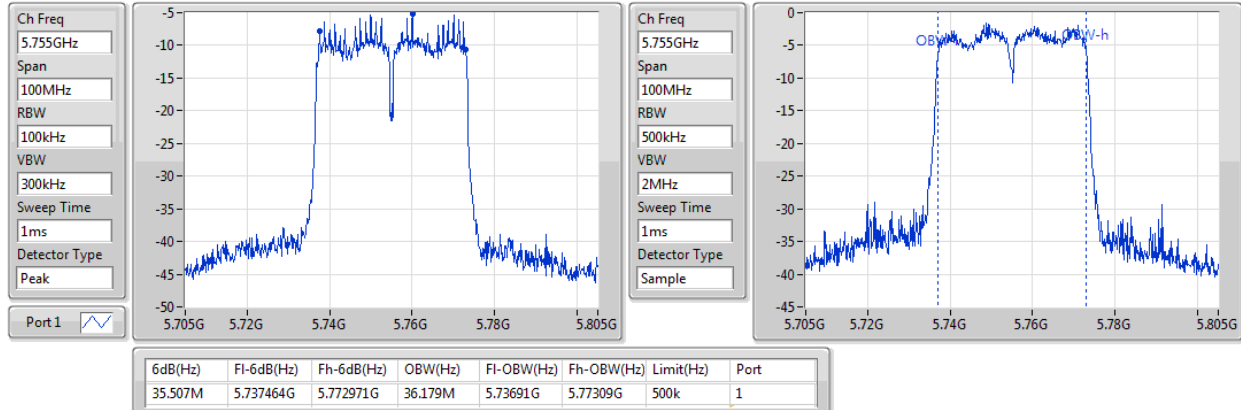




802.11n HT40_Nss1,(MCS0)_1TX

EBW

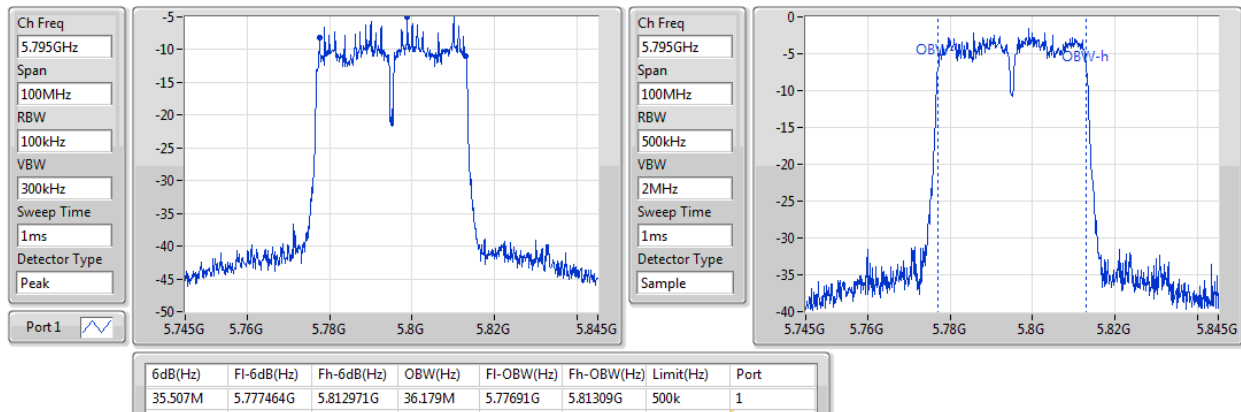
5755MHz



802.11n HT40_Nss1,(MCS0)_1TX

EBW

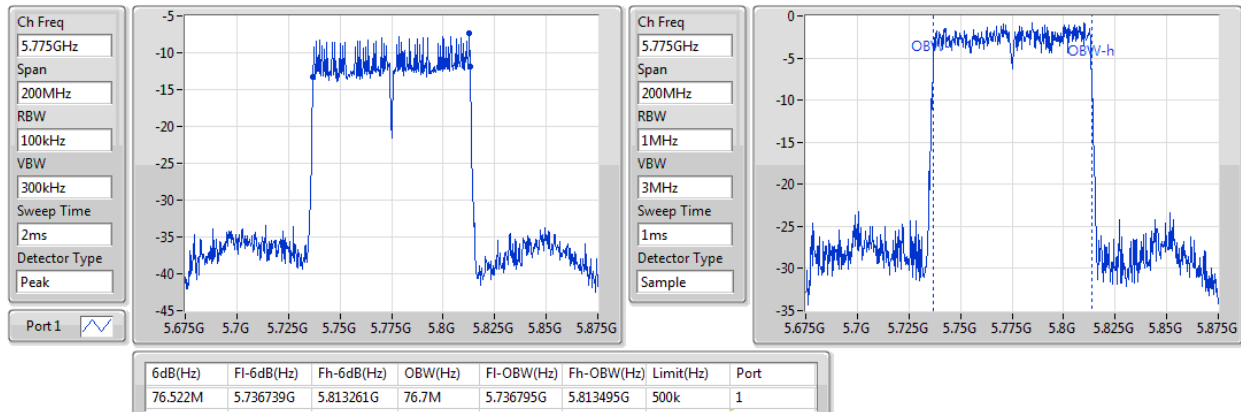
5795MHz



802.11ac VHT80_Nss1,(MCS0)_1TX

EBW

5775MHz



3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

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 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

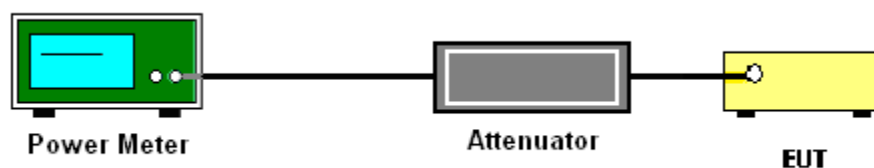
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

Method PM (Measurement using an RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor, $10 \log(1/x)$, where x is the duty cycle.

3.2.4 Test Setup



3.2.5 Test Result of Maximum Conducted Output Power

Summary

Mode	Total Power (dBm)	Total Power (W)	EIRP (dBm)	EIRP (W)
5.725-5.85GHz	-	-	-	-
802.11a_Nss1,(6Mbps)_1TX	8.43	0.00697	12.73	0.01875
802.11n HT20_Nss1,(MCS0)_1TX	7.90	0.00617	12.20	0.01660
802.11n HT40_Nss1,(MCS0)_1TX	7.11	0.00514	11.41	0.01384
802.11ac VHT80_Nss1,(MCS0)_1TX	8.07	0.00641	12.37	0.01726

Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Total Power (dBm)	Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)
802.11a_Nss1,(6Mbps)_1TX	-	-	-	-	-	-	-
5745MHz	Pass	4.30	8.26	8.26	30.00	12.56	36.00
5785MHz	Pass	4.30	8.37	8.37	30.00	12.67	36.00
5825MHz	Pass	4.30	8.43	8.43	30.00	12.73	36.00
802.11n HT20_Nss1,(MCS0)_1TX	-	-	-	-	-	-	-
5745MHz	Pass	4.30	7.9	7.90	30.00	12.20	36.00
5785MHz	Pass	4.30	7.76	7.76	30.00	12.06	36.00
5825MHz	Pass	4.30	7.57	7.57	30.00	11.87	36.00
802.11n HT40_Nss1,(MCS0)_1TX	-	-	-	-	-	-	-
5755MHz	Pass	4.30	7.11	7.11	30.00	11.41	36.00
5795MHz	Pass	4.30	7.06	7.06	30.00	11.36	36.00
802.11ac VHT80_Nss1,(MCS0)_1TX	-	-	-	-	-	-	-
5775MHz	Pass	4.30	8.07	8.07	30.00	12.37	36.00

DG = Directional Gain; **Port X** = Port X output power

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

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

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

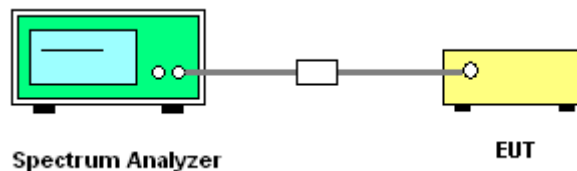
3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
Section F) Maximum power spectral density.

3.3.4 Test Setup





3.3.5 Test Result of Power Spectral Density

Summary

Mode	PD (dBm/RBW)	EIRP PD (dBm/RBW)
5.725-5.85GHz	-	-
802.11a_Nss1,(6Mbps)_1TX	-3.75	0.55
802.11n HT20_Nss1,(MCS0)_1TX	-4.65	-0.35
802.11n HT40_Nss1,(MCS0)_1TX	-8.73	-4.43
802.11ac VHT80_Nss1,(MCS0)_1TX	-11.18	-6.88

RBW = 500kHz

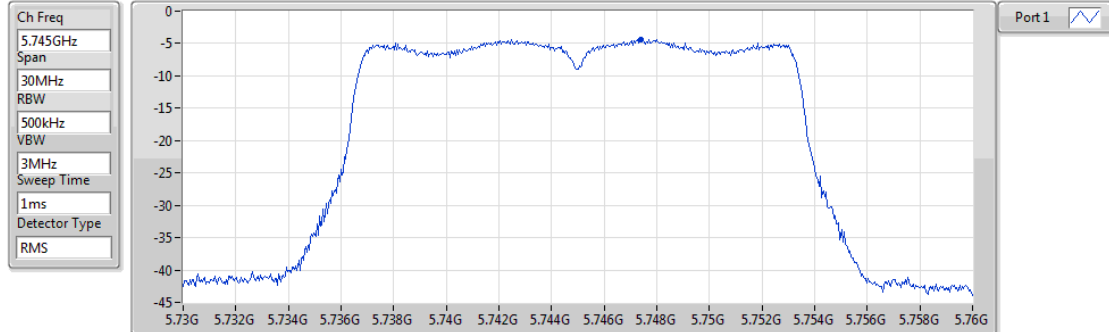
**Result**

Mode	Result	DG (dBi)	Port 1 (dBm/RBW)	PD (dBm/RBW)	PD Limit (dBm/RBW)	EIRP PD (dBm/RBW)	EIRP PD Limit (dBm/RBW)
802.11a_Nss1,(6Mbps)_1TX	-	-	-	-	-	-	-
5745MHz	Pass	4.30	-4.31	-4.31	30.00	-0.01	36.00
5785MHz	Pass	4.30	-3.90	-3.90	30.00	0.40	36.00
5825MHz	Pass	4.30	-3.75	-3.75	30.00	0.55	36.00
802.11n HT20_Nss1,(MCS0)_1TX	-	-	-	-	-	-	-
5745MHz	Pass	4.30	-4.69	-4.69	30.00	-0.39	36.00
5785MHz	Pass	4.30	-4.65	-4.65	30.00	-0.35	36.00
5825MHz	Pass	4.30	-5.51	-5.51	30.00	-1.21	36.00
802.11n HT40_Nss1,(MCS0)_1TX	-	-	-	-	-	-	-
5755MHz	Pass	4.30	-8.73	-8.73	30.00	-4.43	36.00
5795MHz	Pass	4.30	-9.07	-9.07	30.00	-4.77	36.00
802.11ac VHT80_Nss1,(MCS0)_1TX	-	-	-	-	-	-	-
5775MHz	Pass	4.30	-11.18	-11.18	30.00	-6.88	36.00

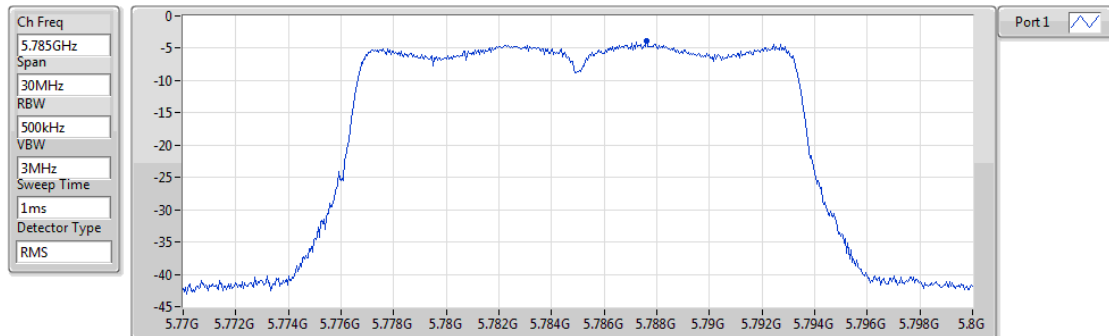
DG = Directional Gain; **RBW** = 500kHz

PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; **Port X** = Port X power density;

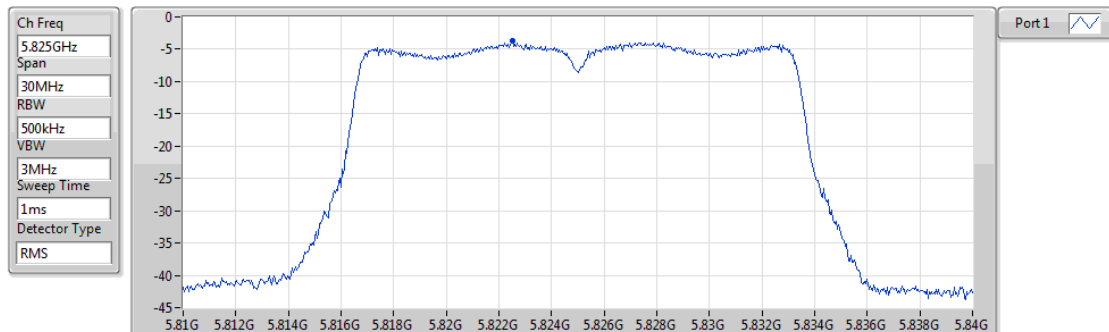
Test results of each port are measured value with duty factor

802.11a_Nss1,(6Mbps)_1TX
PSD
5745MHz


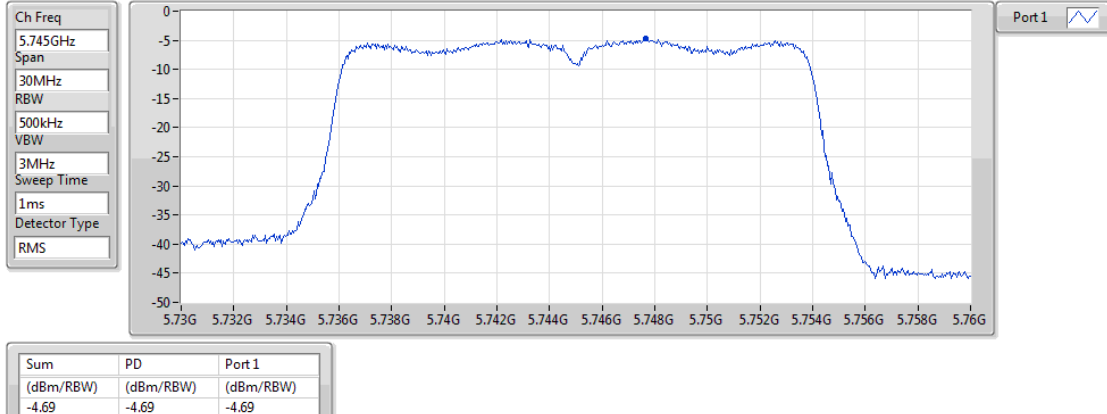
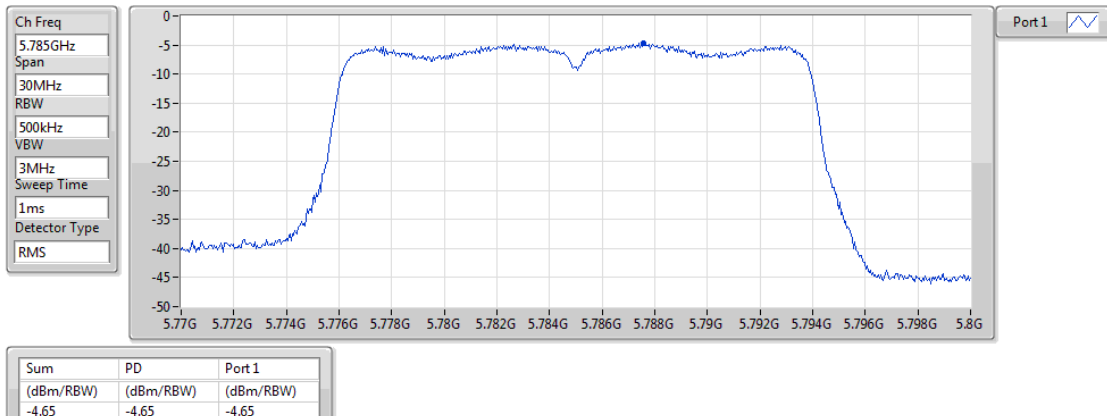
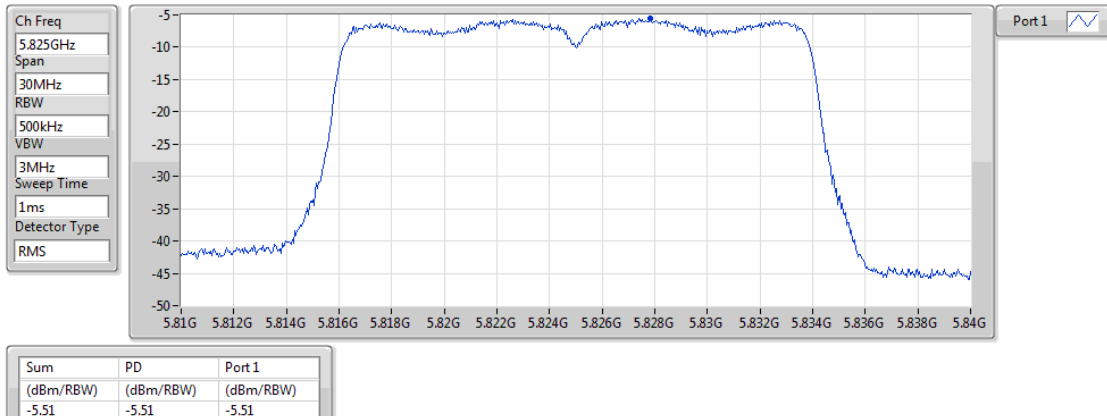
Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-4.31	-4.31	-4.31

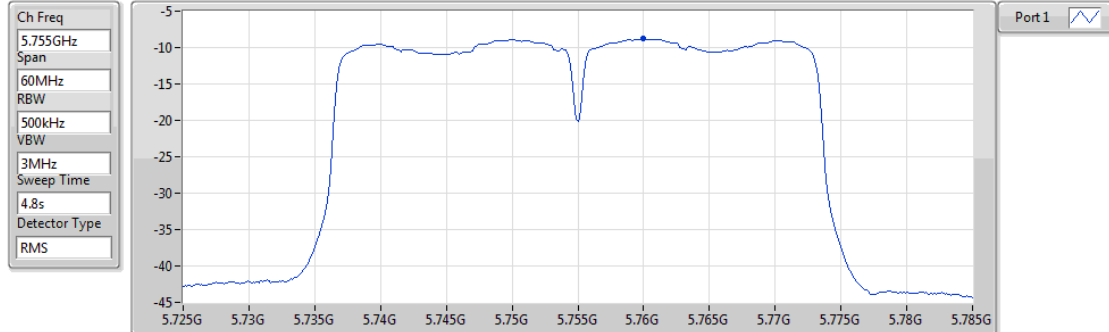
802.11a_Nss1,(6Mbps)_1TX
PSD
5785MHz


Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-3.90	-3.90	-3.90

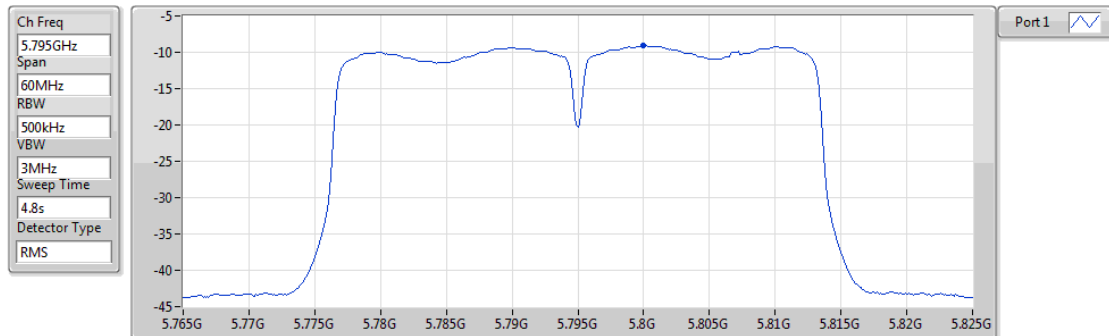
802.11a_Nss1,(6Mbps)_1TX
PSD
5825MHz


Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-3.75	-3.75	-3.75

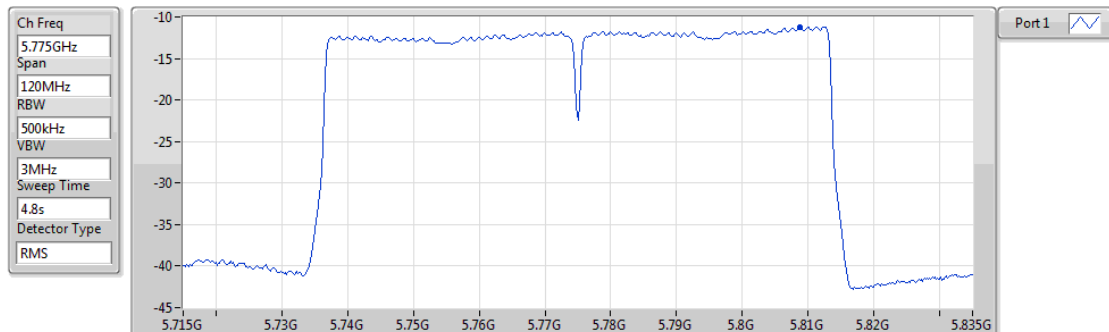
802.11n HT20_Nss1,(MCS0)_1TX
PSD
5745MHz

802.11n HT20_Nss1,(MCS0)_1TX
PSD
5785MHz

802.11n HT20_Nss1,(MCS0)_1TX
PSD
5825MHz


802.11n HT40_Nss1,(MCS0)_1TX
PSD
5755MHz


Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-8.73	-8.73	-8.73

802.11n HT40_Nss1,(MCS0)_1TX
PSD
5795MHz


Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-9.07	-9.07	-9.07

802.11ac VHT80_Nss1,(MCS0)_1TX
PSD
5775MHz


Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-11.18	-11.18	-11.18

3.4 Unwanted Emissions Measurement

3.4.1 Limit of Unwanted Emissions

- (1) 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.

- (2) Unwanted spurious emissions fallen in restricted bands shall comply with the general field strength limits as below table,

Frequency (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 following formula is used to convert the EIRP to field strength.

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

EIRP (dBm)	Field Strength at 3m (dBμV/m)
-17	78.3
- 27	68.3

- (3) ANSI C63.10-2013 clause 12.7.3 note 97

As specified by regulatory requirements, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit. However, an out-of-band emission that complies with both the average and peak general regulatory limits is not required to satisfy the peak emission limit.

3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

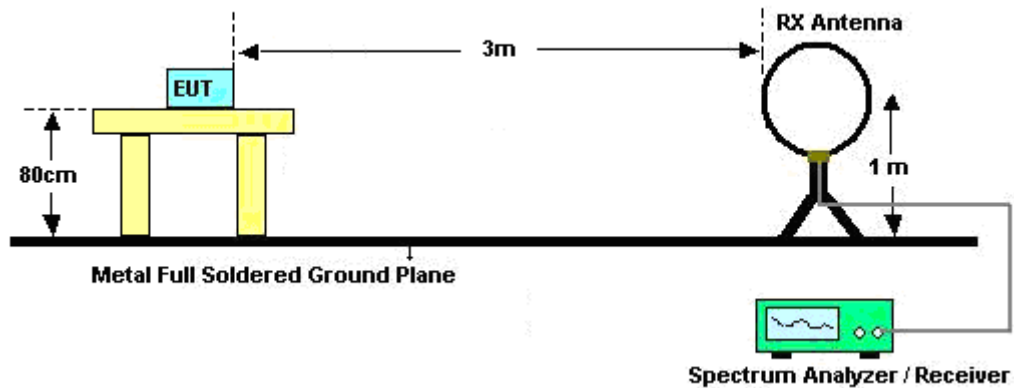
3.4.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
Section G) Unwanted emissions measurement.
(1) Procedure for Unwanted Emissions Measurements Below 1000MHz
 - RBW = 120 kHz
 - VBW = 300 kHz
 - Detector = Peak
 - Trace mode = max hold(2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz
 - RBW = 1 MHz
 - VBW $\geq$ 3 MHz
 - Detector = Peak
 - Sweep time = auto
 - Trace mode = max hold(3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz
 - RBW = 1 MHz
 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW $\geq$ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.

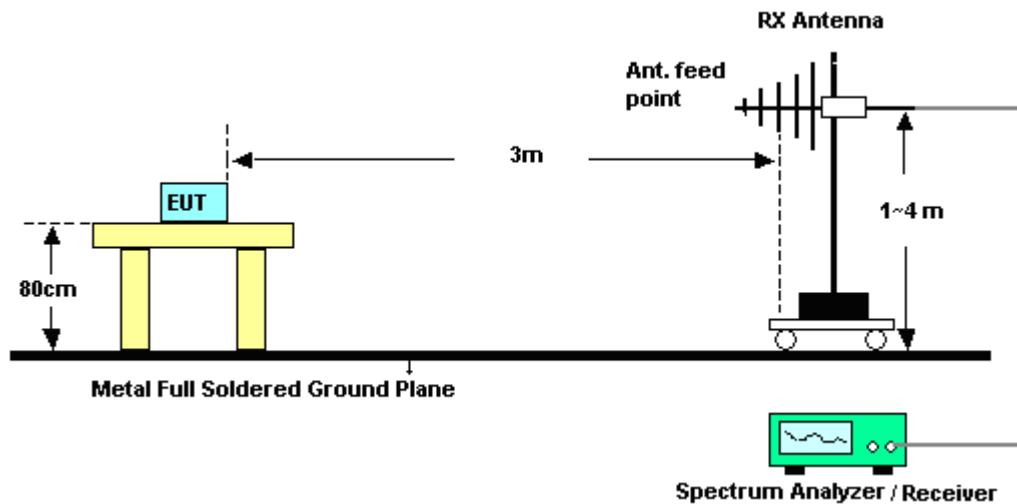
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

3.4.4 Test Setup

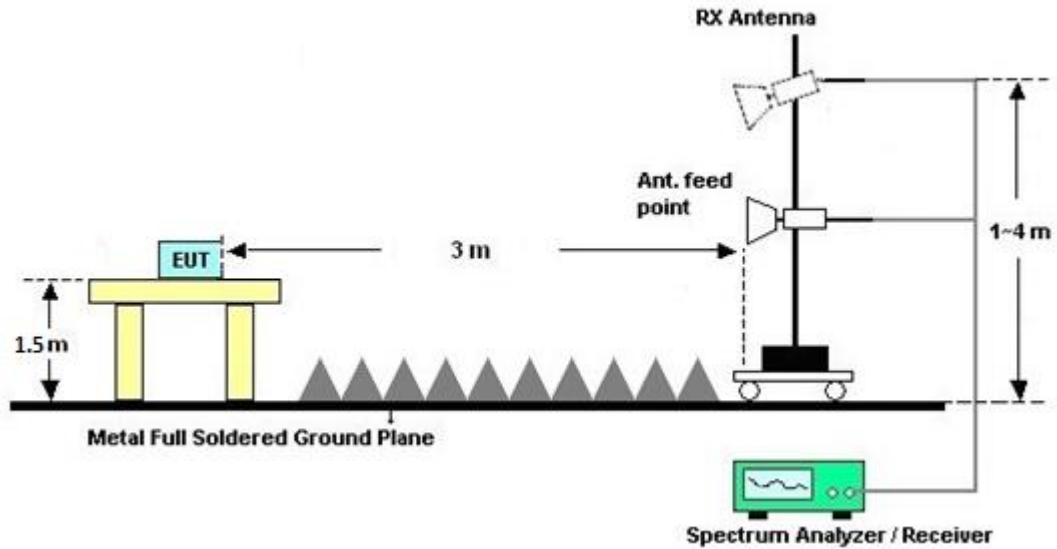
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz

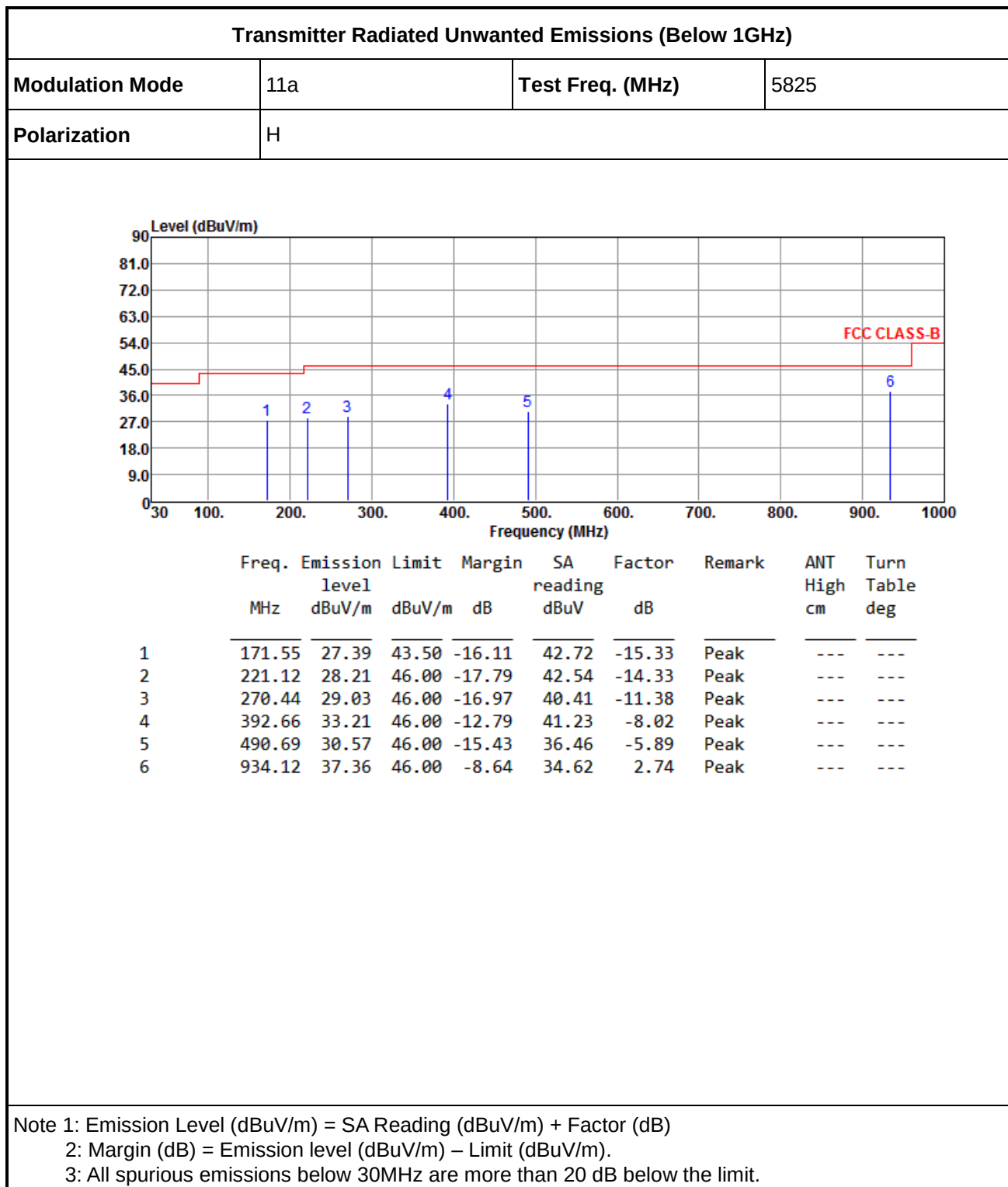


3.4.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

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 NCC LP0002 section 5.13 was not reported.

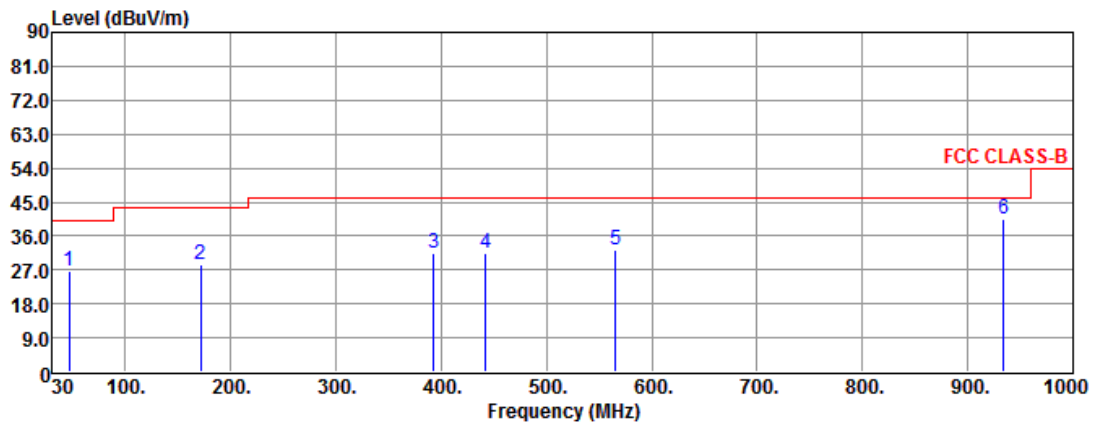
There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

3.4.6 Test Result of Transmitter Radiated Unwanted Emissions (Below 1GHz)



Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation Mode	11a	Test Freq. (MHz)	5825
Polarization	V		



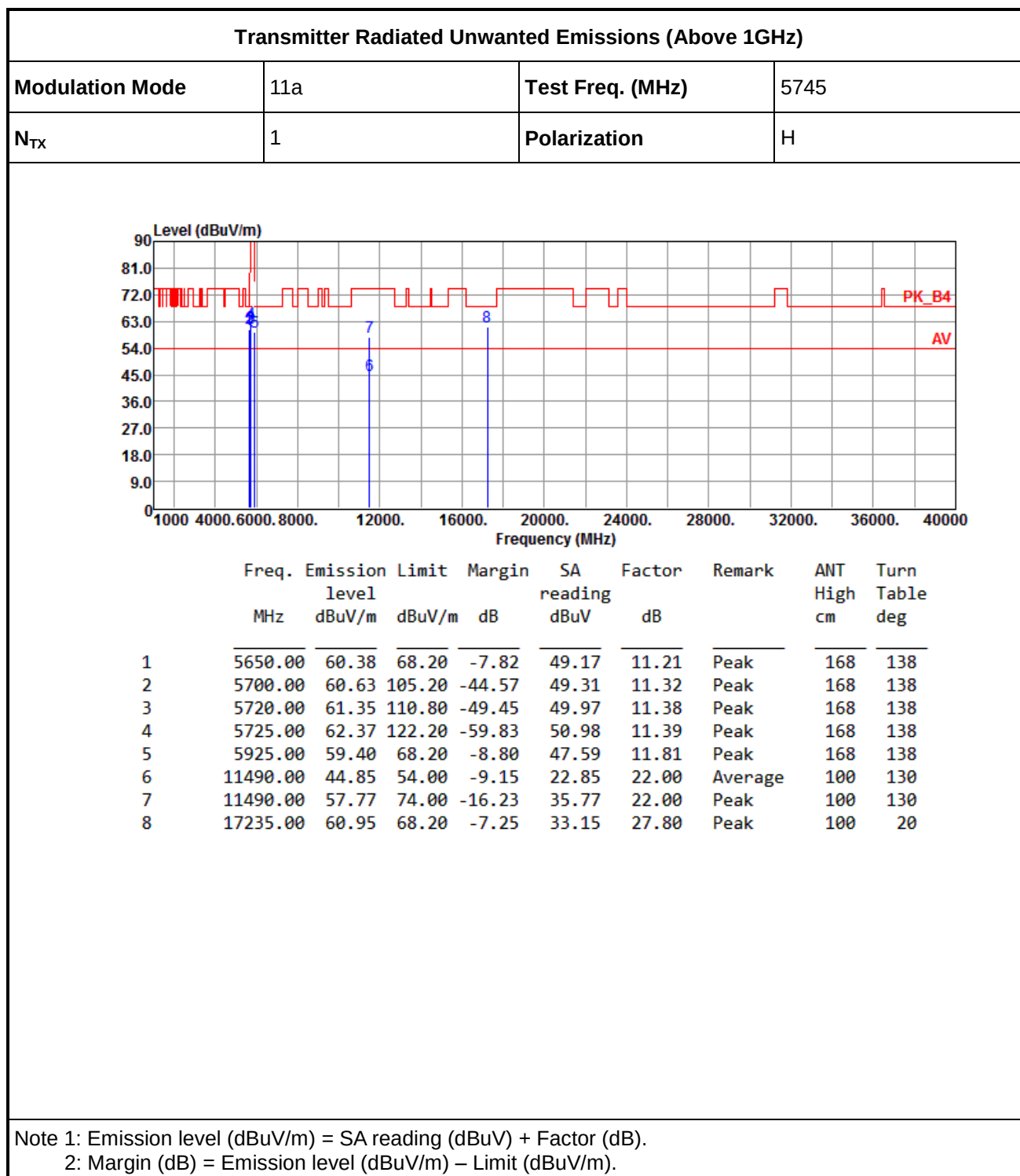
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	46.51	26.88	40.00	-13.12	42.71	-15.83	Peak	---	---
2	171.59	28.23	43.50	-15.27	43.56	-15.33	Peak	---	---
3	392.61	31.59	46.00	-14.41	39.61	-8.02	Peak	---	---
4	442.37	31.56	46.00	-14.44	38.52	-6.96	Peak	---	---
5	565.51	32.21	46.00	-13.79	35.73	-3.52	Peak	---	---
6	934.17	40.41	46.00	-5.59	37.67	2.74	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor (dB)

2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

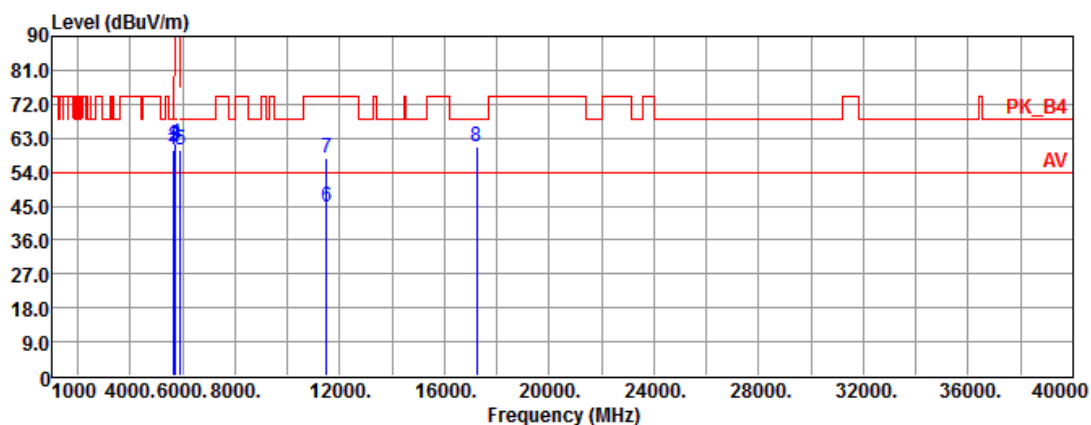
3: All spurious emissions below 30MHz are more than 20 dB below the limit.

3.4.7 Test Result of Transmitter Radiated Unwanted Emissions (Above 1GHz) for 11a



Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11a	Test Freq. (MHz)	5745
N_{TX}	1	Polarization	V



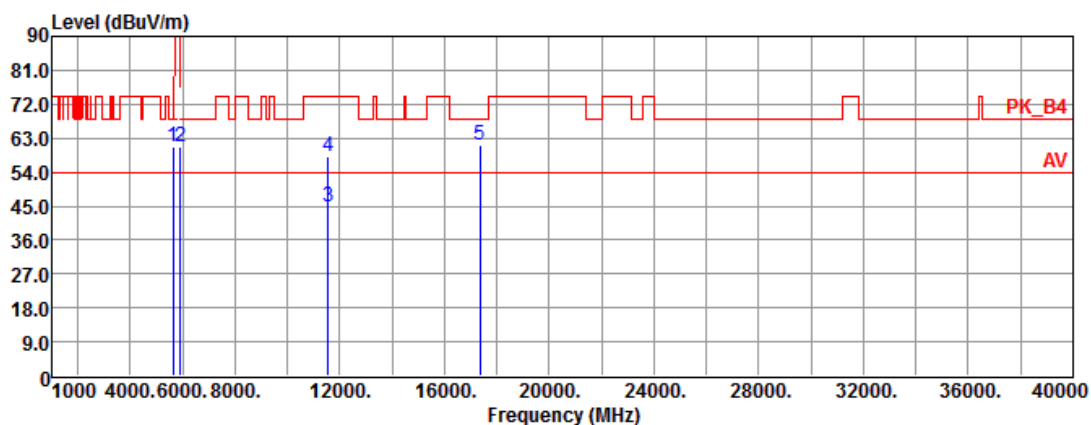
	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5650.00	60.04	68.20	-8.16	48.83	11.21	Peak	100	259
2	5700.00	60.88	105.20	-44.32	49.56	11.32	Peak	100	259
3	5720.00	61.01	110.80	-49.79	49.63	11.38	Peak	100	259
4	5725.00	61.72	122.20	-60.48	50.33	11.39	Peak	100	259
5	5925.00	59.73	68.20	-8.47	47.92	11.81	Peak	100	259
6	11490.00	44.62	54.00	-9.38	22.62	22.00	Average	100	200
7	11490.00	57.85	74.00	-16.15	35.85	22.00	Peak	100	200
8	17235.00	60.93	68.20	-7.27	33.13	27.80	Peak	100	50

Note 1: Emission level (dBUV/m) = SA reading (dBUV) + Factor (dB).

2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11a	Test Freq. (MHz)	5785
N_{TX}	1	Polarization	H



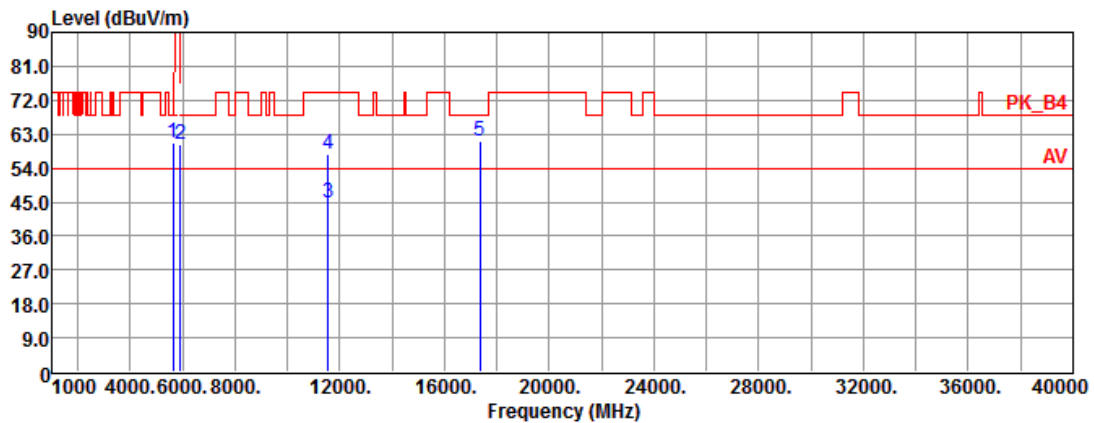
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5650.00	60.52	68.20	-7.68	49.31	11.21	Peak	177	97
2	5925.00	60.77	68.20	-7.43	48.96	11.81	Peak	177	97
3	11570.00	44.80	54.00	-9.20	22.94	21.86	Average	100	70
4	11570.00	57.95	74.00	-16.05	36.09	21.86	Peak	100	70
5	17355.00	61.05	68.20	-7.15	32.43	28.62	Peak	100	90

Note 1: Emission level (dBuV/m) = SA reading (dBuV) + Factor (dB).

2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11a	Test Freq. (MHz)	5785
N_{TX}	1	Polarization	V

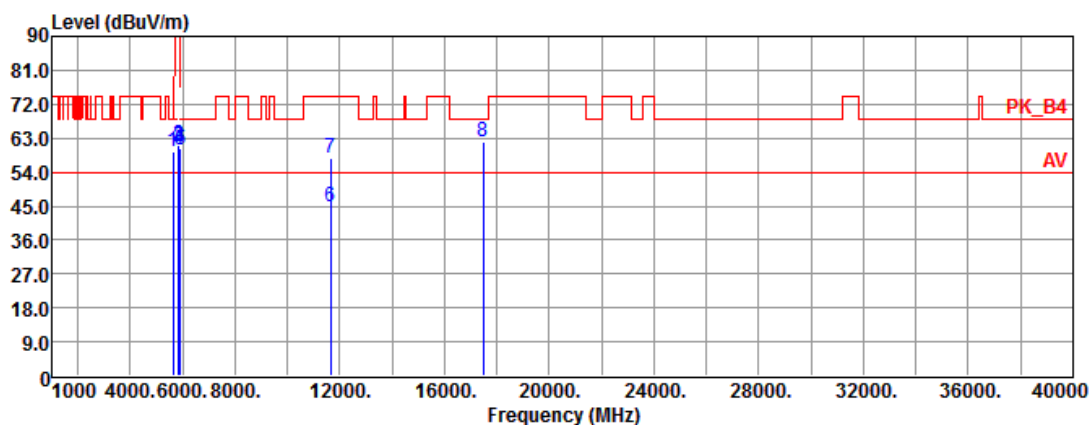


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5650.00	60.79	68.20	-7.41	49.58	11.21	Peak	100	259
2	5925.00	60.33	68.20	-7.87	48.52	11.81	Peak	100	259
3	11570.00	44.84	54.00	-9.16	22.98	21.86	Average	100	20
4	11570.00	57.76	74.00	-16.24	35.90	21.86	Peak	100	20
5	17355.00	61.30	68.20	-6.90	32.68	28.62	Peak	100	20

Note 1: Emission level (dBuV/m) = SA reading (dBuV) + Factor (dB).
 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11a	Test Freq. (MHz)	5825
N_{TX}	1	Polarization	H



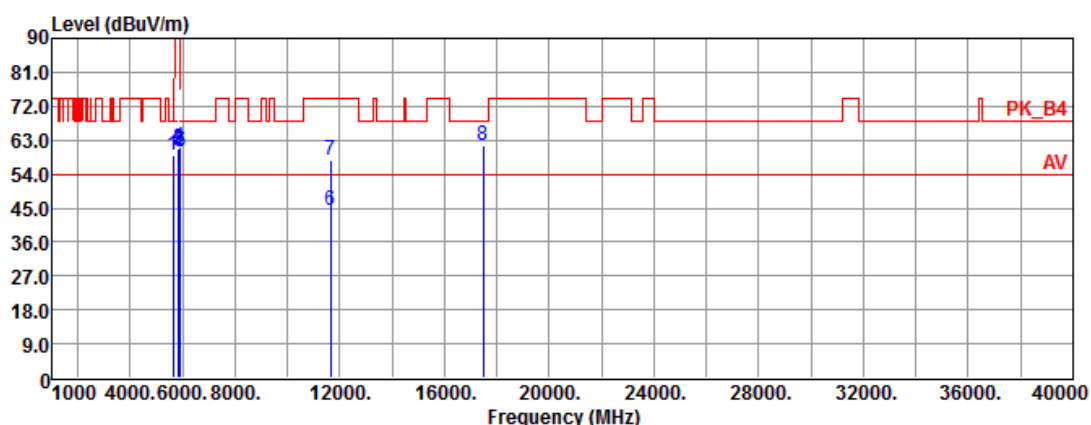
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5650.00	59.23	68.20	-8.97	48.02	11.21	Peak	182	139
2	5850.00	60.50	122.20	-61.70	48.84	11.66	Peak	182	139
3	5855.00	61.32	110.80	-49.48	49.64	11.68	Peak	182	139
4	5875.00	60.26	105.20	-44.94	48.53	11.73	Peak	182	139
5	5925.00	59.72	68.20	-8.48	47.91	11.81	Peak	182	139
6	11650.00	44.59	54.00	-9.41	22.86	21.73	Average	100	30
7	11650.00	57.66	74.00	-16.34	35.93	21.73	Peak	100	30
8	17475.00	61.86	68.20	-6.34	32.43	29.43	Peak	100	50

Note 1: Emission level (dBuV/m) = SA reading (dBuV) + Factor (dB).

2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11a	Test Freq. (MHz)	5825
N_{TX}	1	Polarization	V

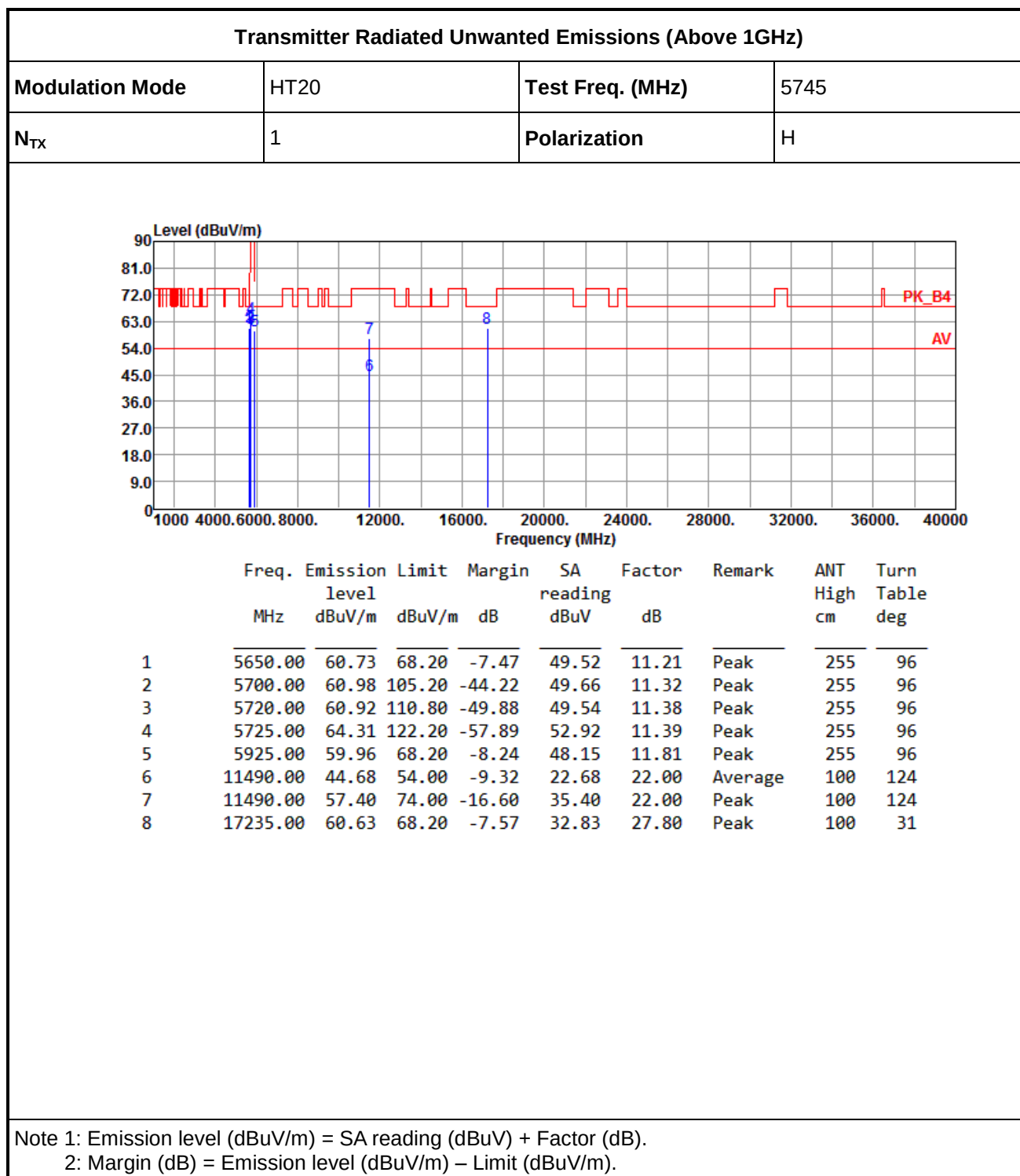


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5650.00	58.97	68.20	-9.23	47.76	11.21	Peak	107	260
2	5850.00	60.29	122.20	-61.91	48.63	11.66	Peak	107	260
3	5855.00	60.51	110.80	-50.29	48.83	11.68	Peak	107	260
4	5875.00	61.35	105.20	-43.85	49.62	11.73	Peak	107	260
5	5925.00	59.77	68.20	-8.43	47.96	11.81	Peak	107	260
6	11650.00	44.43	54.00	-9.57	22.70	21.73	Average	100	100
7	11650.00	57.65	74.00	-16.35	35.92	21.73	Peak	100	100
8	17475.00	61.62	68.20	-6.58	32.19	29.43	Peak	100	90

Note 1: Emission level (dBuV/m) = SA reading (dBuV) + Factor (dB).

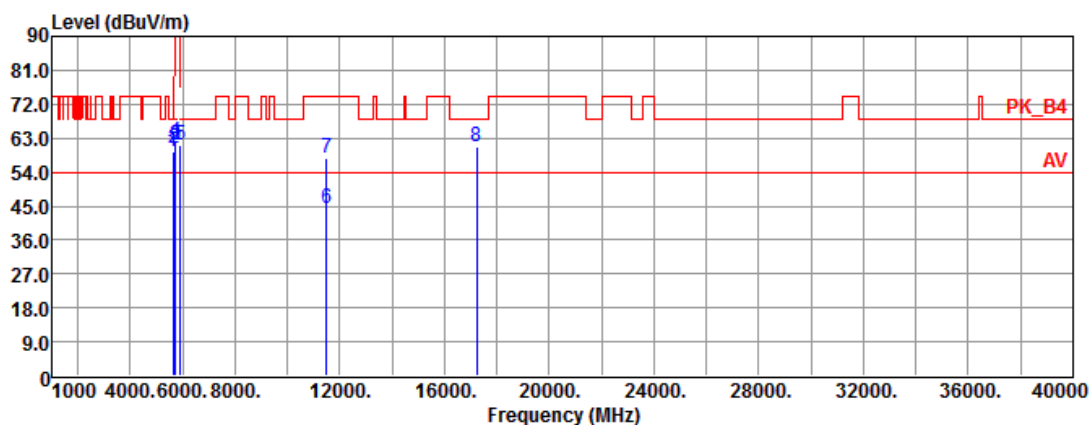
2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.4.8 Test Result of Transmitter Radiated Unwanted Emissions (Above 1GHz) for HT20



Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	HT20	Test Freq. (MHz)	5745
N_{TX}	1	Polarization	V



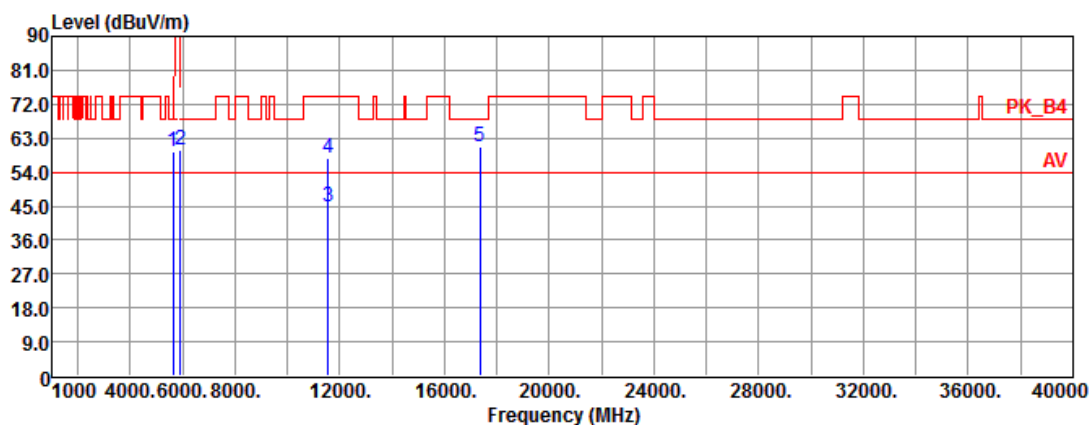
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5650.00	59.46	68.20	-8.74	48.25	11.21	Peak	203	42
2	5700.00	60.36	105.20	-44.84	49.04	11.32	Peak	203	42
3	5720.00	61.23	110.80	-49.57	49.85	11.38	Peak	203	42
4	5725.00	62.16	122.20	-60.04	50.77	11.39	Peak	203	42
5	5925.00	61.18	68.20	-7.02	49.37	11.81	Peak	203	42
6	11490.00	44.55	54.00	-9.45	22.55	22.00	Average	100	186
7	11490.00	57.57	74.00	-16.43	35.57	22.00	Peak	100	186
8	17235.00	60.66	68.20	-7.54	32.86	27.80	Peak	100	38

Note 1: Emission level (dBuV/m) = SA reading (dBuV) + Factor (dB).

2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	HT20	Test Freq. (MHz)	5785
N_{TX}	1	Polarization	H

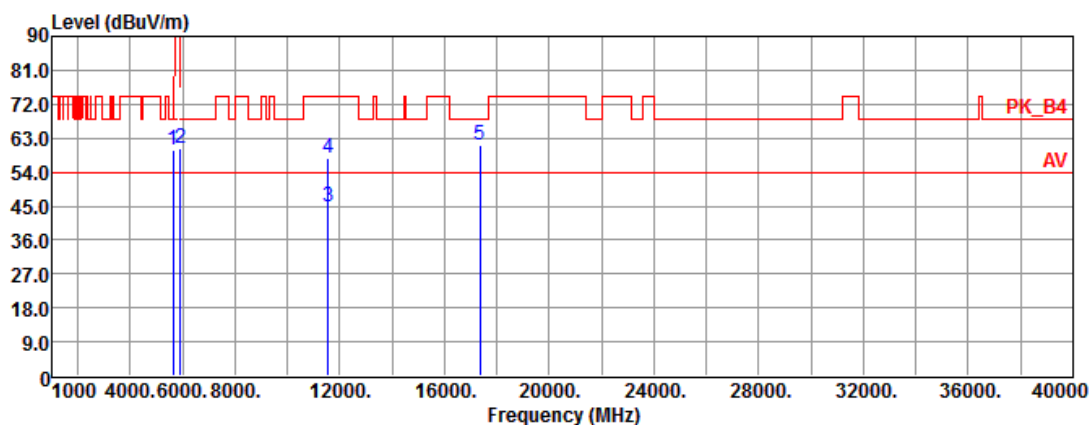


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5650.00	59.64	68.20	-8.56	48.43	11.21	Peak	249	106
2	5925.00	59.85	68.20	-8.35	48.04	11.81	Peak	249	106
3	11570.00	44.68	54.00	-9.32	22.82	21.86	Average	100	81
4	11570.00	57.73	74.00	-16.27	35.87	21.86	Peak	100	81
5	17355.00	60.90	68.20	-7.30	32.28	28.62	Peak	100	105

Note 1: Emission level (dBuV/m) = SA reading (dBuV) + Factor (dB).
 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	HT20	Test Freq. (MHz)	5785
N_{TX}	1	Polarization	V

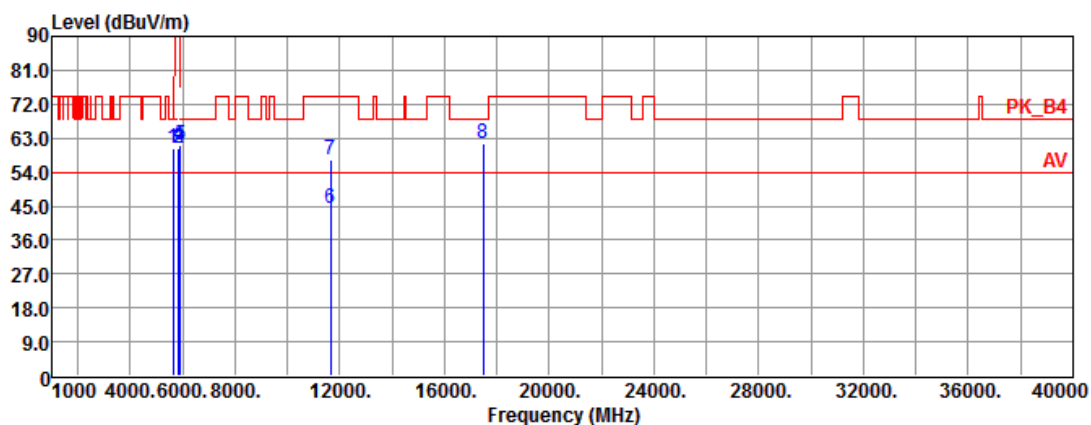


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5650.00	60.00	68.20	-8.20	48.79	11.21	Peak	218	36
2	5925.00	60.49	68.20	-7.71	48.68	11.81	Peak	218	36
3	11570.00	44.65	54.00	-9.35	22.79	21.86	Average	100	35
4	11570.00	57.57	74.00	-16.43	35.71	21.86	Peak	100	35
5	17355.00	61.00	68.20	-7.20	32.38	28.62	Peak	100	28

Note 1: Emission level (dBuV/m) = SA reading (dBuV) + Factor (dB).
 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	HT20	Test Freq. (MHz)	5825
N_{TX}	1	Polarization	H



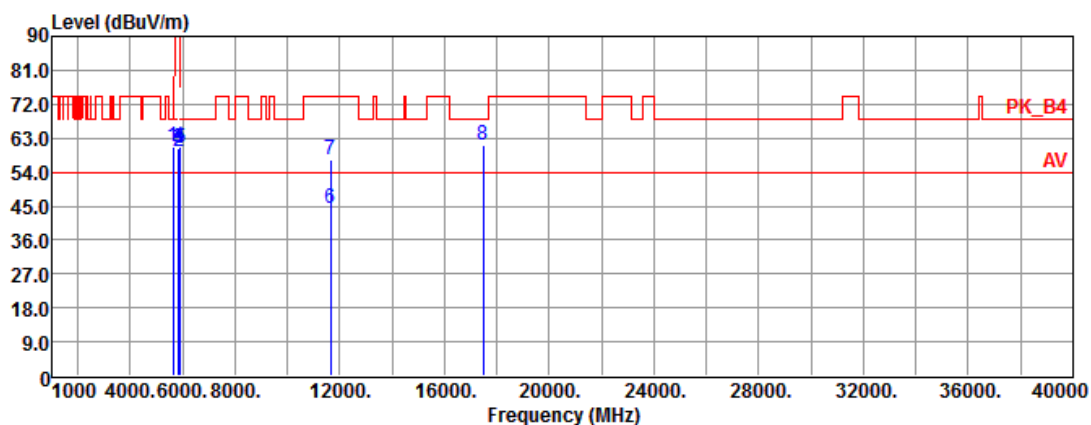
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5650.00	60.18	68.20	-8.02	48.97	11.21	Peak	231	109
2	5850.00	60.34	122.20	-61.86	48.68	11.66	Peak	231	109
3	5855.00	60.21	110.80	-50.59	48.53	11.68	Peak	231	109
4	5875.00	61.09	105.20	-44.11	49.36	11.73	Peak	231	109
5	5925.00	60.94	68.20	-7.26	49.13	11.81	Peak	231	109
6	11650.00	44.46	54.00	-9.54	22.73	21.73	Average	100	39
7	11650.00	57.44	74.00	-16.56	35.71	21.73	Peak	100	39
8	17475.00	61.61	68.20	-6.59	32.18	29.43	Peak	100	66

Note 1: Emission level (dBuV/m) = SA reading (dBuV) + Factor (dB).

2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	HT20	Test Freq. (MHz)	5825
N_{TX}	1	Polarization	V

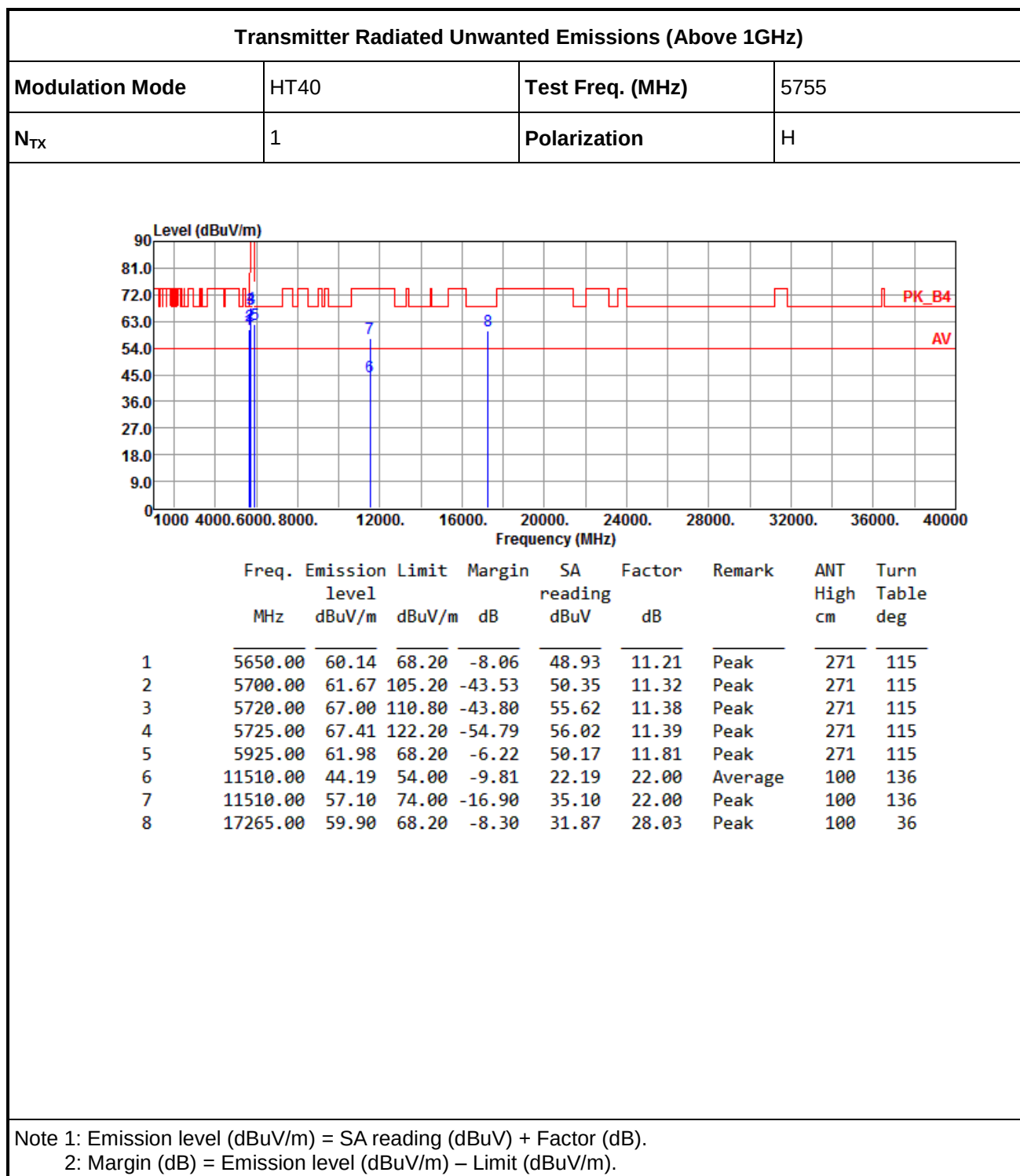


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5650.00	60.66	68.20	-7.54	49.45	11.21	Peak	223	37
2	5850.00	59.44	122.20	-62.76	47.78	11.66	Peak	223	37
3	5855.00	60.48	110.80	-50.32	48.80	11.68	Peak	223	37
4	5875.00	60.59	105.20	-44.61	48.86	11.73	Peak	223	37
5	5925.00	60.18	68.20	-8.02	48.37	11.81	Peak	223	37
6	11650.00	44.25	54.00	-9.75	22.52	21.73	Average	100	112
7	11650.00	57.35	74.00	-16.65	35.62	21.73	Peak	100	112
8	17475.00	61.31	68.20	-6.89	31.88	29.43	Peak	100	78

Note 1: Emission level (dBuV/m) = SA reading (dBuV) + Factor (dB).

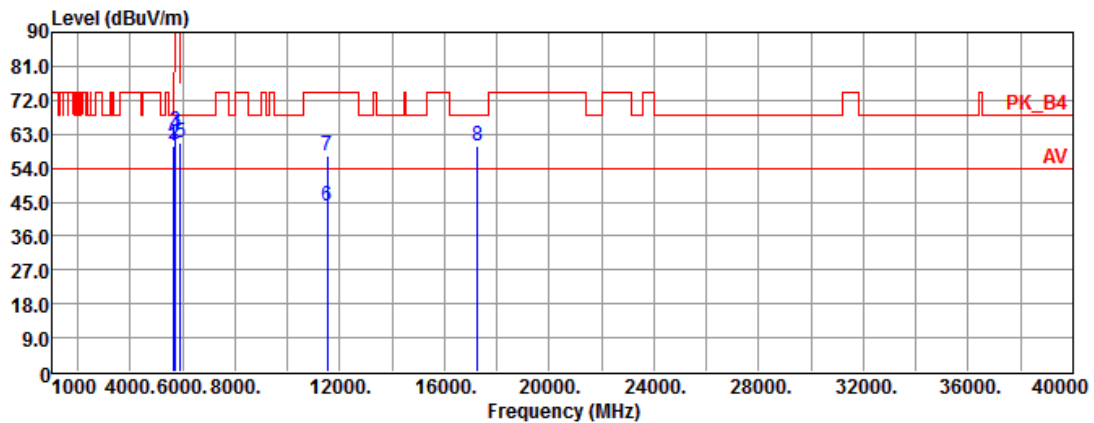
2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.4.9 Test Result of Transmitter Radiated Unwanted Emissions (Above 1GHz) for HT40



Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	HT40	Test Freq. (MHz)	5755
N_{TX}	1	Polarization	V



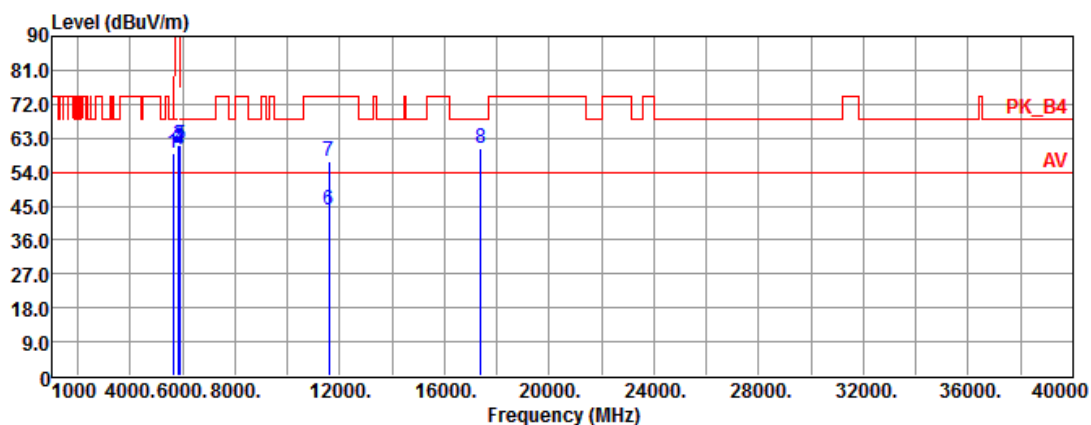
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5650.00	59.95	68.20	-8.25	48.74	11.21	Peak	272	5
2	5700.00	60.35	105.20	-44.85	49.03	11.32	Peak	272	5
3	5720.00	63.88	110.80	-46.92	52.50	11.38	Peak	272	5
4	5725.00	62.99	122.20	-59.21	51.60	11.39	Peak	272	5
5	5925.00	60.78	68.20	-7.42	48.97	11.81	Peak	272	5
6	11510.00	44.11	54.00	-9.89	22.11	22.00	Average	100	177
7	11510.00	57.14	74.00	-16.86	35.14	22.00	Peak	100	177
8	17265.00	60.04	68.20	-8.16	32.01	28.03	Peak	100	49

Note 1: Emission level (dBuV/m) = SA reading (dBuV) + Factor (dB).

2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	HT40	Test Freq. (MHz)	5795
N_{TX}	1	Polarization	H



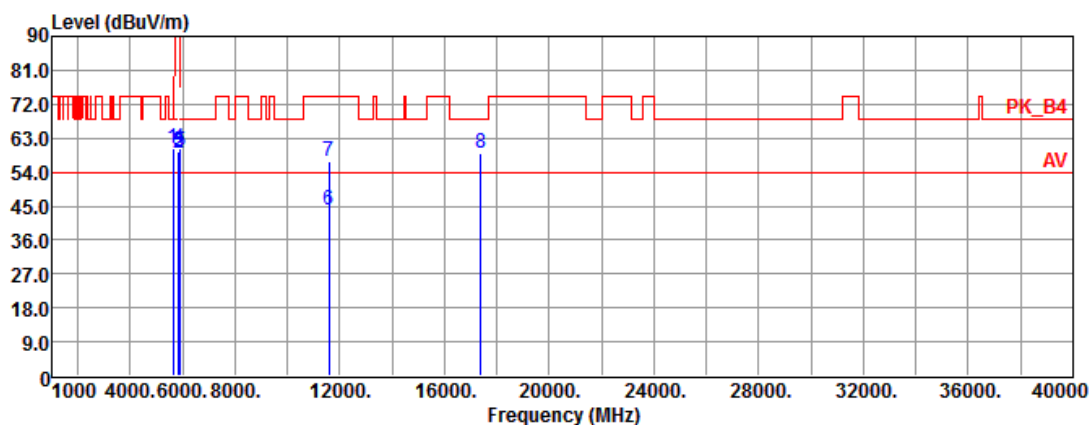
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5650.00	59.06	68.20	-9.14	47.85	11.21	Peak	266	112
2	5850.00	60.10	122.20	-62.10	48.44	11.66	Peak	266	112
3	5855.00	61.05	110.80	-49.75	49.37	11.68	Peak	266	112
4	5875.00	59.89	105.20	-45.31	48.16	11.73	Peak	266	112
5	5925.00	61.18	68.20	-7.02	49.37	11.81	Peak	266	112
6	11590.00	44.00	54.00	-10.00	22.16	21.84	Average	100	133
7	11590.00	56.91	74.00	-17.09	35.07	21.84	Peak	100	133
8	17385.00	60.19	68.20	-8.01	31.36	28.83	Peak	100	41

Note 1: Emission level (dBuV/m) = SA reading (dBuV) + Factor (dB).

2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Transmitter Radiated Unwanted Emissions (Above 1GHz)

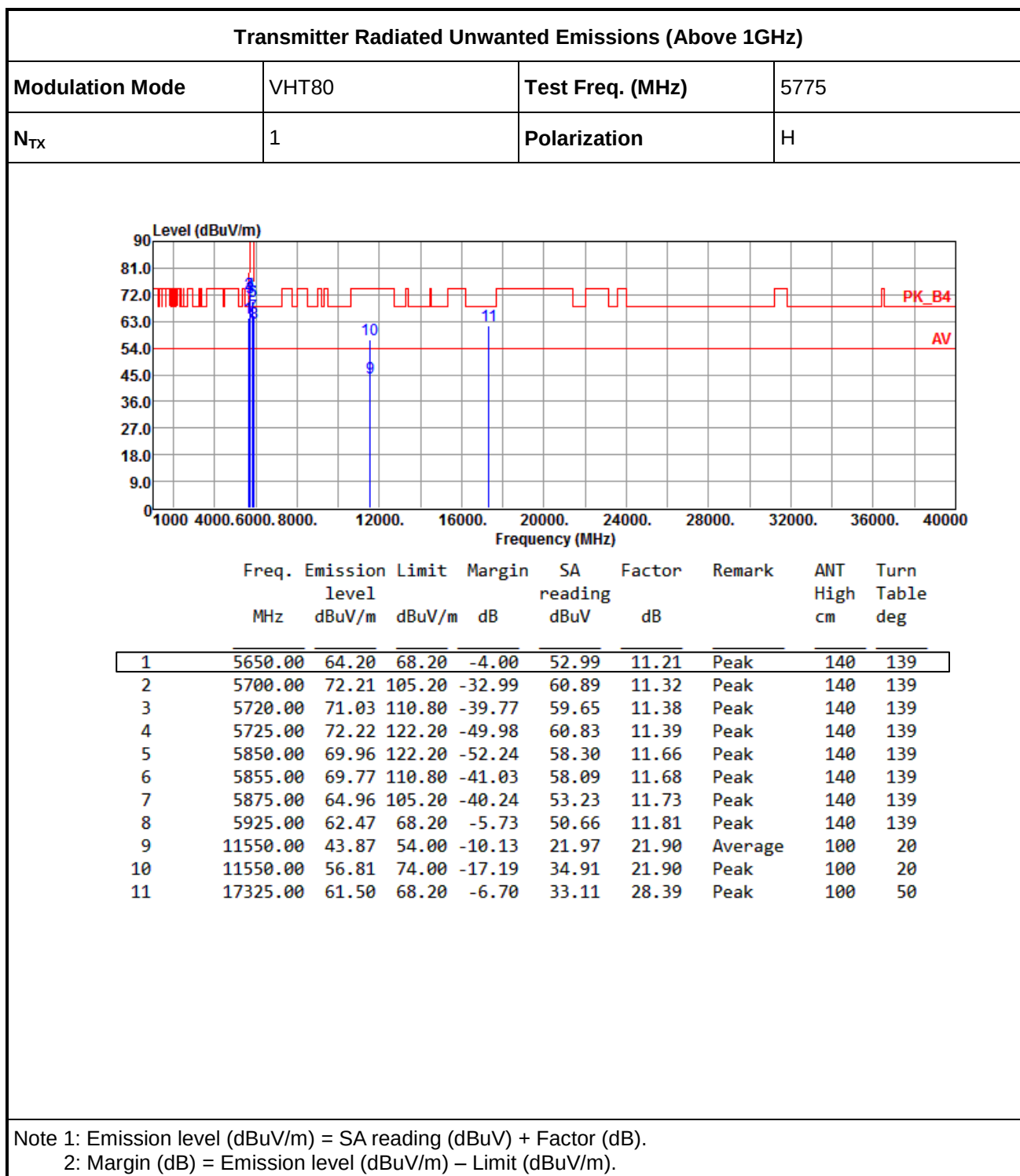
Modulation Mode	HT40	Test Freq. (MHz)	5795
N_{TX}	1	Polarization	V



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5650.00	60.11	68.20	-8.09	48.90	11.21	Peak	268	6
2	5850.00	59.16	122.20	-63.04	47.50	11.66	Peak	268	6
3	5855.00	59.39	110.80	-51.41	47.71	11.68	Peak	268	6
4	5875.00	60.09	105.20	-45.11	48.36	11.73	Peak	268	6
5	5925.00	59.58	68.20	-8.62	47.77	11.81	Peak	268	6
6	11590.00	43.78	54.00	-10.22	21.94	21.84	Average	100	163
7	11590.00	56.78	74.00	-17.22	34.94	21.84	Peak	100	163
8	17385.00	59.20	68.20	-9.00	30.37	28.83	Peak	100	64

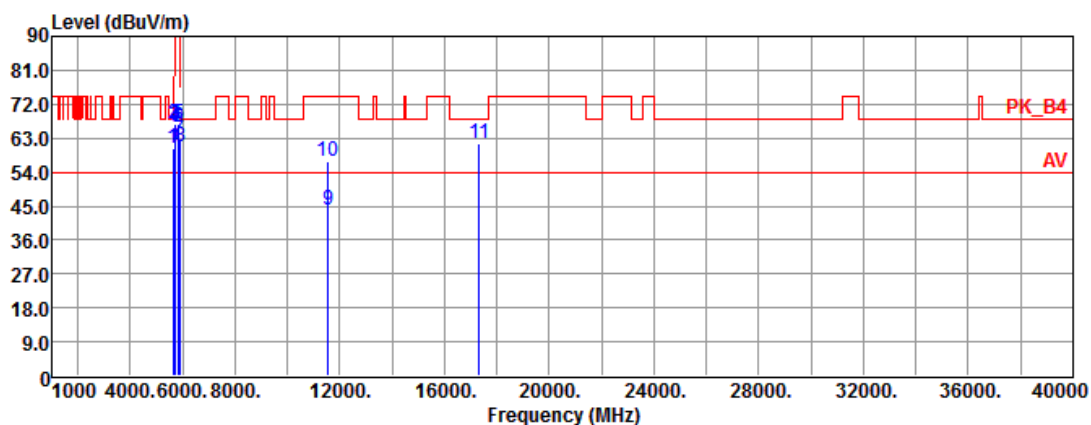
Note 1: Emission level (dBuV/m) = SA reading (dBuV) + Factor (dB).
 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.4.10 Test Result of Transmitter Radiated Unwanted Emissions (Above 1GHz) for VHT80



Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	VHT80	Test Freq. (MHz)	5775
N_{TX}	1	Polarization	V



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5650.00	60.09	68.20	-8.11	48.88	11.21	Peak	100	259
2	5700.00	66.88	105.20	-38.32	55.56	11.32	Peak	100	259
3	5720.00	66.18	110.80	-44.62	54.80	11.38	Peak	100	259
4	5725.00	66.53	122.20	-55.67	55.14	11.39	Peak	100	259
5	5850.00	66.72	122.20	-55.48	55.06	11.66	Peak	100	259
6	5855.00	65.84	110.80	-44.96	54.16	11.68	Peak	100	259
7	5875.00	62.25	105.20	-42.95	50.52	11.73	Peak	100	259
8	5925.00	60.54	68.20	-7.66	48.73	11.81	Peak	100	259
9	11550.00	43.88	54.00	-10.12	21.98	21.90	Average	100	100
10	11550.00	56.80	74.00	-17.20	34.90	21.90	Peak	100	100
11	17325.00	61.40	68.20	-6.80	33.01	28.39	Peak	100	150

Note 1: Emission level (dBuV/m) = SA reading (dBuV) + Factor (dB).

2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.5 Test of Receiver Radiated Emission Measurement

3.5.1 Limit of Receiver Radiated Emission

Frequency (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

3.5.2 Measuring Instruments

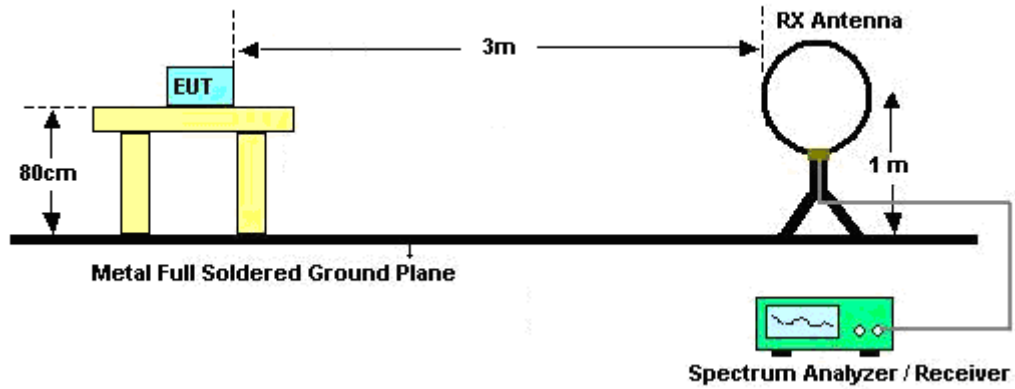
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

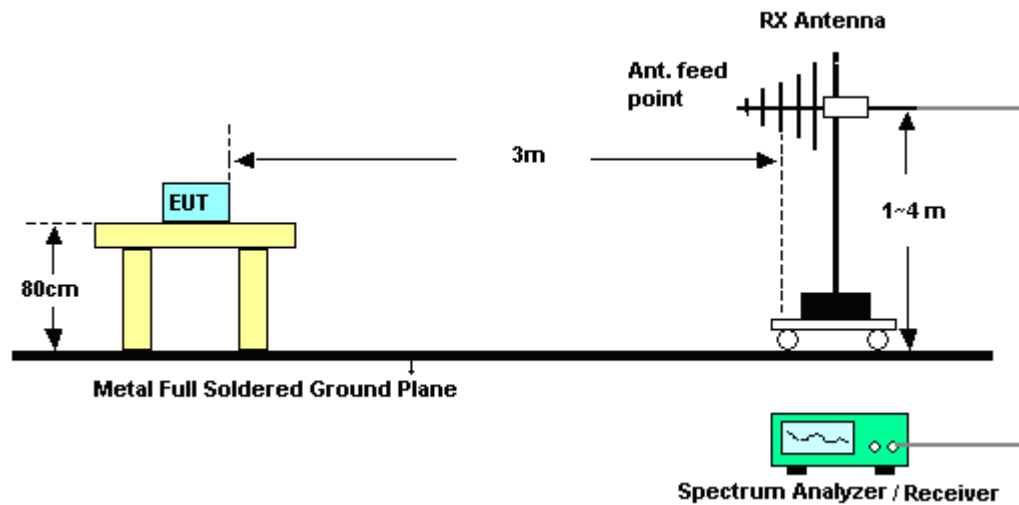
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The EUT was set 10 meters instead of 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower for frequency from 30MHz to 1GHz.
4. The table was rotated 360 degrees to determine the position of the highest radiation.
5. The antenna is a Bi-Log antenna and its height is adjusted between one to four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
6. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
7. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120kHz/VBW=300kHz for frequency below 1GHz; RBW=1MHz VBW=3MHz (Peak), RBW=1MHz/VBW=10Hz (Average) for frequency above 1GHz).
8. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
9. Emission level (dBμV/m) = 20 log Emission level (μV/m)
10. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

3.5.4 Test Setup

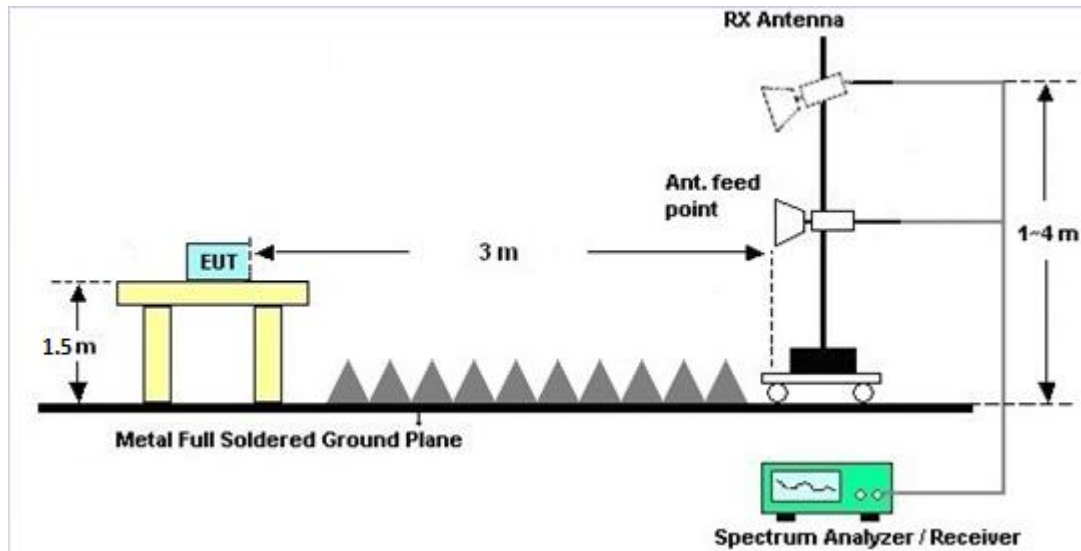
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz

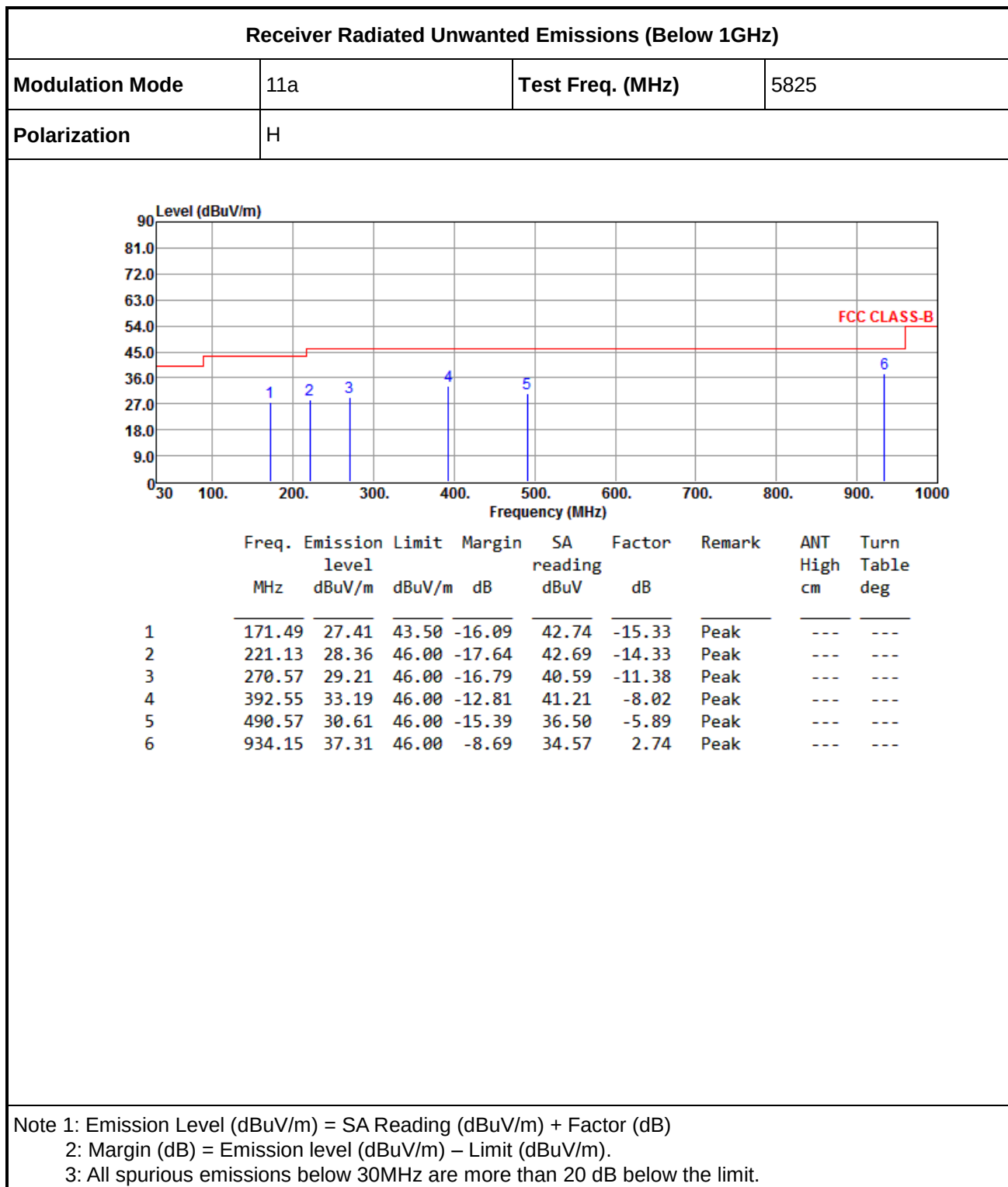


3.5.5 Test Result of Receiver Radiated Spurious Emissions (9kHz ~ 30MHz)

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 NCC LP0002 section 5.13 was not reported.

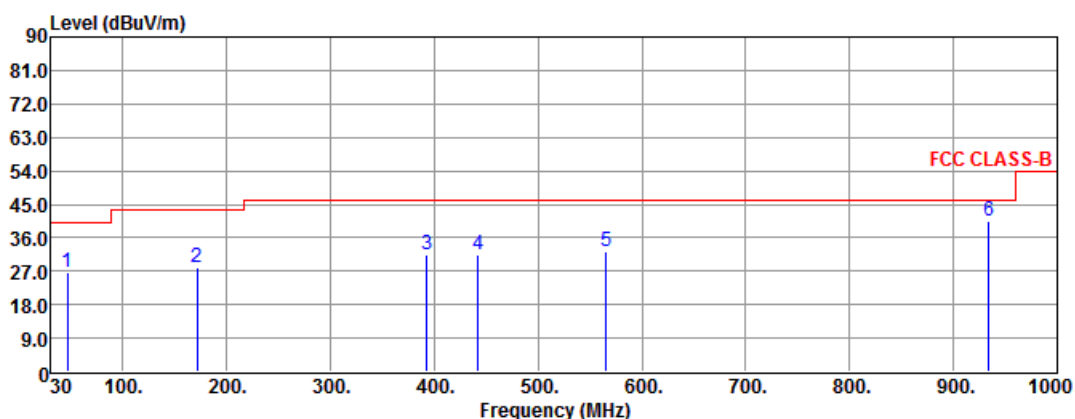
There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

3.5.6 Test Result of Receiver Radiated Unwanted Emissions (Below 1GHz)



Receiver Radiated Unwanted Emissions (Below 1GHz)

Modulation Mode	11a	Test Freq. (MHz)	5825
Polarization	V		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	46.52	26.78	40.00	-13.22	42.62	-15.84	Peak	---	---
2	171.66	28.13	43.50	-15.37	43.47	-15.34	Peak	---	---
3	392.54	31.42	46.00	-14.58	39.44	-8.02	Peak	---	---
4	442.47	31.46	46.00	-14.54	38.42	-6.96	Peak	---	---
5	565.47	32.33	46.00	-13.67	35.85	-3.52	Peak	---	---
6	934.14	40.36	46.00	-5.64	37.62	2.74	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor (dB)

2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

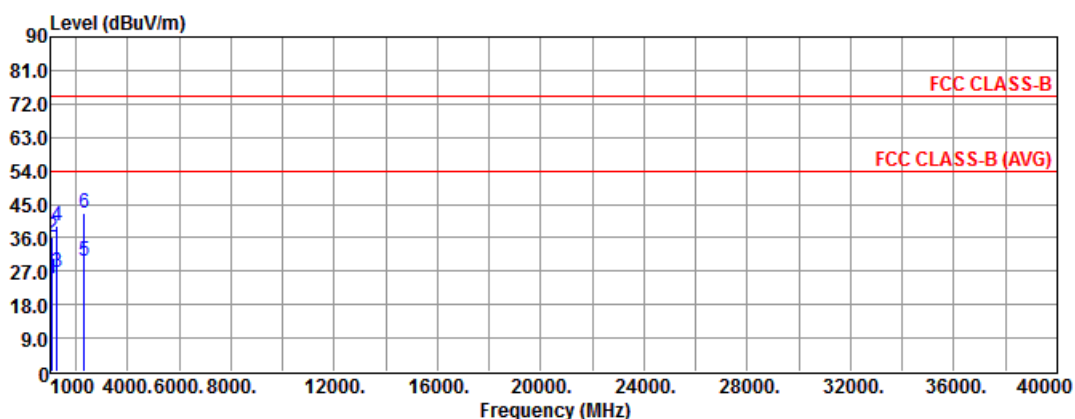
3: All spurious emissions below 30MHz are more than 20 dB below the limit.

3.5.7 Test Result of Receiver Radiated Unwanted Emissions (Above 1GHz)

Receiver Radiated Unwanted Emissions (Above 1GHz)									
Modulation Mode	11a				Test Freq. (MHz)		5825		
Polarization	H								
Level (dBuV/m) </									

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11a	Test Freq. (MHz)	5825
Polarization	V		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1082.00	24.85	54.00	-29.15	29.98	-5.13	Average	100	93
2	1082.00	36.33	74.00	-37.67	41.46	-5.13	Peak	100	93
3	1278.00	26.79	54.00	-27.21	30.17	-3.38	Average	105	66
4	1278.00	39.13	74.00	-34.87	42.51	-3.38	Peak	105	66
5	2316.00	29.83	54.00	-24.17	27.91	1.92	Average	100	71
6	2316.00	42.75	74.00	-31.25	40.83	1.92	Peak	100	71

Note 1: Emission level (dBuV/m) = SA reading (dBuV) + Factor (dB).
 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
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.

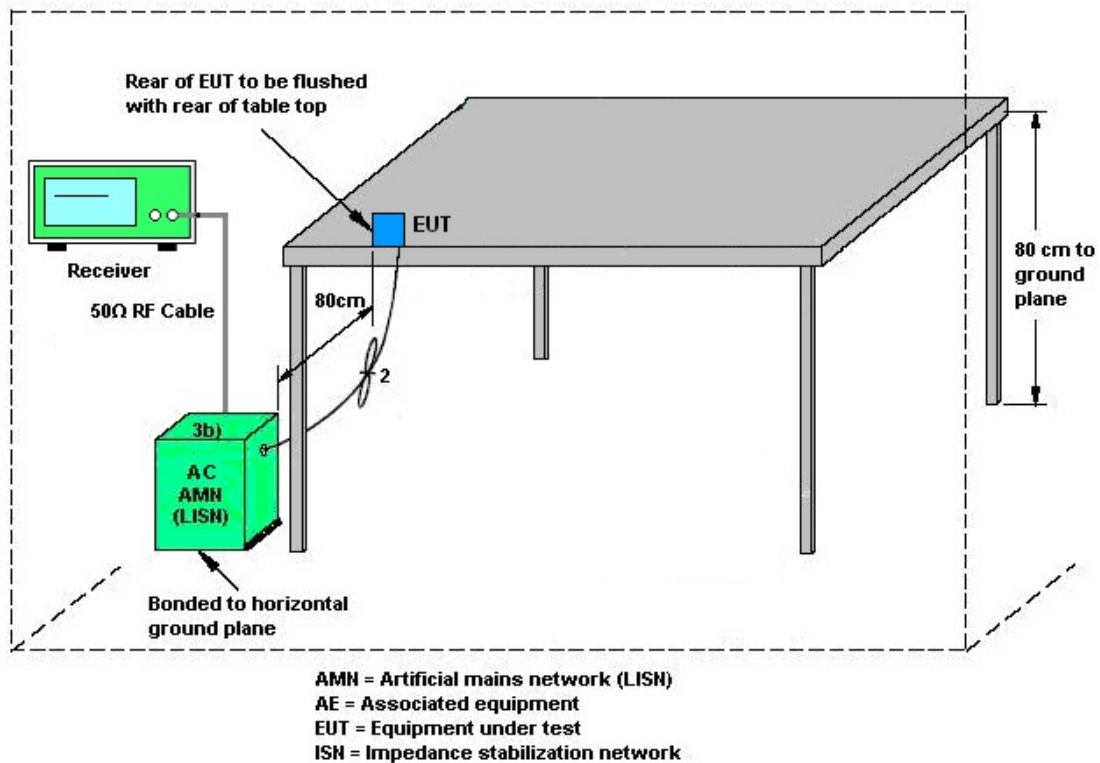
3.6.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

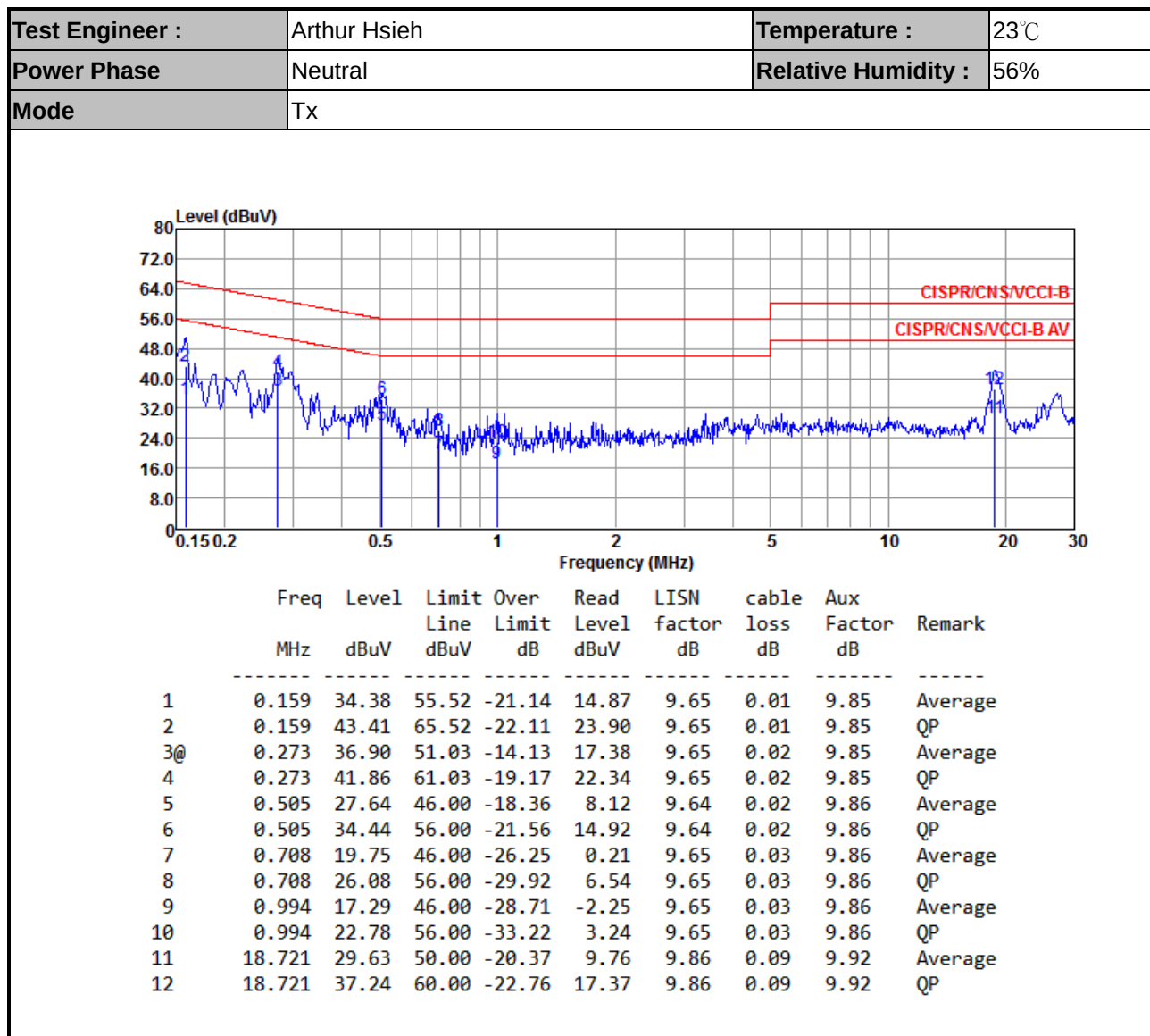
3.6.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF bandwidth = 9kHz) with Maximum Hold Mode.

3.6.4 Test Setup

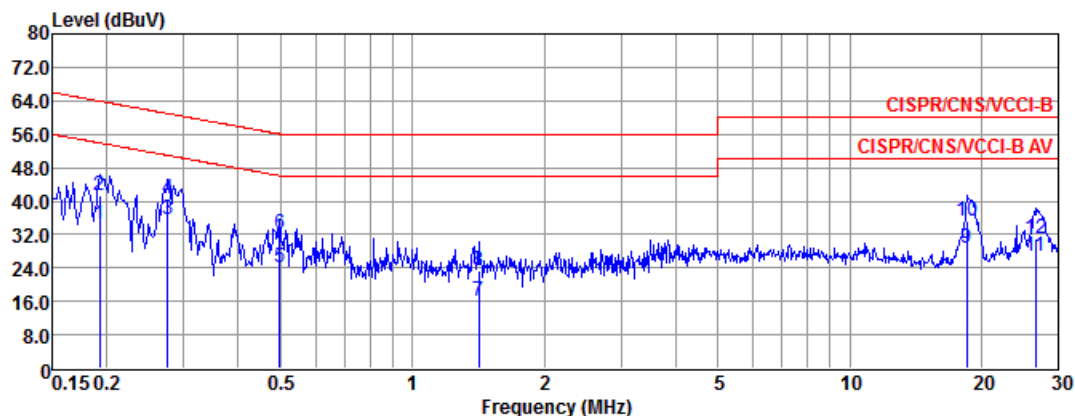


3.6.5 Test Result of AC Conducted Emission





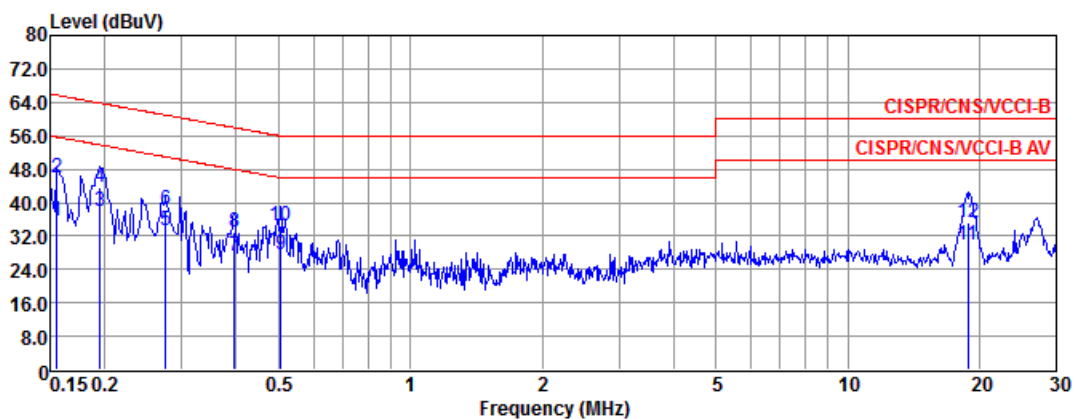
Test Engineer :	Arthur Hsieh	Temperature :	23°C
Power Phase	Line	Relative Humidity :	56%
Mode	Tx		



	Freq MHz	Level dBuV	Limit dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Aux Factor dB	Remark
1	0.192	34.54	53.93	-19.39	15.03	9.65	0.01	9.85	Average
2	0.192	41.44	63.93	-22.49	21.93	9.65	0.01	9.85	QP
3@	0.276	35.48	50.94	-15.46	15.96	9.65	0.02	9.85	Average
4	0.276	40.61	60.94	-20.33	21.09	9.65	0.02	9.85	QP
5	0.497	24.03	46.05	-22.02	4.50	9.65	0.02	9.86	Average
6	0.497	32.14	56.05	-23.91	12.61	9.65	0.02	9.86	QP
7	1.418	16.26	46.00	-29.74	-3.31	9.67	0.04	9.86	Average
8	1.418	23.27	56.00	-32.73	3.70	9.67	0.04	9.86	QP
9	18.524	28.54	50.00	-21.46	8.75	9.78	0.09	9.92	Average
10	18.524	35.16	60.00	-24.84	15.37	9.78	0.09	9.92	QP
11	26.558	26.77	50.00	-23.23	6.95	9.76	0.11	9.95	Average
12	26.558	30.85	60.00	-29.15	11.03	9.76	0.11	9.95	QP



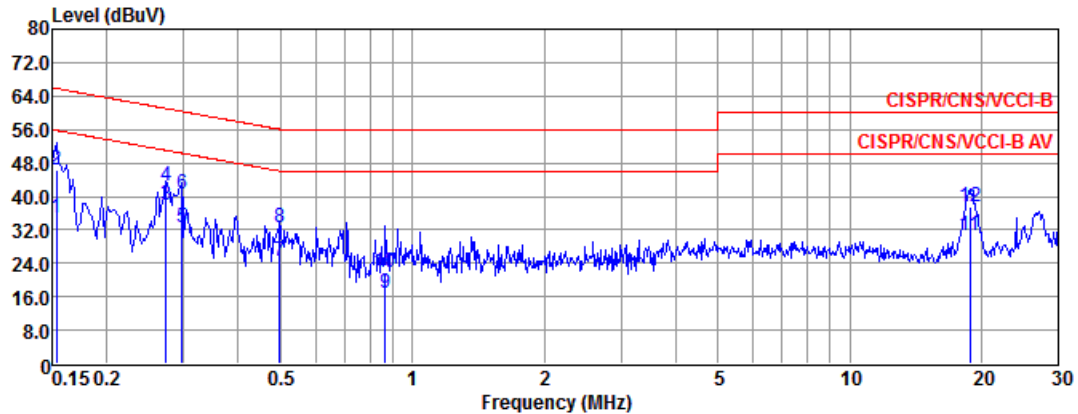
Test Engineer :	Arthur Hsieh	Temperature :	23°C
Power Phase	Neutral	Relative Humidity :	56%
Mode	Rx		



	Freq MHz	Level dBuV	Limit dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Aux Factor dB	Remark
1	0.156	35.56	55.69	-20.13	16.05	9.65	0.01	9.85	Average
2	0.156	46.03	65.69	-19.66	26.52	9.65	0.01	9.85	QP
3@	0.195	37.78	53.80	-16.02	18.27	9.65	0.01	9.85	Average
4	0.195	43.63	63.80	-20.17	24.12	9.65	0.01	9.85	QP
5	0.276	33.22	50.94	-17.72	13.70	9.65	0.02	9.85	Average
6	0.276	38.41	60.94	-22.53	18.89	9.65	0.02	9.85	QP
7	0.396	27.25	47.95	-20.70	7.74	9.64	0.02	9.85	Average
8	0.396	33.09	57.95	-24.86	13.58	9.64	0.02	9.85	QP
9	0.505	27.63	46.00	-18.37	8.11	9.64	0.02	9.86	Average
10	0.505	34.48	56.00	-21.52	14.96	9.64	0.02	9.86	QP
11	18.820	29.82	50.00	-20.18	9.95	9.86	0.09	9.92	Average
12	18.820	35.23	60.00	-24.77	15.36	9.86	0.09	9.92	QP



Test Engineer :	Arthur Hsieh	Temperature :	23°C
Power Phase	Line	Relative Humidity :	56%
Mode	Rx		



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Aux Factor dB	Remark
1	0.153	34.73	55.82	-21.09	15.21	9.66	0.01	9.85	Average
2	0.153	46.42	65.82	-19.40	26.90	9.66	0.01	9.85	QP
3@	0.273	37.96	51.03	-13.07	18.44	9.65	0.02	9.85	Average
4	0.273	42.54	61.03	-18.49	23.02	9.65	0.02	9.85	QP
5	0.297	32.65	50.32	-17.67	13.12	9.65	0.02	9.86	Average
6	0.297	40.62	60.32	-19.70	21.09	9.65	0.02	9.86	QP
7	0.497	24.34	46.05	-21.71	4.81	9.65	0.02	9.86	Average
8	0.497	32.47	56.05	-23.58	12.94	9.65	0.02	9.86	QP
9	0.866	17.02	46.00	-28.98	-2.53	9.66	0.03	9.86	Average
10	0.866	21.88	56.00	-34.12	2.33	9.66	0.03	9.86	QP
11	18.820	30.79	50.00	-19.21	11.00	9.78	0.09	9.92	Average
12	18.820	37.55	60.00	-22.45	17.76	9.78	0.09	9.92	QP

3.7 Automatically Discontinue Transmission

3.7.1 Limit of Automatically Discontinue Transmission

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

3.7.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.7.3 Test Result of Automatically Discontinue Transmission

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

3.8 Antenna Requirements

3.8.1 Standard Applicable

If transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.8.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.8.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

3.9 Maximum Power Density

3.9.1 RF Exposure Limit Introduction

According to NCC LP0002, the criteria listed in Table shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §5.20.2.1 and §5.20.2.2.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna

3.9.2 Standalone Power Density Calculation

Frequency Range (MHz)	Maximum Conducted Power (dBm)	Rated Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
5745 ~ 5825	8.43	8.50	4.3	20	0.004	1



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Nov. 23, 2017	Jun. 28, 2018 Jul. 01, 2018	Nov. 22, 2018	Radiation (03CH15-HY)
Preamplifier	Jet-Power	JPA00101800-30-10P	1601180002	1GHz~18GHz	Jul. 31, 2017	Jun. 28, 2018 Jul. 01, 2018	Jul. 30, 2018	Radiation (03CH15-HY)
Amplifier	SONOMA	310N	363440	9kHz~1GHz	Dec. 26, 2017	Jun. 28, 2018 Jul. 01, 2018	Dec. 25, 2018	Radiation (03CH15-HY)
Bilog Antenna	TESEQ	CBL6111D&00800N1D01N-06	41912&05	30MHz to 1GHz	Jan. 10, 2018	Jun. 28, 2018 Jul. 01, 2018	Jan. 09, 2019	Radiation (03CH15-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY54130085	20Hz ~ 8.4GHz	Oct. 31, 2017	Jun. 28, 2018 Jul. 01, 2018	Oct. 30, 2018	Radiation (03CH15-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1620	1G~18GHz	Oct. 03, 2017	Jun. 28, 2018 Jul. 01, 2018	Oct. 02, 2018	Radiation (03CH15-HY)
Hygrometer	TECPEL	DTM-303B	TP162976	N/A	Oct. 12, 2017	Jun. 28, 2018 Jul. 01, 2018	Oct. 11, 2018	Radiation (03CH15-HY)
Preamplifier	Keysight	83017A	MY53270195	1GHz~26.5GHz	Aug. 21, 2017	Jun. 28, 2018 Jul. 01, 2018	Aug. 20, 2018	Radiation (03CH15-HY)
Spectrum Analyzer	Agilent	E4446A	MY50180136	3Hz~44GHz	Apr. 25, 2018	Jun. 28, 2018 Jul. 01, 2018	Apr. 24, 2019	Radiation (03CH15-HY)
Controller	ChainTek	3000-1	N/A	Control Turn table & Ant Mast	N/A	Jun. 28, 2018 Jul. 01, 2018	N/A	Radiation (03CH15-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Jun. 28, 2018 Jul. 01, 2018	N/A	Radiation (03CH15-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Jun. 28, 2018 Jul. 01, 2018	N/A	Radiation (03CH15-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 27, 2017	Jun. 28, 2018 Jul. 01, 2018	Nov. 26, 2018	Radiation (03CH15-HY)
Software	Audix	E3 6.2009-8-24	RK-001042	N/A	N/A	Jun. 28, 2018 Jul. 01, 2018	N/A	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER / MTJ Cooperation	SUCOFLEX 104 / 000000-MT18 A-100	MY36980/4, MY9838/4 PE, D3210	30MHz~1GHz	Mar. 15, 2018	Jun. 28, 2018 Jul. 01, 2018	Mar. 14, 2019	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER / MTJ Cooperation	SUCOFLEX 104 / 000000-MT18 A-100	MY36980/4, MY9838/4 PE, D3210	1GHz~18GHz	Mar. 15, 2018	Jun. 28, 2018 Jul. 01, 2018	Mar. 14, 2019	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30M~40GHz	Oct. 17, 2017	Jun. 28, 2018 Jul. 01, 2018	Oct. 16, 2018	Radiation (03CH15-HY)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Jul. 05, 2018	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	3.6GHz	Dec. 08, 2017	Jul. 05, 2018	Dec. 07, 2018	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Mar. 06, 2018	Jul. 05, 2018	Mar. 05, 2019	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 30, 2017	Jul. 05, 2018	Nov. 29, 2018	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Dec. 08, 2017	Jul. 05, 2018	Dec. 07, 2018	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Jul. 05, 2018	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Jan. 03, 2018	Jul. 05, 2018	Jan. 02, 2019	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Jan. 03, 2018	Jul. 05, 2018	Jan. 02, 2019	Conduction (CO05-HY)



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Meter	Anritsu	ML2495A	1240001	N/A	Sep. 07, 2017	Jun. 02~Jul. 04, 2018	Sep. 06, 2018	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	1207349	300MHz~40GHz	Sep. 07, 2017	Jun. 02~Jul. 04, 2018	Sep. 06, 2018	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100057	9kHz-40GHz	Nov. 21, 2017	Jun. 02~Jul. 04, 2018	Nov. 20, 2018	Conducted (TH05-HY)
Switch Box & RF Cable	Burgeon	ETF-058	EC130048 4	N/A	Mar. 01, 2018	Jun. 02~Jul. 04, 2018	Feb. 28, 2019	Conducted (TH05-HY)

5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.70
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.20
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.00
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.20
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