



FCC PART 15E TEST REPORT No.24T04Z200327-003

for

Samsung Electronics Co., Ltd.

Multi-band GSM/WCDMA/LTE Tablet with Bluetooth,WLAN

SM-X117U

FCC ID:ZCASM117U

with

Hardware Version: REV1.0

Software Version: X117U.001

Issued Date: 2025-02-12

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

Test Laboratory:

CTTL-Telecommunication Technology Labs, CAICT

No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191.

Tel:+86(0)10-62304633-2512, Fax:+86(0)10-62304633-2504

Email: ctl_terminals@caict.ac.cn, website: www.caict.ac.cn

REPORT HISTORY

Report Number	Revision	Description	Issue Date
24T04Z200327-003	Rev.0	1st edition	2025-02-12

Note: the latest revision of the test report supersedes all previous version.

CONTENTS

CONTENTS	3
1. TEST LABORATORY	5
1.1. INTRODUCTION & ACCREDITATION	5
1.2. TESTING LOCATION	5
1.3. TESTING ENVIRONMENT	5
1.4. PROJECT DATE	5
1.5. SIGNATURE	5
2. CLIENT INFORMATION	6
2.1. APPLICANT INFORMATION	6
2.2. MANUFACTURER INFORMATION	6
3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE)	7
3.1. ABOUT EUT	7
3.2. INTERNAL IDENTIFICATION OF EUT USED DURING THE TEST	7
3.3. INTERNAL IDENTIFICATION OF AE USED DURING THE TEST	7
3.4. GENERAL DESCRIPTION	7
4. REFERENCE DOCUMENTS	8
4.1. DOCUMENTS SUPPLIED BY APPLICANT	8
4.2. REFERENCE DOCUMENTS FOR TESTING	8
5. LABORATORY ENVIRONMENT	8
6. TEST RESULTS	9
6.1. SUMMARY OF TEST RESULTS	9
6.2. STATEMENTS	9
6.3. TEST CONDITIONS	9
7. TEST FACILITIES UTILIZED	10
8. MEASUREMENT UNCERTAINTY	11
8.1. TRANSMITTER OUTPUT POWER	11
8.2. PEAK POWER SPECTRAL DENSITY	11
8.3. 6dB EMISSION BANDWIDTH	11
8.4. BAND EDGES COMPLIANCE	11
8.5. SPURIOUS EMISSIONS	11
8.6. RADIATED UNWANTED EMISSION	11
8.7. AC POWER-LINE CONDUCTED EMISSION	11
ANNEX A: MEASUREMENT RESULTS	12
A.1. MEASUREMENT METHOD	12
A.2. MAXIMUM PEAK OUTPUT POWER	13

A.2.1 ANTENNA GAIN	13
A.2.2. MAXIMUM AVERAGE OUTPUT POWER-CONDUCTED	13
A.3. PEAK POWER SPECTRAL DENSITY	17
A.4. 6dB EMISSION BANDWIDTH	18
A.5. RADIATED UNWANTED EMISSION	23
A.5.1 LIMITS	23
A.5.2 TEST SETUP	24
A.5.3 TEST PROCEDURES	25
A.5.4 CALCULATION	25
A.6. AC POWERLINE CONDUCTED EMISSION	43
A.6.1 SUMMARY	43
A.6.2 METHOD OF MEASUREMENT	43
A.6.3 TEST CONDITION	43
A.6.4 TEST SETUP	43
A.6.5 MEASUREMENT RESULT AND LIMIT	44
A.7. ANTENNA REQUIREMENT	47
ANNEX B: EUT PARAMETERS	47
ANNEX C: ACCREDITATION CERTIFICATE	47

1. Test Laboratory

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2017 accredited test laboratory under American Association for Laboratory Accreditation (A2LA) with lab code 7049.01, and is also an FCC accredited test laboratory (CN1349), and ISED accredited test laboratory (CAB identifier:CN0066). The detail accreditation scope can be found on A2LA website.

1.2. Testing Location

Conducted testing Location: CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing,
P. R. China100191

Radiated testing Location: CTTL (BDA)

Address: No.18A, Kangding Street, Beijing Economic-Technology
Development Area, Beijing, P. R. China 100176

1.3. TestingEnvironment

Normal Temperature: 15-35°C

Relative Humidity: 20-75%

1.4. Project date

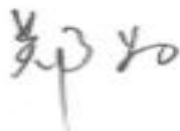
Testing Start Date: 2024-12-18

Testing End Date: 2025-02-12

1.5. Signature



Yao Xingyu
(Prepared this test report)



Zheng Wei
(Reviewed this test report)



Pang Shuai
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name: Samsung Electronics Co., Ltd.
Address: 19 Chapin Rd., Building D Pine Brook, NJ 07058
Contact: Jenni Chun
Email: j1.chun@samsung.com
Telephone: +1-201-937-4203
Fax: /

2.2. Manufacturer Information

Company Name: Samsung Electronics Co., Ltd.
Address: 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Republic of Korea
Contact: Kobe Cho
Email: ggobi.cho@samsung.com
Telephone: +82 - 10 - 2722 - 4159
Fax: /

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	Multi-band GSM/WCDMA/LTE Tablet with Bluetooth,WLAN
Model name	SM-X117U
FCC ID	ZCASM117U
WLAN Frequency Band	ISM Band: 5725MHz~5850MHz
Type of modulation	OFDM
Normal Voltage	3.82V
Extreme High Voltage	4.4V
Extreme Low Voltage	3.45V

3.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version	Date of receipt
UT20a	2404200327UT20a	REV1.0	X117U.001	2025-01-09
UT06a	2404200327UT06a	REV1.0	X117U.001	2024-12-18

*EUT ID: is used to identify the test sample in the lab internally.

UT20a is used for Conduction test, UT06a is used for Radiation test.

3.3. Internal Identification of AE used during the test

AE ID*	Name	Model	Manufacturer
AE1	Battery	HQ-6739SDS	SCUD(Fujian) Electronics Co., LTD.
AE2*	Adapter	EP-T1510	DONGYANG
AE3	Date Cable C-C	EP-DN980BWE	Cresyn Electronics(Dongguan)co;Ltd.

*AE ID: is used to identify the test sample in the lab internally.

*AE2 is not the AE for EUT, provided by the lab for relevant tests.

3.4. General Description

Equipment Under Test (EUT) is a model of Multi-band GSM/WCDMA/LTE Tablet with Bluetooth,WLAN with integrated antenna. It consists of normal options: Battery and Charger.

Manual and specifications of the EUT were provided to fulfil the test.

Samples undergoing test were selected by the Client.

4. Reference Documents

4.1. Documents supplied by applicant

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

FCC Part15	FCC CFR 47, Part 15, Subpart C and E:	
	15.205 Restricted bands of operation;	2021
	15.209 Radiated emission limits, general requirements;	
	15.407 General technical requirements	
ANSI C63.10	Methods of Measurement of Radio-Noise Emissions from	
	Low-Voltage Electrical and Electronic Equipment in the	2013
	Range of 9 kHz to 40 GHz	
UNII: KDB 789033	General U-NII Test Procedures New Rules v02r01	2017-12
D02		

Note:UNII: KDB 789033 D02 is not in the scope of ISO/IEC 17025 accreditation by A2LA.

5. Laboratory Environment

Conducted RF performance testing is performed in shielding room.

EMC performance testing is performed in Semi-anechoic chamber.

6. Test Results

6.1. Summary of Test Results

SUMMARY OF MEASUREMENT RESULTS	Sub-clause of Part15E	Sub-clause of IC	Verdict
Maximum Peak Output Power	15.407 (a)	/	P
Peak Power Spectral Density	15.407 (a)	/	P
6dB Emission Bandwidth	15.407 (e)	/	P
Radiated Unwanted Emission	15.407, 15.205, 15.209	/	P
AC Powerline Conducted Emission	15.107, 15.207	/	P

Please refer to **ANNEX A** for detail.

Terms used in Verdict column

P	Pass, The EUT complies with the essential requirements in the standard.
NM	Not measured, The test was not measured by CTTL
NA	Not Applicable, The test was not applicable
F	Fail, The EUT does not comply with the essential requirements in the standard

6.2. Statements

CTTL has evaluated the test cases as listed in section 6.1 of this report for the EUT specified in section 3 according to the standards or reference documents listed in section 4.

This report only deals with the WLAN function among the features described in section 3.

6.3. Test Conditions

For this report, all the test cases are tested under normal temperature and normal voltage, and also under norm humidity, the specific condition is shown as follows:

Temperature	26°C
Voltage	3.82V
Humidity	44%

7. Test Facilities Utilized

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Vector Signal Analyzer	FSW67	104051	Rohde & Schwarz	1 year	2025-04-30
2	Attenuator	10dB/2W	/	Rosenberger	/	/
3	Shielding Room	S81	/	ETS-Lindgren	/	/

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Test Receiver	ESU26	100376	R&S	1 year	2025-06-06
2	Test Receiver	ESW44	103015	R&S	1 year	2025-02-18
3	Loop Antenna	HFH2-Z2	829324/007	R&S	2 years	2026-01-04
4	EMI Antenna	VULB9163	235	Schwarzbeck	1 year	2025-08-27
5	EMI Antenna	3117	00058888	ETS-Lindgren	1 year	2025-09-18
6	EMI Antenna	LB-180400 -25-C-KF	21100840000 06	A-INFO	1 year	2025-05-15

AC Power Line Conducted Emission

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	LISN	ENV216	101459	R&S	1 year	2025-05-16
2	Test Receiver	ESCI	100766	R&S	1 year	2025-04-18

8. Measurement Uncertainty

8.1. Transmitter Output Power

Measurement Uncertainty: 0.387dB,k=1.96

8.2. Peak Power Spectral Density

Measurement Uncertainty: 0.705dB,k=1.96

8.3. 6dB Emission Bandwidth

Measurement Uncertainty: 60.80Hz,k=1.96

8.4. Band Edges Compliance

Measurement Uncertainty : 0.62dB,k=1.96

8.5. Spurious Emissions

Conducted (k=1.96)

Frequency Range	Uncertainty(dB)
$30\text{MHz} \leq f \leq 2\text{GHz}$	1.22
$2\text{GHz} \leq f \leq 3.6\text{GHz}$	1.22
$3.6\text{GHz} \leq f \leq 8\text{GHz}$	1.22
$8\text{GHz} \leq f \leq 12.75\text{GHz}$	1.51
$12.75\text{GHz} \leq f \leq 26\text{GHz}$	1.51
$26\text{GHz} \leq f \leq 40\text{GHz}$	1.59

8.6. Radiated Unwanted Emission

Frequency Range	Uncertainty(dB)
9kHz-30MHz	3.96
$30\text{MHz} \leq f \leq 1\text{GHz}$	5.73
$1\text{GHz} \leq f \leq 18\text{GHz}$	5.62
$18\text{GHz} \leq f \leq 40\text{GHz}$	3.52

8.7. AC Power-line Conducted Emission

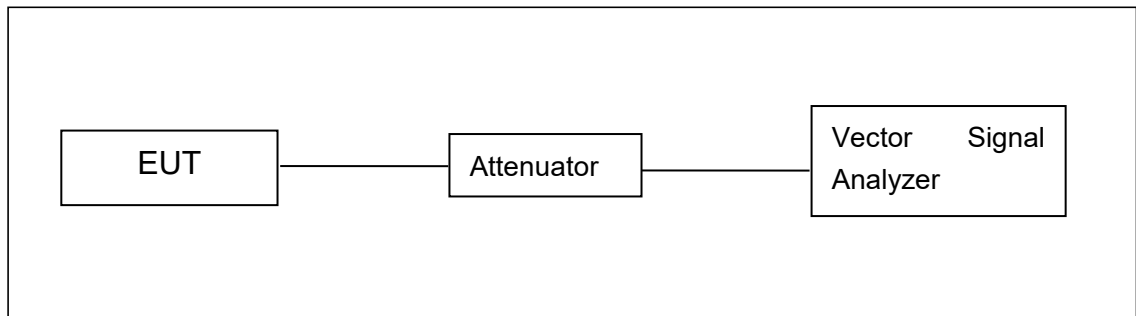
Measurement Uncertainty: 3.10dB, k=2

ANNEX A: MEASUREMENT RESULTS

A.1. Measurement Method

A.1.1. Conducted Measurements

- 1). Connect the EUT to the test system correctly.
- 2). Set the EUT to the required work mode.
- 3). Set the EUT to the required channel.
- 4). Set the spectrum analyzer to start measurement.
- 5). Record the values. Vector Signal Analyzer



A.1.2. Radiated Emission Measurements

Measurement performed according to Clause 6.4, 6.5, 6.6 in ANSI C63.10 and II.G.4, II.G.5, II.G.6 in KDB 789033.

The radiated emission test is performed in semi-anechoic chamber. The EUT was placed on a non-conductive table with 80cm above the ground plane for measurement below 1GHz and 1.5m above the ground plane for measurement above 1GHz. The measurement antenna was placed at a distance of 3 meters from the EUT. The test is carried out on both vertical and horizontal polarization and only maximization result of both polarizations is kept. During the test, the turntable is rotated from 0° to 360° and the measurement antenna is moved from 1m to 4m to get the maximization result. The maximization process was repeated with the EUT positioned in each of its three orthogonal orientations

A.2. Maximum Peak Output Power

Measurement Limit and Method:

Standard	Limit (dBm)
FCC CRF Part 15.407(a)	< 30

Set span to encompass the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.

Set RBW = 1 MHz.

Set VBW $\geq$ 3 MHz.

Number of points in sweep $\geq 2 \times \text{span} / \text{RBW}$.

Sweep time = auto.

Detector = power averaging (rms)

Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed to ensure that the average accurately represents the true average over the on and off periods of the transmitter.

Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal. Add 10 log (1/x), where x is the duty cycle

A.2.1 Antenna Gain

Antenna gain is -1.2dBi and the value is supplied by the applicant or manufacturer.

A.2.2. Maximum Average Output Power-Conducted

EUT ID: UT20a

Measurement Results:

802.11a mode

Mode	Data Rate (Mbps)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11a	6	13.83	13.69	13.36
	9	13.82	/	/
	12	13.78	/	/
	18	13.83	/	/
	24	13.76	/	/
	36	13.65	/	/
	48	13.68	/	/
	54	13.66	/	/

The data rate 6Mbps is selected as worst condition, and the following cases are performed with this condition.

802.11n-HT20 mode

Mode	Data Rate (Index)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11n (20MHz)	MCS0	13.58	13.31	13.04
	MCS1	13.55	/	/
	MCS2	13.53	/	/
	MCS3	13.50	/	/
	MCS4	13.44	/	/
	MCS5	13.52	/	/
	MCS6	13.53	/	/
	MCS7	13.43	/	/

The data rate MCS0 is selected as worst condition, and the following cases are performed with this condition.

802.11ac-VHT20 mode

Mode	Data Rate (Index)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11ac (20MHz)	MCS0	13.67	13.28	13.05
	MCS1	13.63	/	/
	MCS2	13.49	/	/
	MCS3	13.66	/	/
	MCS4	13.52	/	/
	MCS5	13.62	/	/
	MCS6	13.47	/	/
	MCS7	13.67	/	/
	MCS8	13.65	/	/

The data rate MCS0 is selected as worst condition, and the following cases are performed with this condition.

802.11n-HT40 mode

Mode	Data Rate (Index)	Test Result (dBm)	
		5755MHz (Ch151)	5795MHz (Ch159)
802.11n (40MHz)	MCS0	13.32	12.95
	MCS1	13.18	/
	MCS2	13.06	/
	MCS3	13.32	/
	MCS4	13.25	/
	MCS5	13.30	/

	MCS6	13.10	/
	MCS7	13.26	/

The data rate MCS0 is selected as worst condition, and the following cases are performed with this condition.

802.11ac-VHT40 mode

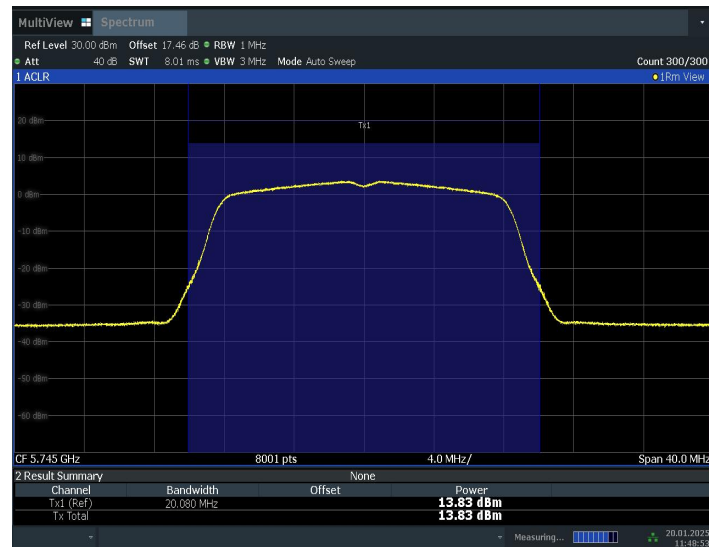
Mode	Data Rate (Index)	Test Result (dBm)	
		5755MHz (Ch151)	5795MHz (Ch159)
802.11ac (40MHz)	MCS0	13.33	12.98
	MCS1	13.30	/
	MCS2	13.08	/
	MCS3	13.12	/
	MCS4	13.30	/
	MCS5	13.06	/
	MCS6	13.02	/
	MCS7	13.28	/
	MCS8	13.26	/
	MCS9	13.18	/

The data rate MCS0 is selected as worst condition, and the following cases are performed with this condition.

802.11ac-VHT80 mode

Mode	Data Rate (Index)	Test Result (dBm)
		5775MHz (Ch155)
802.11ac (80MHz)	MCS0	13.94
	MCS1	13.82
	MCS2	13.72
	MCS3	13.71
	MCS4	13.86
	MCS5	13.89
	MCS6	13.92
	MCS7	13.93
	MCS8	13.91
	MCS9	13.94

The data rate MCS0 is selected as worst condition, and the following cases are performed with this condition.

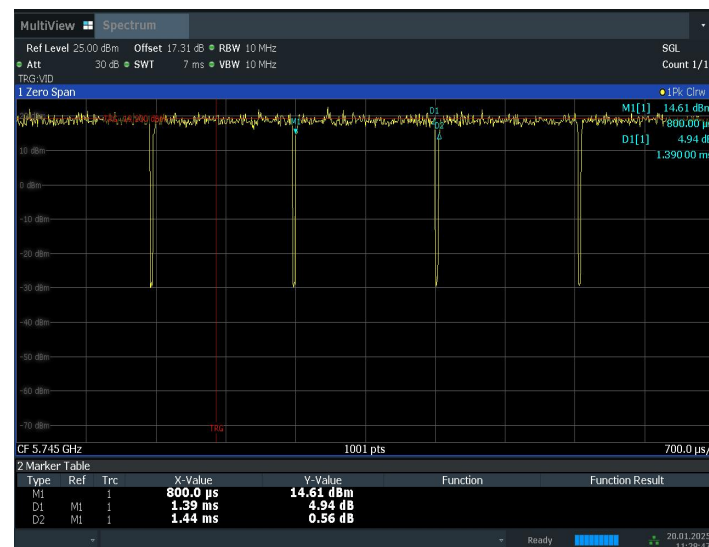


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Maximum output Power: 11a CH149

The duty cycle of all mode

Mode	802.11a	802.11n20	802.11ac20	802.11n40	802.11ac40	802.11ac80
Duty Cycle	97%	97%	97%	95%	95%	90%



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Conclusion: PASS

A.3. Peak Power Spectral Density

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.407(a)	< 30 dBm/500 kHz

Set span to encompass the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.

Set RBW = 500 kHz.

Set VBW ≥ 3 MHz.

Number of points in sweep ≥ 2 × span / RBW.

Sweep time = auto.

Detector = power averaging (rms)

Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed to ensure that the average accurately represents the true average over the on and off periods of the transmitter. Use the peak search function on the instrument to find the peak of the spectrum and record its value. Add 10 log (1/x), where x is the duty cycle.

Measurement Uncertainty:

Measurement Uncertainty	0.75dB
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EUT ID: UT20a

Measurement Results:

TestMode	Frequency[MHz]	Result [dBm/MHz]	Limit[dBm/MHz]	Verdict
11A	5745	0.56	≤30.00	PASS
	5785	0.43	≤30.00	PASS
	5825	0.26	≤30.00	PASS
11AC20SISO	5745	0.30	≤30.00	PASS
	5785	0.04	≤30.00	PASS
	5825	-0.06	≤30.00	PASS
11AC40SISO	5755	-2.62	≤30.00	PASS
	5795	-3.20	≤30.00	PASS
11AC80SISO	5775	-5.42	≤30.00	PASS



Peak Power Spectral Density:11a CH149

Conclusion: PASS

A.4. 6dB Emission Bandwidth

Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.407 (e)	≥ 500

Set RBW = 100 kHz.

Set the video bandwidth (VBW) $\geq 3 \times$ RBW.

Detector = Peak.

Trace mode = max hold.

Sweep = auto couple.

Allow the trace to stabilize.

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.

Measurement Uncertainty:

Measurement Uncertainty	60.80Hz
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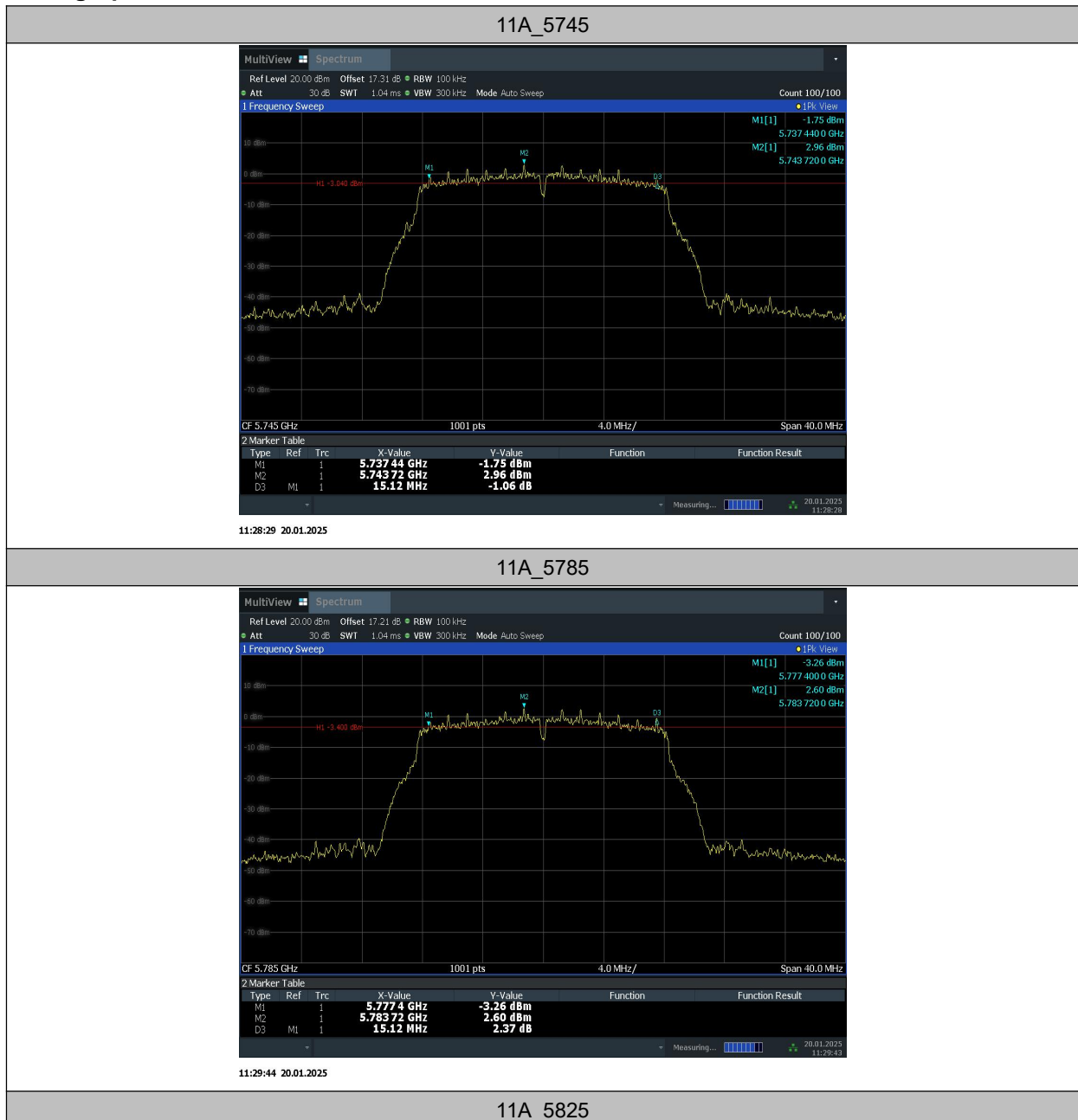
EUT ID: UT20a

Measurement Result:

TestMode	Frequency[MHz]	6db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	5745	15.12	5737.44	5752.56	0.5	PASS
	5785	15.12	5777.40	5792.52	0.5	PASS
	5825	15.16	5817.40	5832.56	0.5	PASS
11AC20SISO	5745	15.32	5737.24	5752.56	0.5	PASS

	5785	15.44	5777.44	5792.88	0.5	PASS
	5825	15.16	5817.40	5832.56	0.5	PASS
11AC40SISO	5755	35.12	5737.40	5772.52	0.5	PASS
	5795	35.12	5777.40	5812.52	0.5	PASS
11AC80SISO	5775	75.20	5737.40	5812.60	0.5	PASS

Test graphs as below:





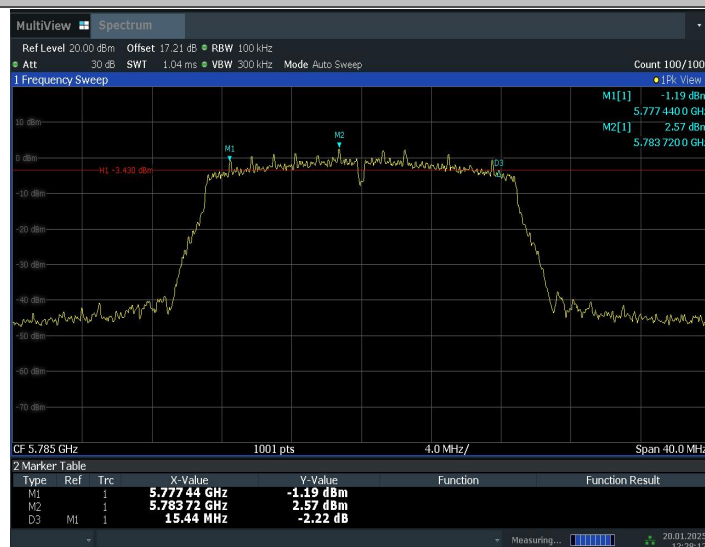
11:30:59 20.01.2025

11AC20SISO_5745



12:25:46 20.01.2025

11AC20SISO_5785



12:28:13 20.01.2025

11AC20SISO_5825



12:29:32 20.01.2025

11AC40SISO_5755



12:42:19 20.01.2025

11AC40SISO_5795



12:43:29 20.01.2025

11AC80SISO_5775



13:04:37 20.01.2025

Conclusion: PASS

A.5. Radiated Unwanted Emission

A.5.1 Limits

Unwanted Emissions in the unrestricted bands shall not exceed the limits that shown in 15.407:

Standard	Limit (dBm/MHz)	
FCC 47 CFR Part 15.407	at the band edge	27
	at 5 MHz above or below the band edge	15.6
	at 25 MHz above or below the band edge	10
	at 75 MHz or more above or below the band edge	-27
	Note: Increasing linearly from point to point.	

In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c))

Frequency (MHz)	Field strength(μ V/m)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30

Frequency of emission (MHz)	Field strength (μ V/m)	Field strength (dBuV/m)	Measurement distance (m)
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Note: When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor (as defined in KDB 789033 II.G.2.d).

A.5.2 Test setup

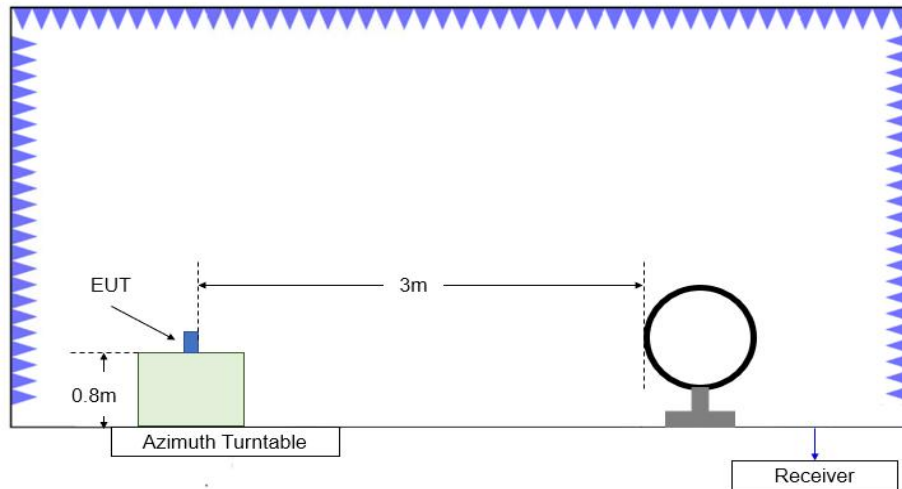


Figure A.5.1. Test Site Diagram (9kHz-30MHz)

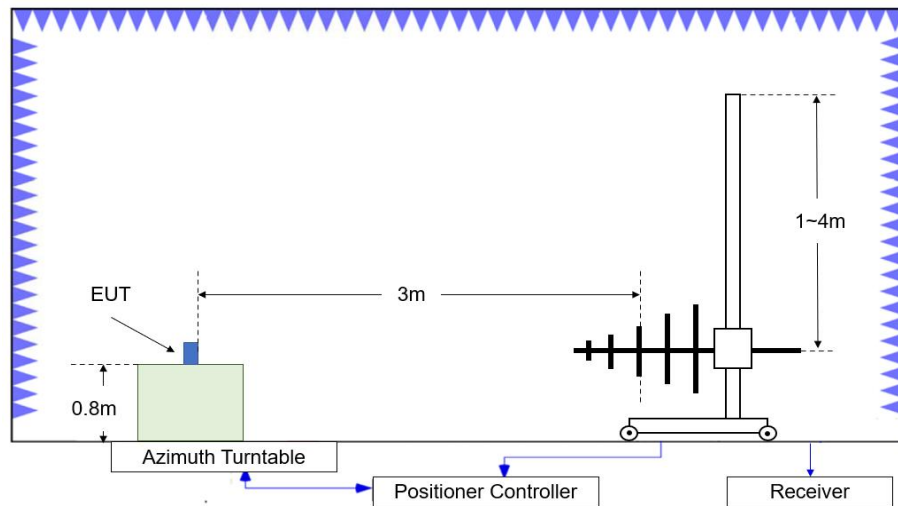


Figure A.5.2. Test Site Diagram (30MHz-1GHz)

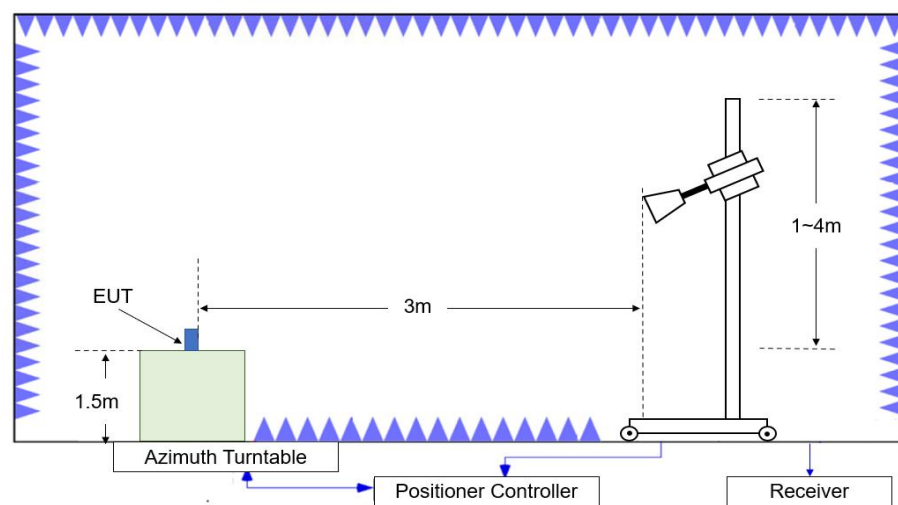


Figure A.5.3. Test Site Diagram (1GHz-40GHz)

A.5.3 Test Procedures

Radiated unwanted emissions from the EUT were measured according to ANSI C63.10 and KDB 789033.

Test setting

Frequency of emission (MHz)	RBW/VBW
30-1000	100kHz/300kHz
1000-4000	1MHz/3MHz
4000-18000	1MHz/3MHz
18000-26500	1MHz/3MHz
26500-40000	1MHz/3MHz

A.5.4 Calculation

1. The measurement results reported below is calculated by:

Measurement Results (dB μ V/m) = $P_{\text{measurement}}$ (dB μ V) + Cable Loss(dB) + Antenna Factor (dB/m)

Where: $P_{\text{measurement}}$ is the field strength recorded from the instrument

2. Convert the resultant EIRP level to an equivalent electric field strength using the following relationship:

$$E = \text{EIRP} - 20 \log(D) + 104.77$$

Where:

E is the field strength in dB μ V/m

D is the measurement distance in meters

EIRP is the equivalent isotropically radiated power in dBm

Test note

1. The EUT is operating at its maximum duty cycle and its maximum power control level.
2. Investigation has been done on all modes and modulations/data rates. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.
3. Spurious emissions for all channels were investigated and almost the same below 1GHz. According to FCC 47 CFR §15.31, emission levels are not report much lower than the limit by over 20dB
4. Measurement frequencies were performed from 9 kHz to 40GHz.

A.5.5 Measurement Result

Average Results:

Channel 149

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5434.125	45.7	-22.8	34.7	33.80	54.0	8.3	V
5456.875	45.5	-22.4	34.7	33.23	54.0	8.5	V
11490.000	36.5	-29.0	38.1	27.42	54.0	17.5	V
17711.000	42.5	-23.6	41.8	24.25	54.0	11.5	V
17798.500	42.8	-23.4	41.9	24.24	54.0	11.2	V
17928.000	42.9	-23.2	41.9	24.15	54.0	11.1	H

Channel 157

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5432.000	45.5	-22.7	34.7	33.58	54.0	8.5	V
5455.875	45.3	-22.5	34.7	33.11	54.0	8.7	V
11552.000	36.7	-29.5	38.2	27.98	54.0	17.3	V
17717.000	42.7	-23.4	41.8	24.33	54.0	11.3	H
17794.500	42.8	-23.4	41.9	24.30	54.0	11.2	V
17927.500	42.8	-23.2	41.9	24.12	54.0	11.2	H

Channel 165

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5370.625	45.4	-22.5	34.5	33.42	54.0	8.6	V
5457.625	45.5	-22.4	34.7	33.20	54.0	8.5	V
11650.000	36.1	-29.0	38.3	26.85	54.0	17.9	V
17755.500	42.6	-23.5	41.9	24.26	54.0	11.4	H
17925.500	42.8	-23.3	41.9	24.15	54.0	11.2	V
17799.500	42.6	-23.3	41.9	24.07	54.0	11.4	V

802.11n-HT20
Channel 149

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5371.375	46.0	-22.5	34.5	34.08	54.0	8.0	V
5457.625	45.4	-22.4	34.7	33.13	54.0	8.6	V
11490.000	36.5	-29.0	38.1	27.43	54.0	17.5	H
17714.000	42.9	-23.5	41.8	24.62	54.0	11.1	H
17795.500	42.6	-23.4	41.9	24.15	54.0	11.4	H
17931.000	42.8	-23.2	41.9	24.07	54.0	11.2	H

Channel 157

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5371.250	45.6	-22.5	34.5	33.64	54.0	8.4	V
5421.625	45.5	-22.6	34.6	33.47	54.0	8.5	V
11570.000	34.8	-30.1	38.2	26.70	54.0	19.2	V
17837.000	43.1	-23.5	41.9	24.62	54.0	10.9	V
17921.500	43.1	-23.4	42.0	24.56	54.0	10.9	V
17953.000	43.1	-23.6	41.9	24.78	54.0	10.9	H

Channel 165

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5371.500	45.7	-22.5	34.5	33.73	54.0	8.3	V
5453.125	45.4	-22.7	34.7	33.40	54.0	8.6	V
11650.000	35.9	-29.0	38.3	26.67	54.0	18.1	V
17706.500	42.5	-23.6	41.8	24.30	54.0	11.5	H
17770.500	42.6	-23.6	41.9	24.33	54.0	11.4	V
17926.000	42.7	-23.3	41.9	24.05	54.0	11.3	H

802.11n-HT40

Channel 151

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5368.250	45.7	-22.5	34.5	33.69	54.0	8.3	V
5413.875	45.3	-22.7	34.6	33.41	54.0	8.7	V
11510.000	35.2	-29.8	38.1	26.87	54.0	18.8	V
17749.000	42.5	-23.7	41.8	24.33	54.0	11.5	H
17836.500	42.3	-23.5	41.9	23.83	54.0	11.7	H
17925.500	42.5	-23.3	41.9	23.87	54.0	11.5	H

Channel 159

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5365.625	45.7	-22.6	34.5	33.77	54.0	8.3	V
5370.375	45.7	-22.5	34.5	33.71	54.0	8.3	V
11587.500	36.1	-29.5	38.2	27.44	54.0	17.9	H
17716.000	42.4	-23.4	41.8	24.04	54.0	11.6	H
17763.000	42.6	-23.5	41.9	24.17	54.0	11.4	H
17921.000	42.7	-23.4	42.0	24.11	54.0	11.3	V

802.11ac-HT20

Channel 149

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5364.750	45.6	-22.6	34.5	33.73	54.0	8.4	V
5456.125	45.6	-22.5	34.7	33.38	54.0	8.4	V
11490.000	36.5	-29.0	38.1	27.36	54.0	17.5	V
17742.000	42.4	-23.7	41.8	24.22	54.0	11.6	H
17802.500	42.2	-23.4	41.9	23.65	54.0	11.8	V
17925.000	42.3	-23.3	41.9	23.63	54.0	11.7	H

Channel 157

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5368.375	45.6	-22.5	34.5	33.63	54.0	8.4	V
5437.125	45.5	-22.9	34.7	33.70	54.0	8.5	V
11570.000	34.8	-30.1	38.2	26.73	54.0	19.2	V
17795.000	42.8	-23.4	41.9	24.34	54.0	11.2	H
17921.500	42.5	-23.4	42.0	23.94	54.0	11.5	V
17928.500	42.6	-23.2	41.9	23.92	54.0	11.4	V

Channel 165

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5368.125	45.8	-22.5	34.5	33.80	54.0	8.2	V
5437.875	45.4	-22.9	34.7	33.61	54.0	8.6	V
11650.000	36.0	-29.0	38.3	26.77	54.0	18.0	V
17706.000	42.6	-23.6	41.8	24.31	54.0	11.4	H
17783.500	42.4	-23.6	41.9	24.11	54.0	11.6	H
17882.500	42.3	-23.9	42.0	24.27	54.0	11.7	H

802.11ac-HT40

Channel 151

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5370.750	45.6	-22.5	34.5	33.58	54.0	8.4	V
5449.750	45.5	-22.9	34.7	33.69	54.0	8.5	V
11512.000	35.3	-29.9	38.1	27.03	54.0	18.7	H
17717.500	42.4	-23.4	41.8	23.99	54.0	11.6	H
17792.000	42.2	-23.5	41.9	23.81	54.0	11.8	V
17914.500	42.4	-23.4	42.0	23.80	54.0	11.6	V

Channel 159

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5365.750	45.9	-22.6	34.5	33.97	54.0	8.1	V
5421.875	45.6	-22.6	34.6	33.53	54.0	8.4	V
11590.000	35.5	-29.5	38.2	26.81	54.0	18.5	H
17744.000	42.6	-23.7	41.8	24.41	54.0	11.4	V
17797.500	42.6	-23.4	41.9	24.10	54.0	11.4	H
17924.000	42.5	-23.3	42.0	23.91	54.0	11.5	H

802.11ac-HT80

Channel 155

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5369.250	45.5	-22.5	34.5	33.48	54.0	8.5	V
5458.750	45.7	-22.3	34.7	33.29	54.0	8.3	V
11380.000	35.8	-30.1	38.1	27.81	54.0	18.2	V
17801.000	42.2	-23.4	41.9	23.70	54.0	11.8	H
17852.500	42.2	-23.5	42.0	23.83	54.0	11.8	V
17934.500	42.8	-23.3	41.9	24.20	54.0	11.2	H

Peak Results:

802.11a

Channel 149

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5650.805	58.4	-22.7	34.9	46.21	68.8	10.4	H
5651.035	56.7	-22.7	34.9	44.47	69.0	12.3	V
11490.000	46.0	-29.0	38.1	36.91	74.0	28.0	H
16814.500	54.1	-24.1	42.8	35.43	68.2	14.1	V
17077.500	54.1	-23.8	42.2	35.66	68.2	14.1	H
17236.500	53.0	-24.1	41.8	35.37	68.2	15.2	H

Channel 157

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5733.500	57.4	-22.6	34.7	45.37	68.2	10.8	H
5837.500	57.5	-22.5	35.1	44.85	68.2	10.7	V
11570.000	45.8	-30.1	38.2	37.67	74.0	28.2	H
16786.500	54.3	-24.1	42.8	35.59	68.2	13.9	V
17042.500	53.1	-23.7	42.4	34.37	68.2	15.1	H
17355.000	51.4	-24.0	41.6	33.76	68.2	16.8	V

Channel 165

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5923.563	57.4	-22.4	34.9	44.84	69.3	11.8	H
5923.850	58.0	-22.4	34.9	45.37	69.1	11.1	V
11650.000	45.4	-29.0	38.3	36.12	74.0	28.6	H
16700.000	53.7	-23.5	42.5	34.70	68.2	14.5	V
16871.000	54.2	-24.4	42.8	35.87	68.2	14.0	H
17475.000	50.9	-23.9	41.7	33.11	68.2	17.3	H

802.11n-HT20
Channel 149

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5651.150	57.2	-22.7	34.9	44.99	69.1	11.9	V
5651.380	57.2	-22.7	34.9	44.94	69.2	12.1	V
11490.000	45.7	-29.0	38.1	36.63	74.0	28.3	H
16322.500	52.3	-24.6	41.1	35.72	68.2	15.9	H
16830.000	53.9	-24.1	42.8	35.16	68.2	14.3	V
17235.000	51.2	-24.1	41.8	33.53	68.2	17.0	V

Channel 157

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5731.500	57.3	-22.7	34.7	45.33	68.2	10.9	V
5832.000	57.3	-22.3	35.1	44.57	68.2	10.9	V
11570.000	44.9	-30.1	38.2	36.81	74.0	29.1	V
16754.500	53.2	-24.0	42.7	34.57	68.2	15.0	H
17227.500	53.1	-24.1	41.8	35.37	68.2	15.1	H
17353.000	51.9	-24.0	41.6	34.31	68.2	16.3	V

Channel 165

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5923.620	56.9	-22.4	34.9	44.28	69.2	12.4	V
5924.253	57.1	-22.4	34.9	44.48	68.8	11.7	V
11650.000	46.2	-29.0	38.3	36.95	74.0	27.8	H
16750.500	53.9	-24.1	42.7	35.34	68.2	14.3	H
17260.500	53.4	-24.0	41.7	35.59	68.2	14.8	V
17484.000	53.1	-24.0	41.7	35.43	68.2	15.1	V

802.11n-HT40

Channel 151

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5650.518	59.9	-22.7	34.9	47.74	68.6	8.7	V
5650.863	56.0	-22.7	34.9	43.85	68.8	12.8	V
11510.000	44.4	-29.8	38.1	36.06	74.0	29.6	V
16494.000	52.6	-25.0	41.6	35.99	68.2	15.6	H
16804.500	53.5	-23.8	42.8	34.52	68.2	14.7	H
17265.000	50.9	-23.8	41.7	33.00	68.2	17.3	H

Channel 159

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5923.850	57.0	-22.4	34.9	44.41	69.1	12.1	H
5924.253	57.7	-22.4	34.9	45.15	68.8	11.0	H
11590.000	46.2	-29.5	38.2	37.46	74.0	27.8	V
16759.000	53.4	-23.9	42.7	34.56	68.2	14.8	H
17073.500	53.3	-23.7	42.3	34.75	68.2	14.9	V
17385.000	50.8	-24.0	41.6	33.19	68.2	17.4	H

802.11ac-HT20

Channel 149

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5651.035	57.4	-22.7	34.9	45.18	69.0	11.6	H
5651.495	56.8	-22.7	34.9	44.62	69.3	12.5	V
11490.000	46.0	-29.0	38.1	36.84	74.0	28.0	H
16758.000	53.5	-23.9	42.7	34.72	68.2	14.7	V
16912.000	54.0	-23.5	42.7	34.81	68.2	14.2	H
17233.500	51.8	-24.1	41.8	34.10	68.2	16.4	H

Channel 157

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5748.000	57.5	-22.5	34.7	45.35	68.2	10.7	V
5822.000	57.6	-22.6	35.0	45.15	68.2	10.6	V
11570.000	44.7	-30.1	38.2	36.55	74.0	29.3	H
16790.500	53.3	-24.0	42.8	34.50	68.2	14.9	H
17260.000	53.4	-24.0	41.7	35.61	68.2	14.8	H
17356.500	51.9	-24.0	41.6	34.21	68.2	16.3	V

Channel 165

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5923.793	56.5	-22.4	34.9	43.87	69.1	12.6	V
5924.080	57.6	-22.4	34.9	45.06	68.9	11.2	H
11650.000	46.1	-29.0	38.3	36.84	74.0	27.9	V
16742.000	53.9	-24.3	42.6	35.56	68.2	14.3	V
17207.000	53.5	-23.6	41.8	35.32	68.2	14.7	H
17476.500	51.8	-23.9	41.7	34.04	68.2	16.4	V

802.11ac-HT40

Channel 151

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5650.173	56.7	-22.8	34.9	44.53	68.3	11.6	V
5650.345	56.5	-22.7	34.9	44.30	68.5	12.0	V
11510.000	44.2	-29.8	38.1	35.87	74.0	29.8	V
16501.500	51.8	-24.9	41.6	35.14	68.2	16.4	V
16820.500	53.9	-24.3	42.8	35.36	68.2	14.3	V
17267.000	52.5	-23.7	41.7	34.46	68.2	15.7	H

Channel 159

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5924.023	57.1	-22.4	34.9	44.56	68.9	11.8	V
5924.425	57.2	-22.4	34.9	44.65	68.6	11.4	H
11590.000	46.2	-29.5	38.2	37.45	74.0	27.8	H
16796.500	53.7	-23.8	42.8	34.72	68.2	14.5	V
17032.000	53.5	-23.9	42.5	34.86	68.2	14.7	V
17385.000	51.4	-24.0	41.6	33.77	68.2	16.8	H

802.11ac-HT80

Channel 155

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
5650.575	57.3	-22.7	34.9	45.14	68.6	11.3	V
5924.885	57.3	-22.4	34.9	44.72	68.3	11.0	V
11550.000	45.1	-29.5	38.2	36.41	74.0	28.9	H
16761.500	53.7	-23.9	42.7	34.88	68.2	14.5	V
17201.500	52.9	-23.7	41.8	34.77	68.2	15.3	H
17324.500	51.9	-23.8	41.7	34.07	68.2	16.3	V

Conclusion: PASS
Note:

1. The spurious emission above 18G is noise only.
2. All emissions below 30MHz are more than 20 dB below the limit

Band edge compliance

Mode	Channel	Test Results	Conclusion
802.11a	5745 MHz	Fig.1	P
	5825 MHz	Fig.2	P
802.11n HT20	5745 MHz	Fig.3	P
	5825 MHz	Fig.4	P
802.11n HT40	5755 MHz	Fig.5	P
	5795 MHz	Fig.6	P
802.11ac HT20	5745 MHz	Fig.7	P
	5825 MHz	Fig.8	P
802.11ac HT40	5755 MHz	Fig.9	P
	5795 MHz	Fig.10	P
802.11ac HT80	5775 MHz	Fig.11 Fig.12	P

Conclusion: PASS

Test graphs as below:

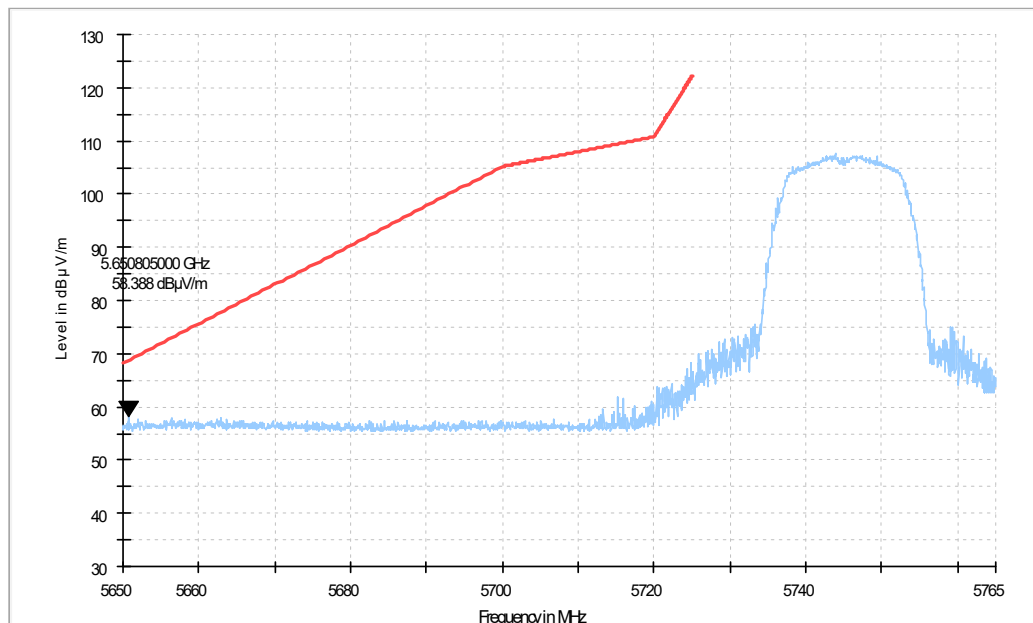


Fig. 1 Band Edges (802.11a Ch149, 5745MHz)

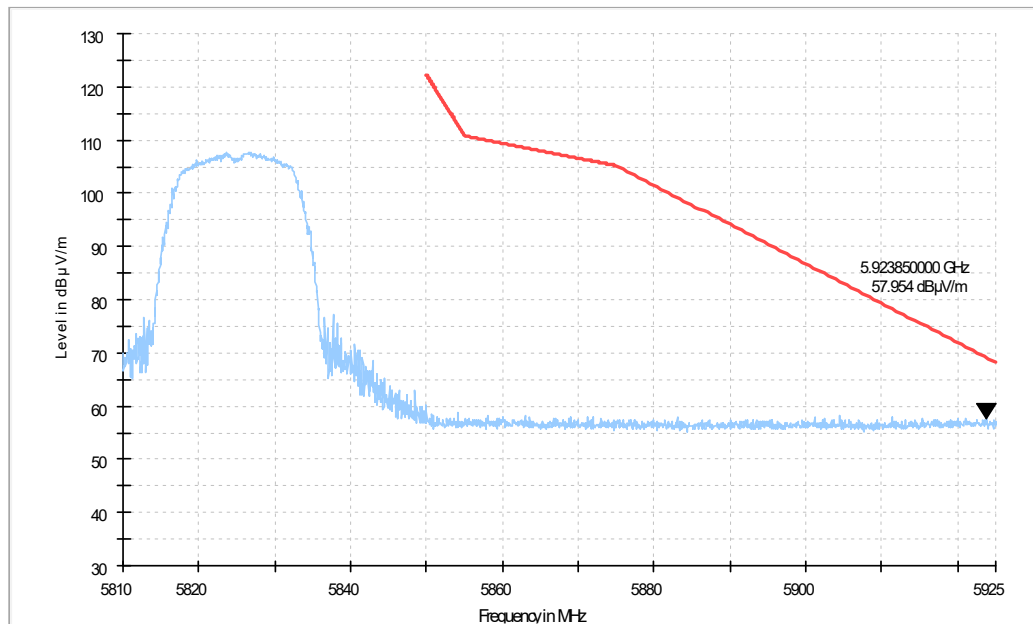


Fig. 2 Band Edges (802.11a Ch165, 5825MHz)

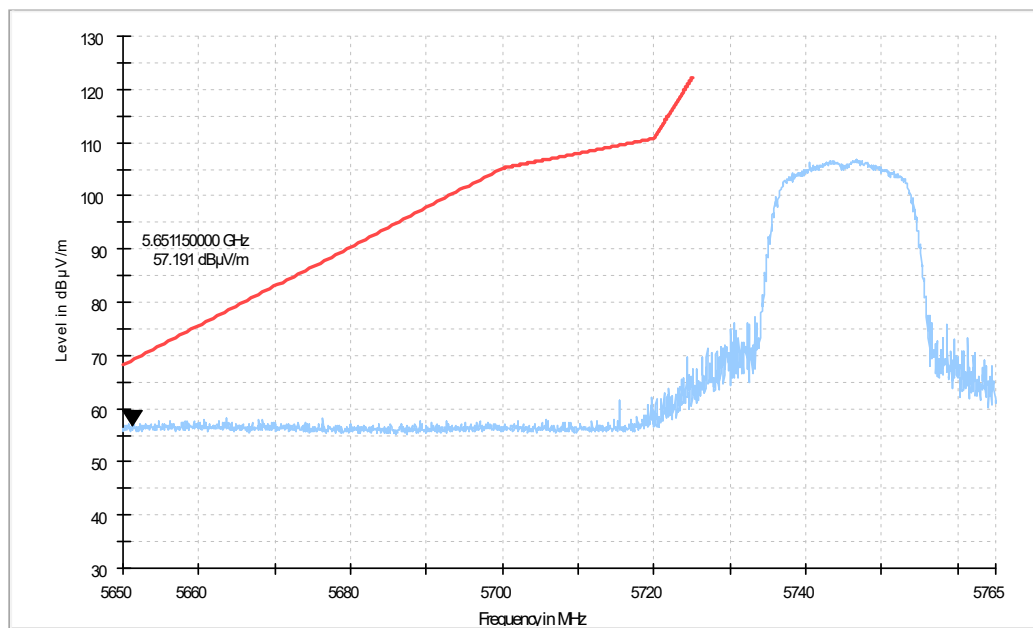


Fig. 3 Band Edges (802.11n-HT20 Ch149, 5745MHz)

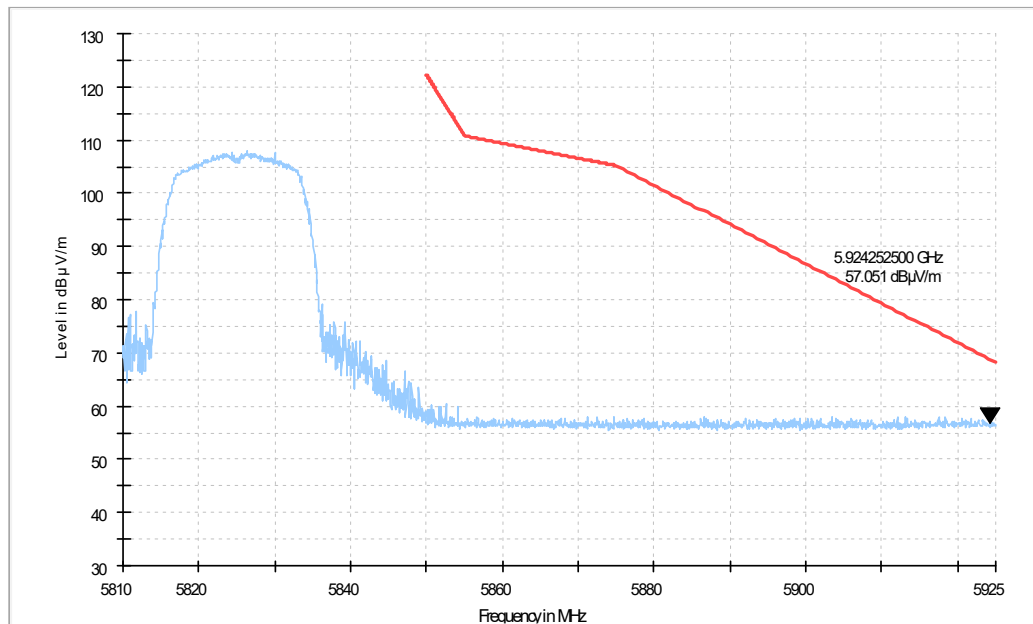


Fig. 4 Band Edges (802.11n-HT20 Ch165, 5825MHz)

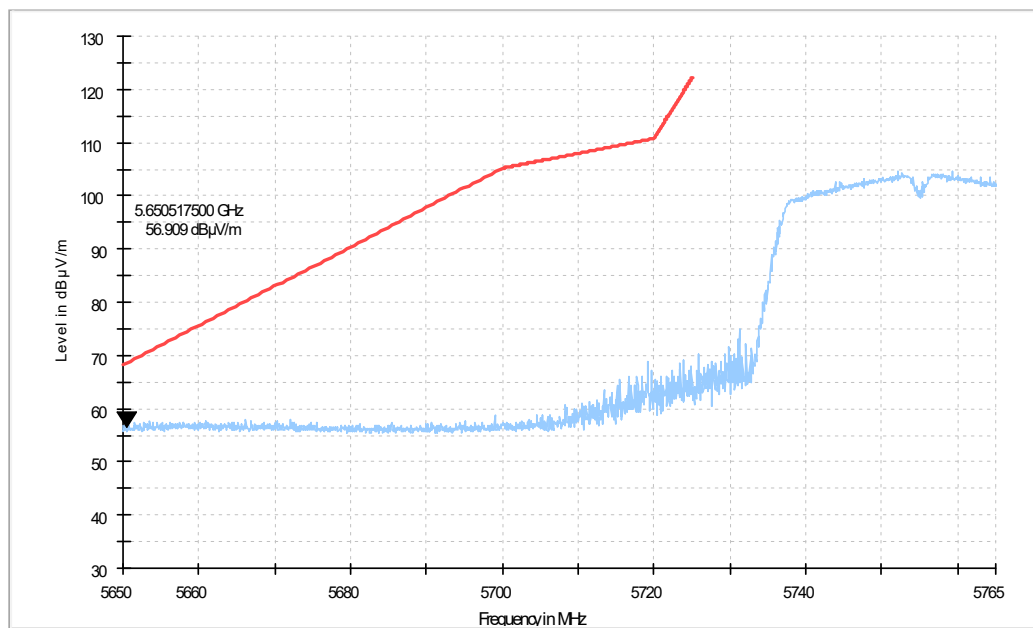


Fig. 5 Band Edges (802.11n-HT40 Ch151, 5755MHz)

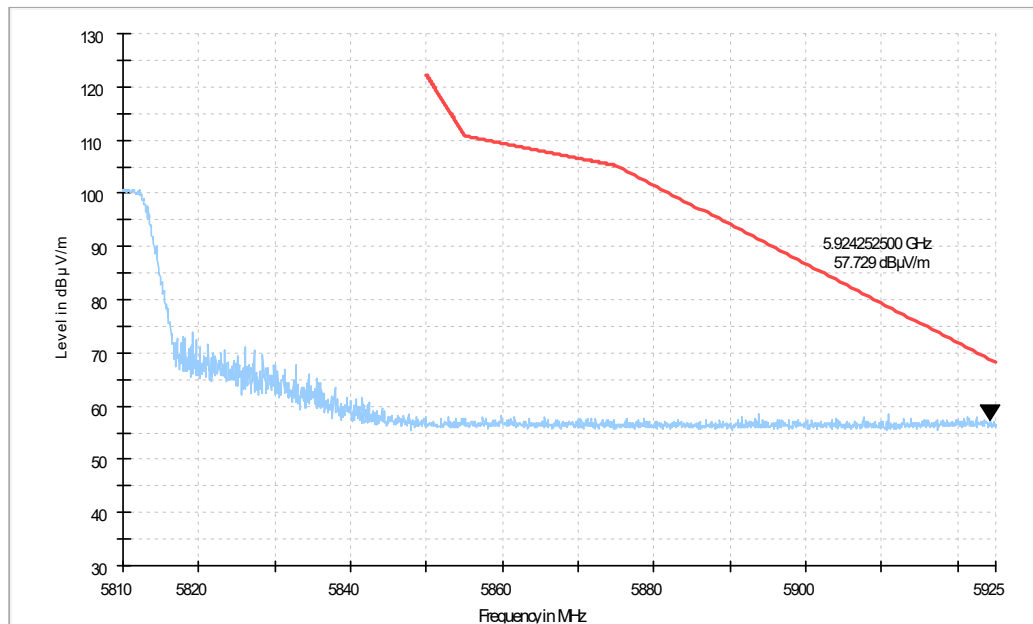


Fig. 6 Band Edges (802.11n-HT40 Ch159, 5795MHz)

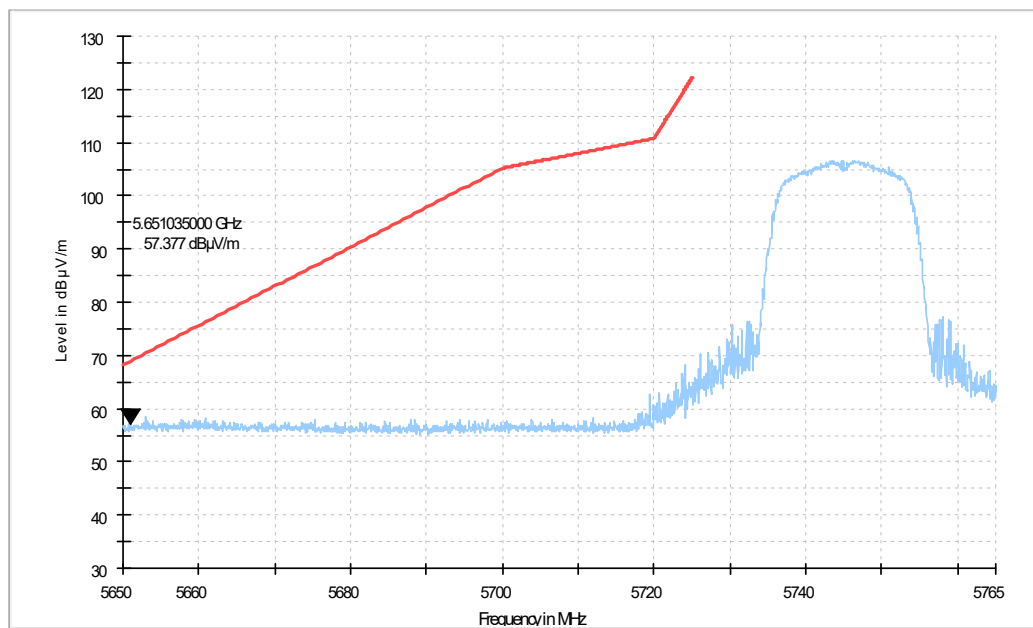


Fig. 7 Band Edges (802.11ac-HT20 Ch149, 5745MHz)

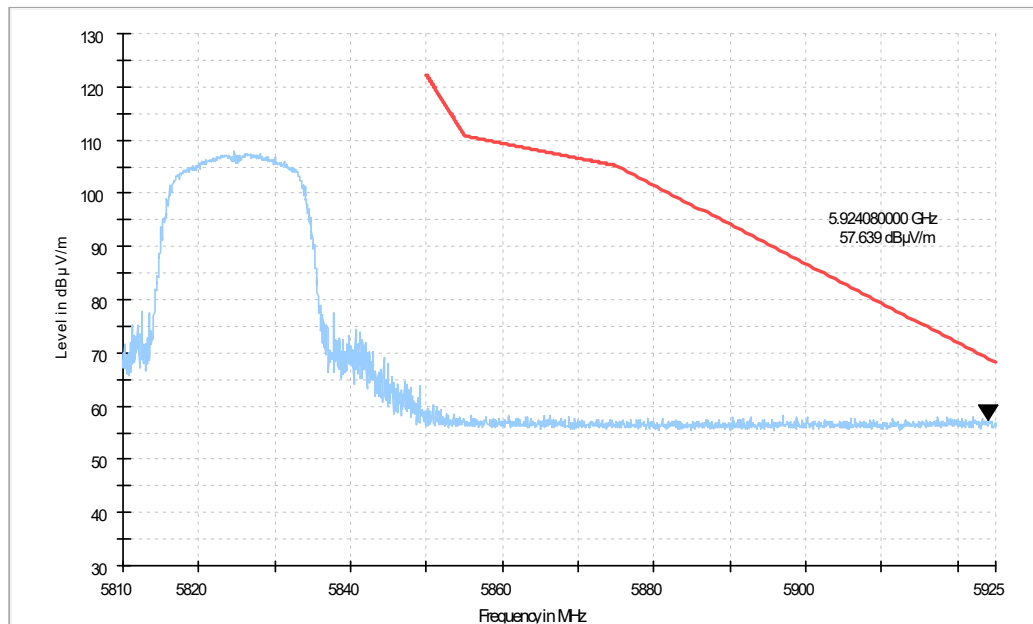


Fig. 8 Band Edges (802.11ac-HT20 Ch165, 5825MHz)

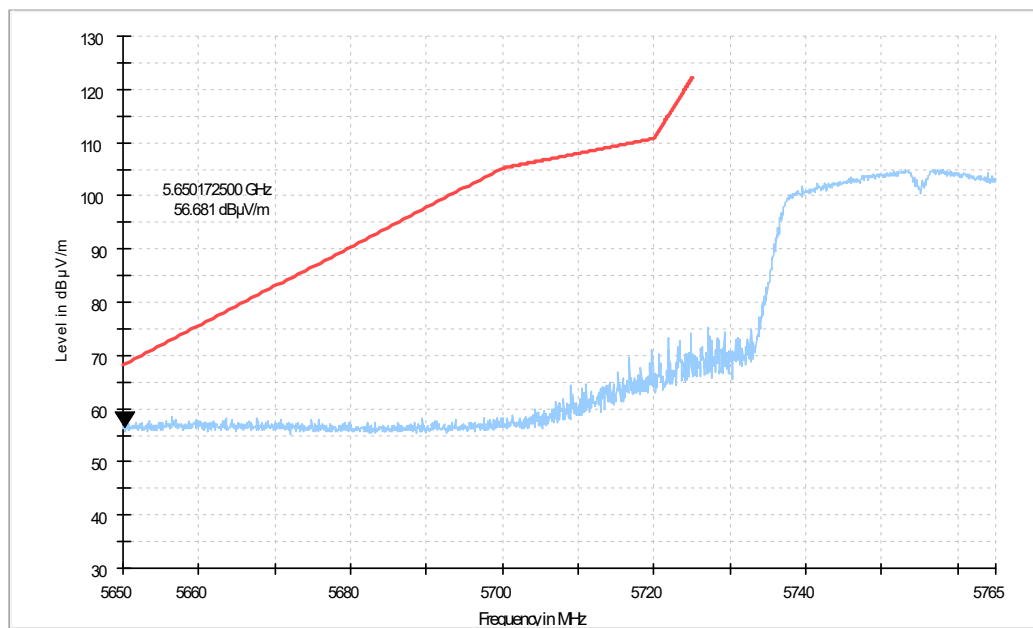


Fig. 9 Band Edges (802.11ac-HT40 Ch151, 5755MHz)

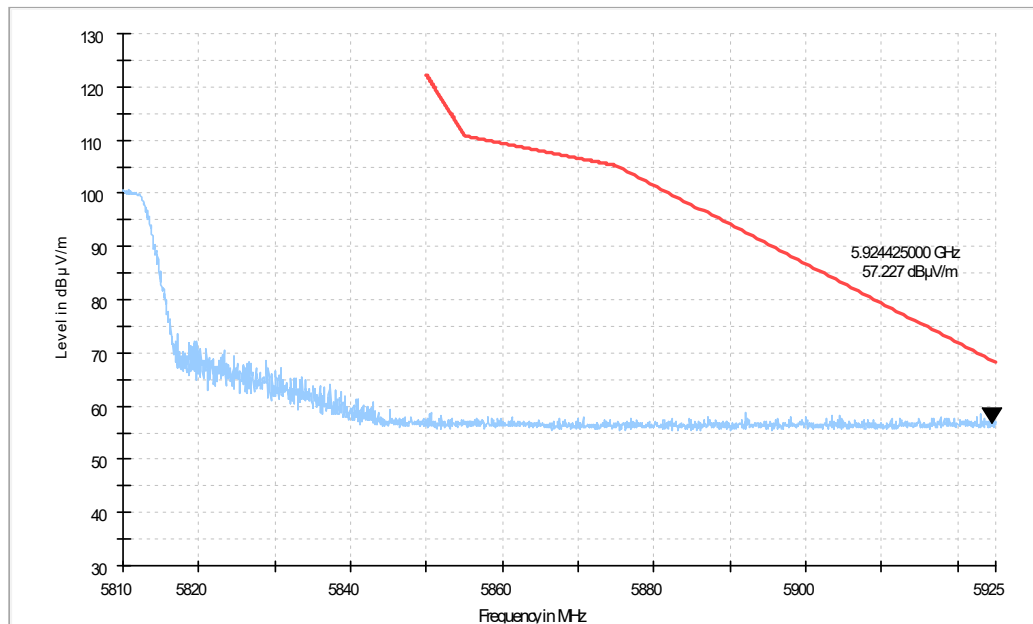


Fig. 10 Band Edges (802.11ac-HT40 Ch159, 5795MHz)

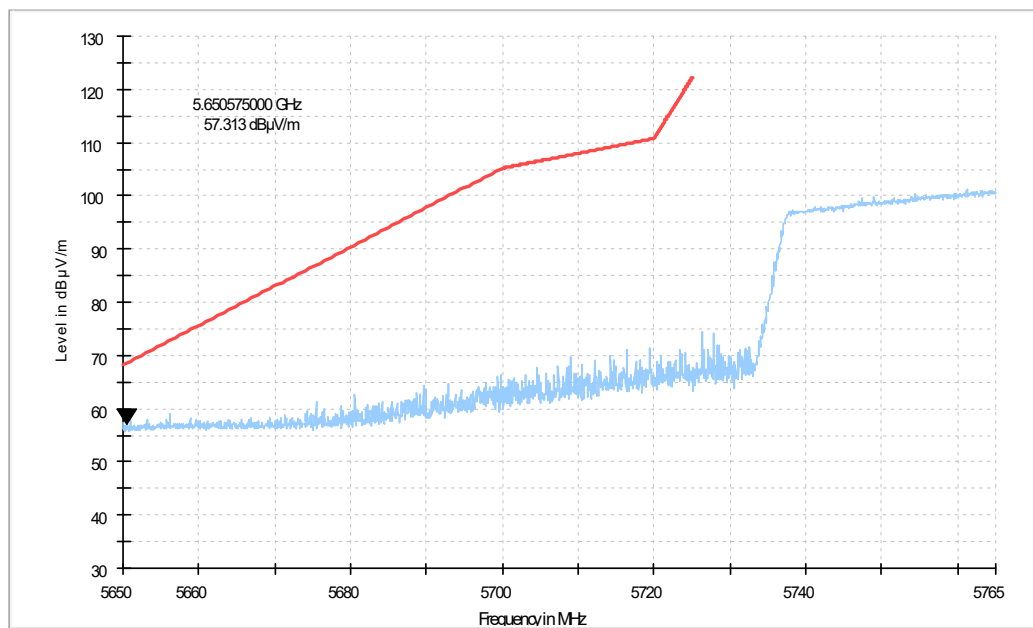


Fig. 11 Band Edges (802.11ac-HT80 Ch155, 5775MHz)

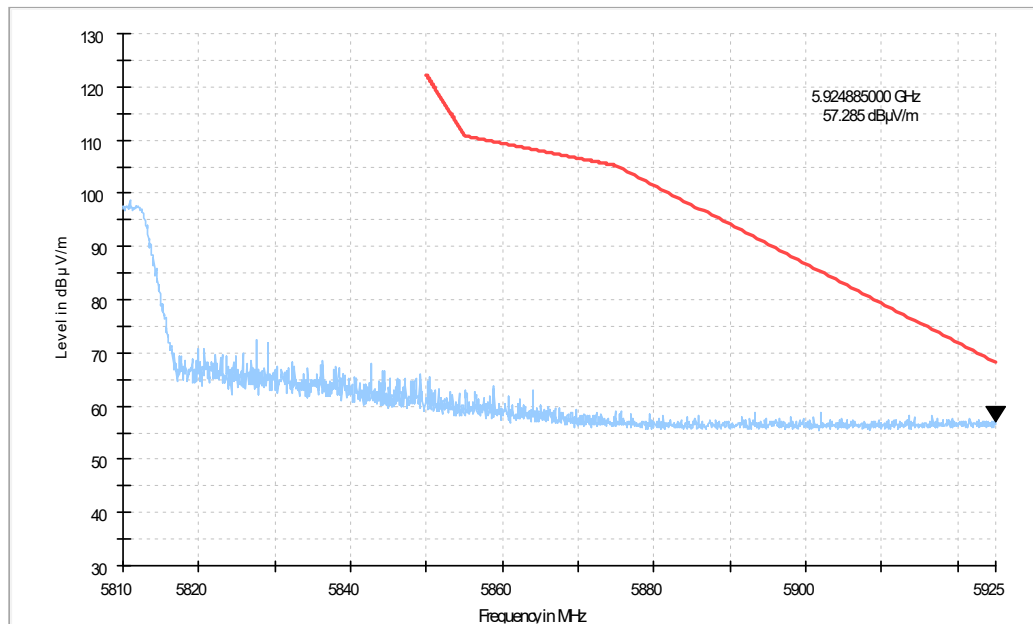


Fig. 12 Band Edges (802.11ac-HT80, Ch155, 5775MHz)

A.6. AC Powerline Conducted Emission

A.6.1 Summary

All AC line conducted spurious emissions are measured with a receiver connected to a grounded LISN while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for conducted spurious emissions. Only the conducted emissions of the configuration that produced the worst case emissions are reported in this section

A.6.2 Method of Measurement

See Clause 6.2 of ANSI C63.10 specifically.

See Clause 4 and Clause 5 of ANSI C63.10 generally.

The conducted emissions from the AC port of the EUT are measured in a shielding room. The EUT is connected to a Line Impedance Stabilization Network (LISN). An overview sweep with peak detection was performed. The measurements were performed with a quasi-peak detector and if required, an average detector.

The conducted emission measurements were made with the following detector of the test receiver:
Quasi-Peak / Average Detector.

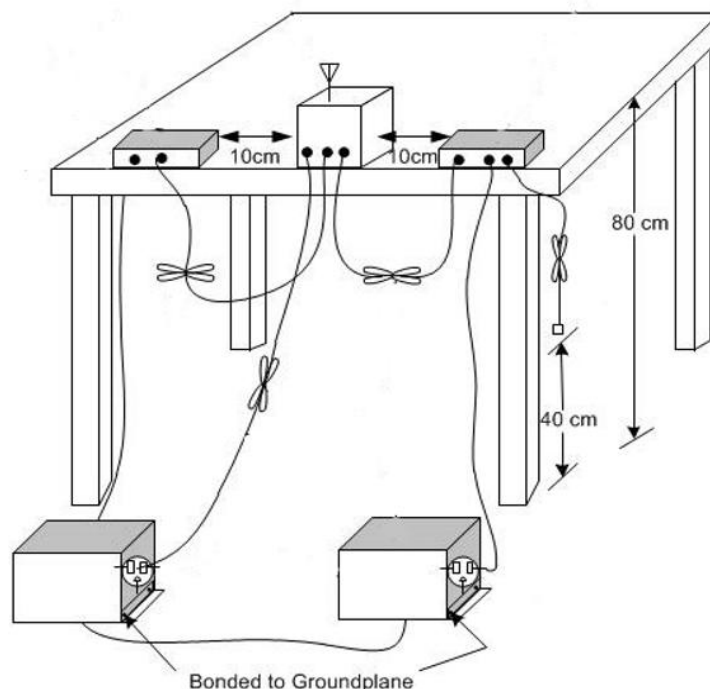
The measurement bandwidth is:

Frequency of Emission (MHz)	RBW/IF bandwidth
0.15-30	9kHz

A.6.3 Test Condition

Voltage (V)	Frequency (Hz)
120	60

A.6.4 Test setup



A.6.5 Measurement Result and limit

Wi-Fi (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV)		Conclusion
		With charger		
		Wi-Fi	Idle	
0.15 to 0.5	66 to 56	Fig.A.6.1	Fig. A.6.2	P
0.5 to 5	56			
5 to 30	60			

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

Wi-Fi (Average Limit)

Frequency range (MHz)	Average Limit (dBμV)	Result (dBμV)		Conclusion
		With charger		
		Wi-Fi	Idle	
0.15 to 0.5	56 to 46	Fig.A.6.1	Fig. A.6.2	P
0.5 to 5	46			
5 to 30	50			

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

Conclusion: Pass

Test graphs as below:

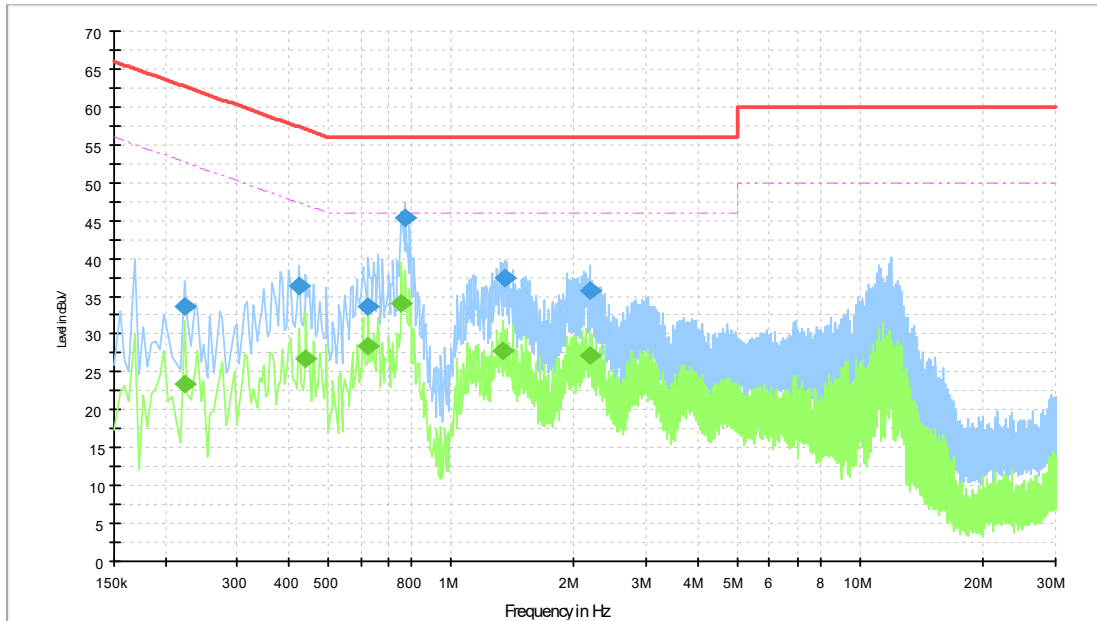


Fig.A.6.1. AC Powerline Conducted Emission-Ide

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.222000	33.7	2000.0	9.000	On	L1	20.0	29.0	62.7
0.424500	36.3	2000.0	9.000	On	L1	20.1	21.1	57.4
0.627000	33.6	2000.0	9.000	On	N	20.1	22.4	56.0
0.775500	45.4	2000.0	9.000	On	L1	20.0	10.6	56.0
1.351500	37.5	2000.0	9.000	On	L1	19.9	18.5	56.0
2.175000	35.7	2000.0	9.000	On	L1	19.8	20.3	56.0

Final Result 2

Frequency (MHz)	Average (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.222000	23.3	2000.0	9.000	On	L1	20.0	29.4	52.7
0.442500	26.8	2000.0	9.000	On	L1	20.1	20.2	47.0
0.627000	28.3	2000.0	9.000	On	L1	20.0	17.7	46.0
0.757500	34.1	2000.0	9.000	On	L1	20.0	11.9	46.0
1.333500	27.9	2000.0	9.000	On	L1	19.9	18.1	46.0
2.175000	27.2	2000.0	9.000	On	L1	19.8	18.8	46.0

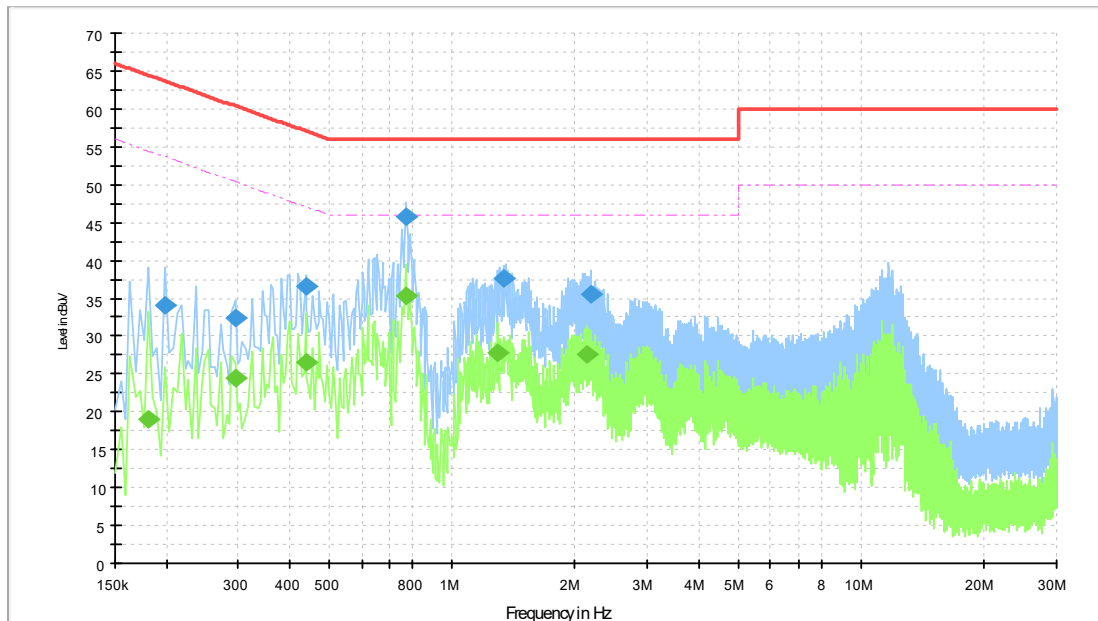


Fig.A.6.2. AC Powerline Conducted Emission-Ide

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.199500	34.1	2000.0	9.000	On	L1	20.0	29.5	63.6
0.294000	32.3	2000.0	9.000	On	L1	20.0	28.1	60.4
0.438000	36.5	2000.0	9.000	On	L1	20.1	20.6	57.1
0.771000	45.7	2000.0	9.000	On	L1	20.0	10.3	56.0
1.329000	37.7	2000.0	9.000	On	L1	19.9	18.3	56.0
2.179500	35.5	2000.0	9.000	On	L1	19.8	20.5	56.0

Final Result 2

Frequency (MHz)	Average (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.181500	19.1	2000.0	9.000	On	N	20.0	35.3	54.4
0.294000	24.5	2000.0	9.000	On	L1	20.0	25.9	50.4
0.438000	26.4	2000.0	9.000	On	L1	20.1	20.7	47.1
0.771000	35.4	2000.0	9.000	On	L1	20.0	10.6	46.0
1.293000	27.8	2000.0	9.000	On	L1	19.9	18.2	46.0
2.130000	27.6	2000.0	9.000	On	L1	19.8	18.4	46.0

A.7. Antenna Requirement

The antenna of the device is permanently attached. There are no provisions for connection to an external antenna.

The unit complies with the requirement of FCC Part 15.203.

ANNEX B: EUT parameters

Disclaimer: The antenna gain provided by the client may affect the validity of the measurement results in this report, and the client shall bear the impact and consequences arising therefrom.

ANNEX C: Accreditation Certificate



*** END OF REPORT BODY ***