



FCC PART 15C TEST REPORT No.I21Z70186-EMC08

for

Samsung Electronics Co., Ltd.

Notebook PC

XE315XDA

with

FCC ID: ZCAXE315XDA

Hardware Version: REV1.0

Software Version: Chrome

Issued Date: 2021-07-14

Note:

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Test Laboratory:

CTTL, Telecommunication Technology Labs, CAICT

No.52, HuayuanNorth 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.chinattl.com



REPORT HISTORY

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I21Z70186-EMC08	Rev.0	1st edition	2021-07-14

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1. Test Laboratory

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2017 accredited test laboratory under NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0, and is also an FCC accredited test laboratory (CN5017), and ISED accredited test laboratory (ISED#: 24849). The detail accreditation scope can be found on NVLAP website.

1.2. Testing Location

Location1: CTTL(huayuan North Road)

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

Location2: CTTL(BDA)

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

1.3. Testing Environment

Normal Temperature: 15-35℃

Relative Humidity: 20-75%

1.4. Project data

Testing Start Date: 2021-05-06

Testing End Date: 2021-07-02

1.5. Signature




Li Yan

(Prepared this test report)



Zhang Ying

(Reviewed this test report)



Zhang Xia

Deputy Director of the laboratory

(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: Samsung R5, Maetan dong 129, Samsung ro
Youngtong gu, Suwon city 443 742, Korea
Contact: Sunghoon Cho
Email: ggobi.cho@samsung.com
Telephone: +82-10-2722-4159
Fax: /

3. PRODUCT INFORMATION

3.1. About EUT

Description	Notebook PC
Model name	XE315XDA
FCC ID	ZCAXE315XDA

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of T CTTL-Telecommunication Technology Labs, CAICT

3.2. Internal Identification of EUT

EUT ID*	SN or IMEI	HW Version	SW Version
EUT1	2170186UT44a	REV1.0	Chrome
EUT2	2170186UT25a	REV1.0	Chrome

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

3.3. Internal Identification of AE

AE ID*	Description	SN	Remarks
AE1	Travel Adapter	/	/
AE2	Travel Adapter	/	/
AE3	battery	/	Inbuilt

AE1

Model	EP-TA845
Manufacturer	DONGYANG E&P Inc
Length of cable	/

AE2

Model	EP-TA845
Manufacturer	SOLUM CO.,LTD
Length of cable	/

AE3

Model	/
Manufacturer	/

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

3.4. General Description

The Equipment Under Test (EUT) was a Notebook PC with Bluetooth, Bluetooth Low Energy and 802.11 a/b/g/n/ac/ax capabilities in the 2.4 GHz and 5 GHz bands.

Antenna information

Item	Spec.	Vendor	Vendor P/N	Sample under test
Antenna	Main antenna (Chain A)	AWAN	/	EUT2
	Auxiliary antenna (Chain B)			
Antenna	Main antenna (Chain A)	SPEED	/	EUT1
	Auxiliary antenna (Chain B)			

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

Samples undergoing test were selected by the Client.

For more EUT information please refers to the manufacturer's specifications or user's manual.

3.5. Test Configuration

For Bluetooth mode the EUT can transmit only at CHAIN A RF output.

The software DRTU provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

3.6. Interpretation of the Test Environment

For the test methods, the test environment uncertainty figures correspond to an expansion factor k=2.

Measurement Uncertainty

Parameter	Uncertainty
temperature	0.48°C
humidity	2 %
DC voltages	0.003V

4. Reference Documents

4.1. Documents supplied by applicant

EUT parameters, referring to Annex A for detailed information, is supplied by the client 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.

Reference	Title	Version
FCC Part15	FCC CFR 47, Part 15, Subpart C: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.247 Operation within the bands 902-928MHz, 2400-2483.5 MHz, and 5725-5850 MHz.	2019
ANSI C63.10	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices Federal Communications Commission Office of Engineering and Technology Laboratory Division	2013
KDB 558074 D01	GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES	2019

Note: The test methods have no deviation with standards.

5. Test Results

5.1. Summary of Test Results

Abbreviations used in this clause:

- P** Pass, The EUT complies with the essential requirements in the standard.
- F** Fail, The EUT does not comply with the essential requirements in the standard
- NA** Not Applicable, The test was not applicable
- NP** Not Performed, The test was not performed by CTTL

SUMMARY OF MEASUREMENT RESULTS	Sub-clause of Part15C	Verdict
Radiated Spurious Emission	15.247, 15.205, 15.209	P
AC Power line Conducted Emission	15.107, 15.207	P

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

The measurement is made according to ANSI C63.10.

5.2. Statements

CTTL has evaluated the test cases requested by the applicant /manufacturer as listed in section 5.1 of this report for the EUT specified in section 3 according to the standards or reference documents listed in section 4.2

5.3. Test Conditions

T nom	Normal Temperature
T min	Low Temperature
T max	High Temperature
V nom	Normal Voltage

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

Temperature	T nom	26°C
Voltage	V nom	4.0V
Humidity	H nom	20-75%

6. Test Facilities Utilized

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Test Receiver	ESU26	100376	R&S	1 year	2021-09-04
2	BiLog Antenna	VULB9163	9163-482	Schwarzbeck	1 year	2021-11-04
3	Dual-Ridge Waveguide Horn Antenna	3117	00139065	ETS-Lindgren	1 year	2021-10-11
4	Dual-Ridge Waveguide Horn Antenna	3116	2663	ETS-Lindgren	1 year	2021-08-05
5	Analytical Spectrometer	FSV40	R&S	101047	1 year	2022-05-17
6	Loop Antenna	HFH2-Z2	829324/007	R&S	1 year	2021-12-10
7	Test Receiver	ESU26	100235	R&S	1 year	2022-02-23
8	Universal Radio Communication Tester	CMW500	159048	R&S	1 Year	2022-03-03

AC Powerline Conducted Emission

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	LISN	ENV216	101459	R&S	1 year	2022-03-16
2	Test Receiver	ESCI	100766	R&S	1 year	2022-03-09
3	Universal Radio Communication Tester	CMW500	159048	R&S	1 Year	2022-03-03

7. Measurement Uncertainty

Radiated Spurious Emission

Measurement Uncertainty:

Frequency Range	Uncertainty(dBm) (k=2)
9kHz-30MHz	/
$30\text{MHz} \leq f \leq 1\text{GHz}$	5.40
$1\text{GHz} \leq f \leq 18\text{GHz}$	4.32
$18\text{GHz} \leq f \leq 40\text{GHz}$	5.26

AC Power-line Conducted Emission

Measurement Uncertainty (k=2)	3.10dB
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ANNEX A: EUT parameters

Disclaimer: The antenna gain and setting power 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 B: Antenna Requirements

According to FCC 47 CFR § 15.203:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

- (1) The antennas of the EUT are permanently attached.
- (2) The EUT complies with the requirement of §15.203

ANNEX C: Detailed Test Results

C.1. Radiated Spurious Emission

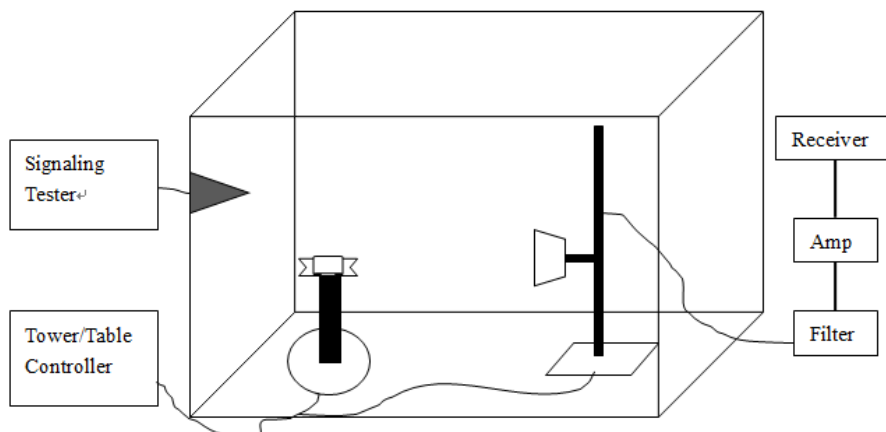
Specification Reference

FCC 47 CFR Part 15.247, 15.205, 15.209

Method of Measurement

Testing was performed in accordance with ANSI C63.10-2013 and KDB 558074.

The radiated emission test is performed in a semi-anechoic chamber. The distance from the EUT to the reference point of the measurement antenna is 3m. The test is carried out on both vertical and horizontal polarization and only the maximization result of both polarizations is kept. During the test, the turntable is rotated 360° and the measurement antenna is moved from 1m to 4m to get the maximization result.



Measurement Limit

Standard	Limit
FCC 47 CFR Part 15.247, 15.205, 15.209	20dB below peak output power

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)).

Limit in restricted band:

Frequency (MHz)	Field strength($\mu\text{V}/\text{m}$)	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(dB μ V/m)	Measurement distance(m)
30-88	40.0	3
88-216	43.5	3
216-960	46.0	3
Above 960	54.0	3

Test settings

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

Sample Calculation

The measurement results are obtained as described below:

$$\text{Result} = P_{\text{Mea}} + A_{\text{Rpl}} = P_{\text{Mea}} + \text{Cable Loss} + \text{Antenna Factor}$$

A "reference path loss" is established and the A_{Rpl} is the attenuation of "reference path loss", and including the gain of receive antenna, the gain of the preamplifier, the cable loss.

P_{Mea} is the field strength recorded from the instrument.

Test Notes

1. The EUT is operating at its maximum duty cycle and its maximum power control level.
2. Investigation has been done on all channel, modes and modulations/data rates. Only the radiated emissions of the configurations that produced the worst case emissions are reported in this section.

C.1.1 Radiated Spurious Emission- above 1GHz

SPEED

Peak Measurement results

GFSK Ch 0

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)
2384.060	60.31	2.86	31.99	25.46	74.00	13.69	V
2385.138	61.04	2.86	31.99	26.18	74.00	12.96	H
4804.000	39.63	-33.27	34.12	38.77	74.00	34.37	H
7206.000	40.54	-31.17	35.78	35.93	74.00	33.46	H
9608.000	40.92	-30.55	36.65	34.82	74.00	33.08	V
12010.000	43.91	-28.93	38.71	34.14	74.00	30.09	V

GFSK Ch 39

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)
2370.000	43.05	-35.34	31.98	46.42	74.00	30.95	H
2506.800	43.43	-34.98	32.11	46.29	74.00	30.57	V
4882.000	38.71	-33.32	34.15	37.88	74.00	35.29	H
7323.000	40.77	-30.91	35.83	35.84	74.00	33.23	H
9764.000	42.16	-30.33	36.87	35.62	74.00	31.84	V
12205.000	44.84	-28.02	38.82	34.04	74.00	29.16	V

GFSK Ch 78

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)
2483.630	60.76	2.93	32.09	25.74	74.00	13.24	V
2484.170	60.23	2.93	32.09	25.21	74.00	13.77	H
4960.000	38.14	-33.60	34.18	37.56	74.00	35.86	V
7440.000	40.54	-31.69	35.88	36.36	74.00	33.46	V
9920.000	42.14	-30.00	37.09	35.05	74.00	31.86	V
12400.000	45.11	-28.10	38.94	34.27	74.00	28.89	V

$\pi/4$ DQPSK Ch 0

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)
2382.128	60.95	2.86	31.99	26.09	74.00	13.05	V
2389.422	60.01	2.87	32.00	25.14	74.00	13.99	V
4804.000	39.02	-33.27	34.12	38.17	74.00	34.98	H
7206.000	41.00	-31.17	35.78	36.38	74.00	33.00	V
9608.000	42.84	-30.55	36.65	36.74	74.00	31.16	H
12010.000	45.54	-28.93	38.71	35.76	74.00	28.46	H

 $\pi/4$ DQPSK Ch 39

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)
2371.000	43.20	-35.34	31.98	46.56	74.00	30.80	H
2506.400	43.45	-34.98	32.11	46.32	74.00	30.55	H
4882.000	40.34	-33.32	34.15	39.50	74.00	33.66	H
7323.000	40.93	-30.91	35.83	36.00	74.00	33.07	H
9764.000	41.93	-30.33	36.87	35.39	74.00	32.07	H
12205.000	46.51	-28.02	38.82	35.71	74.00	27.49	H

 $\pi/4$ DQPSK Ch 78

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)
2483.500	62.17	2.93	32.09	27.15	74.00	11.83	V
2483.910	60.83	2.93	32.09	25.81	74.00	13.17	V
4960.000	38.16	-33.60	34.18	37.57	74.00	35.84	H
7440.000	38.87	-31.69	35.88	34.68	74.00	35.13	H
9920.000	42.77	-30.00	37.09	35.67	74.00	31.23	H
12400.000	44.80	-28.10	38.94	33.96	74.00	29.20	H

8DPSK Ch 0

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)
2377.382	60.87	2.86	31.99	26.03	74.00	13.13	H
2380.364	60.60	2.86	31.99	25.75	74.00	13.40	V
4804.000	40.28	-33.27	34.12	39.43	74.00	33.72	V
7206.000	40.00	-31.17	35.78	35.38	74.00	34.00	H
9608.000	42.34	-30.55	36.65	36.23	74.00	31.66	H
12010.000	44.75	-28.93	38.71	34.98	74.00	29.25	H

8DPSK Ch 39

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)
2371.800	44.04	-35.35	31.98	47.41	74.00	29.96	V
2503.000	42.77	-35.04	32.11	45.71	74.00	31.23	H
4882.000	38.80	-33.32	34.15	37.97	74.00	35.20	V
7323.000	40.35	-30.91	35.83	35.42	74.00	33.65	H
9764.000	43.98	-30.33	36.87	37.44	74.00	30.02	V
12205.000	44.43	-28.02	38.82	33.62	74.00	29.57	H

8DPSK Ch 78

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)
2489.245	60.98	2.94	32.09	25.95	74.00	13.02	H
2497.375	61.09	2.94	32.10	26.06	74.00	12.91	V
4960.000	38.58	-33.60	34.18	38.00	74.00	35.42	H
7440.000	40.42	-31.69	35.88	36.23	74.00	33.58	H
9920.000	41.91	-30.00	37.09	34.82	74.00	32.09	H
12400.000	46.08	-28.10	38.94	35.24	74.00	27.92	V

Average Measurement results
GFSK Ch 0

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)
2385.960	46.68	2.86	32.00	11.82	54.00	7.32	V
2388.660	46.50	2.86	32.00	11.63	54.00	7.50	V
4804.000	27.69	-33.27	34.12	26.83	54.00	26.31	V
7206.000	29.54	-31.17	35.78	24.93	54.00	24.46	H
9608.000	30.45	-30.55	36.65	24.35	54.00	23.55	H
12010.000	33.20	-28.93	38.71	23.42	54.00	20.80	V

GFSK Ch 39

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)
2425.920	46.86	2.89	32.03	11.94	54.00	7.14	V
2451.180	46.77	2.91	32.06	11.81	54.00	7.23	V
4882.000	27.65	-33.32	34.15	26.82	54.00	26.35	V
7323.000	29.58	-30.91	35.83	24.66	54.00	24.42	H
9764.000	30.76	-30.33	36.87	24.22	54.00	23.24	H
12205.000	33.83	-28.02	38.82	23.02	54.00	20.17	V

GFSK Ch 78

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)
2483.580	50.16	2.93	32.09	15.14	54.00	3.84	V
2483.640	49.33	2.93	32.09	14.32	54.00	4.67	V
4960.000	27.41	-33.60	34.18	26.82	54.00	26.59	H
7440.000	28.80	-31.69	35.88	24.62	54.00	25.20	V
9920.000	30.79	-30.00	37.09	23.69	54.00	23.21	V
12400.000	33.62	-28.10	38.94	22.78	54.00	20.38	V

$\pi/4$ DQPSK Ch 0

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)
2389.200	46.71	2.87	32.00	11.84	54.00	7.29	V
2389.860	46.70	2.87	32.00	11.83	54.00	7.30	V
4804.000	27.70	-33.27	34.12	26.85	54.00	26.30	H
7206.000	29.56	-31.17	35.78	24.94	54.00	24.44	V
9608.000	30.54	-30.55	36.65	24.43	54.00	23.46	V
12010.000	33.14	-28.93	38.71	23.37	54.00	20.86	V

 $\pi/4$ DQPSK Ch 39

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)
2429.700	46.73	2.89	32.04	11.80	54.00	7.27	V
2454.000	46.82	2.91	32.06	11.85	54.00	7.18	V
4882.000	27.80	-33.32	34.15	26.97	54.00	26.20	H
7323.000	29.60	-30.91	35.83	24.68	54.00	24.40	H
9764.000	30.74	-30.33	36.87	24.20	54.00	23.26	H
12205.000	33.97	-28.02	38.82	23.16	54.00	20.03	V

 $\pi/4$ DQPSK Ch 78

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)
2483.520	48.94	2.93	32.09	13.93	54.00	5.06	V
2483.700	48.57	2.93	32.09	13.56	54.00	5.43	V
4960.000	27.43	-33.60	34.18	26.85	54.00	26.57	V
7440.000	28.80	-31.69	35.88	24.61	54.00	25.20	H
9920.000	30.77	-30.00	37.09	23.67	54.00	23.23	H
12400.000	33.63	-28.10	38.94	22.79	54.00	20.37	H

8DPSK Ch 0

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)
2388.840	46.75	2.86	32.00	11.89	54.00	7.25	V
2389.680	46.71	2.87	32.00	11.85	54.00	7.29	V
4804.000	27.74	-33.27	34.12	26.88	54.00	26.26	H
7206.000	29.55	-31.17	35.78	24.93	54.00	24.45	V
9608.000	30.51	-30.55	36.65	24.41	54.00	23.49	V
12010.000	33.30	-28.93	38.71	23.52	54.00	20.70	H

8DPSK Ch 39

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)
2436.000	46.85	2.90	32.04	11.91	54.00	7.15	V
2445.300	47.17	2.90	32.05	12.22	54.00	6.83	V
4882.000	27.77	-33.32	34.15	26.93	54.00	26.23	H
7323.000	29.45	-30.91	35.83	24.53	54.00	24.55	H
9764.000	30.80	-30.33	36.87	24.26	54.00	23.20	H
12205.000	33.97	-28.02	38.82	23.16	54.00	20.03	V

8DPSK Ch 78

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)
2483.520	49.53	2.93	32.09	14.52	54.00	4.47	V
2483.580	49.23	2.93	32.09	14.21	54.00	4.77	V
4960.000	27.39	-33.60	34.18	26.80	54.00	26.61	H
7440.000	28.82	-31.69	35.88	24.63	54.00	25.18	V
9920.000	30.75	-30.00	37.09	23.65	54.00	23.25	V
12400.000	33.69	-28.10	38.94	22.85	54.00	20.31	V

Note: the spurious emission above 18G is noise only.

Conclusion: Pass

AWAN
Peak Measurement results
GFSK Ch 0

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)
2331.131	59.90	2.57	27.64	29.70	74.00	14.10	V
2384.427	59.88	2.62	27.66	29.59	74.00	14.12	H
4804.219	38.77	-37.75	32.01	44.51	74.00	35.23	H
4991.719	45.81	-37.72	32.48	51.04	74.00	28.19	H
7206.094	41.12	-36.95	35.70	42.36	74.00	32.88	H
9607.969	44.56	-35.78	37.80	42.54	74.00	29.44	H

GFSK Ch 39

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)
2501.125	42.64	-39.04	27.70	53.98	74.00	31.36	H
2561.375	41.77	-40.03	27.87	53.92	74.00	32.23	V
4881.562	40.44	-37.76	32.20	46.00	74.00	33.56	V
4975.312	46.82	-37.70	32.44	52.08	74.00	27.18	V
7322.812	41.96	-36.91	35.98	42.89	74.00	32.04	H
9764.062	46.89	-35.67	37.80	44.76	74.00	27.11	H

GFSK Ch 78

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)
2488.725	60.91	2.68	27.70	30.52	74.00	13.09	H
2496.325	60.20	2.74	27.70	29.75	74.00	13.80	V
4959.844	40.84	-37.90	32.40	46.34	74.00	33.16	V
4988.438	47.01	-37.67	32.47	52.21	74.00	26.99	H
7440.000	43.49	-36.59	36.26	43.83	74.00	30.51	V
9920.156	44.53	-35.60	37.80	42.33	74.00	29.47	V

$\pi/4$ DQPSK Ch 0

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)
2345.271	60.91	2.61	27.64	30.66	74.00	13.09	V
2361.345	60.35	2.62	27.65	30.08	74.00	13.65	V
3088.125	39.82	-39.41	29.09	50.14	74.00	34.18	V
4804.220	39.29	-37.75	32.01	45.03	74.00	34.71	H
4977.656	46.58	-37.67	32.44	51.80	74.00	27.42	H
7206.094	42.42	-36.95	35.70	43.66	74.00	31.58	V

 $\pi/4$ DQPSK Ch 39

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)
2561.625	41.15	-40.03	27.87	53.30	74.00	32.85	H
2620.625	40.00	-40.14	28.04	52.10	74.00	34.00	H
3197.812	39.81	-38.88	29.21	49.49	74.00	34.19	V
4882.031	39.73	-37.76	32.21	45.29	74.00	34.27	H
4978.594	46.58	-37.66	32.45	51.79	74.00	27.42	H
7322.812	42.84	-36.91	35.98	43.77	74.00	31.16	V

 $\pi/4$ DQPSK Ch 78

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)
2483.925	60.23	2.65	27.69	29.89	74.00	13.77	V
2491.747	60.13	2.71	27.70	29.73	74.00	13.87	H
3188.438	40.01	-38.76	29.20	49.58	74.00	33.99	H
4959.844	38.91	-37.90	32.40	44.40	74.00	35.09	V
4980.469	46.82	-37.63	32.45	52.00	74.00	27.18	V
7440.000	42.67	-36.59	36.26	43.00	74.00	31.33	H

8DPSK Ch 0

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)
2313.194	60.52	2.55	27.63	30.34	74.00	13.48	V
2379.050	60.16	2.62	27.66	29.88	74.00	13.84	H
3087.656	42.17	-39.40	29.09	52.47	74.00	31.83	V
4804.219	38.65	-37.75	32.01	44.39	74.00	35.35	V
4992.656	46.91	-37.73	32.48	52.15	74.00	27.09	V
7206.094	41.00	-36.95	35.70	42.24	74.00	33.00	H

8DPSK Ch 39

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)
2560.375	41.58	-40.03	27.87	53.74	74.00	32.42	V
2610.875	39.58	-40.09	28.01	51.65	74.00	34.42	V
3137.812	39.47	-38.74	29.15	49.06	74.00	34.53	V
4882.031	38.77	-37.76	32.21	44.33	74.00	35.23	H
4984.688	46.78	-37.62	32.46	51.93	74.00	27.22	V
7322.812	42.05	-36.91	35.98	42.97	74.00	31.95	V

8DPSK Ch 78

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)
2496.356	60.34	2.74	27.70	29.90	74.00	13.66	V
2496.794	60.39	2.75	27.70	29.94	74.00	13.61	V
3188.438	39.48	-38.76	29.20	49.05	74.00	34.52	H
4959.844	38.27	-37.90	32.40	43.77	74.00	35.73	V
4976.250	46.29	-37.69	32.44	51.54	74.00	27.71	H
7440.000	44.29	-36.59	36.26	44.62	74.00	29.71	V

Average Measurement results
GFSK Ch 0

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)
2342.250	45.62	2.60	27.64	15.38	54.00	8.38	V
2485.625	45.38	2.66	27.69	15.02	54.00	8.62	V
4803.750	30.55	-37.75	32.01	36.30	54.00	23.45	V
4996.875	30.67	-37.79	32.49	35.97	54.00	23.33	H
7206.250	31.60	-36.95	35.71	32.84	54.00	22.40	V
9608.125	34.28	-35.78	37.80	32.26	54.00	19.72	H

GFSK Ch 39

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)
2381.125	45.79	2.62	27.66	15.51	54.00	8.21	V
2483.625	45.36	2.65	27.69	15.02	54.00	8.64	V
4881.875	31.32	-37.76	32.21	36.87	54.00	22.68	V
4996.250	30.80	-37.78	32.49	36.08	54.00	23.20	H
7323.125	31.76	-36.91	35.98	32.69	54.00	22.24	V
9763.750	34.67	-35.67	37.80	32.54	54.00	19.33	H

GFSK Ch 78

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)
2484.500	45.59	2.65	27.69	15.25	54.00	8.41	V
2494.125	45.51	2.73	27.70	15.09	54.00	8.49	V
4959.375	34.92	-37.90	32.40	40.42	54.00	19.08	V
4993.750	30.78	-37.74	32.48	36.04	54.00	23.22	H
7440.000	33.48	-36.59	36.26	33.82	54.00	20.52	H
9920.000	34.24	-35.60	37.80	32.04	54.00	19.76	V

$\pi/4$ DQPSK Ch 0

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)
2306.000	45.62	2.55	27.63	15.44	54.00	8.38	V
2370.625	45.44	2.62	27.65	15.17	54.00	8.56	V
3087.500	33.22	-39.40	29.09	43.52	54.00	20.78	V
4803.750	29.09	-37.75	32.01	34.83	54.00	24.91	H
4988.125	31.01	-37.67	32.47	36.21	54.00	22.99	V
7206.250	31.44	-36.95	35.71	32.68	54.00	22.56	H

 $\pi/4$ DQPSK Ch 39

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)
2381.375	45.83	2.62	27.66	15.55	54.00	8.17	V
2492.750	45.59	2.71	27.70	15.18	54.00	8.41	V
3137.500	35.74	-38.74	29.15	45.33	54.00	18.26	H
4881.250	29.68	-37.77	32.20	35.24	54.00	24.32	V
4996.875	30.89	-37.79	32.49	36.18	54.00	23.11	H
7323.125	31.48	-36.91	35.98	32.41	54.00	22.52	H

 $\pi/4$ DQPSK Ch 78

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)
2485.000	45.78	2.66	27.69	15.43	54.00	8.22	V
2488.500	45.64	2.68	27.70	15.26	54.00	8.36	V
3188.125	32.42	-38.76	29.20	41.99	54.00	21.58	H
4981.875	30.69	-37.62	32.46	35.85	54.00	23.31	H
4960.000	30.71	-37.89	32.40	36.20	54.00	23.29	V
7440.000	33.31	-36.59	36.26	33.64	54.00	20.69	V

8DPSK Ch 0

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)
2341.875	45.46	2.60	27.64	15.22	54.00	8.54	V
2380.875	45.48	2.62	27.66	15.20	54.00	8.52	V
3087.500	33.45	-39.40	29.09	43.75	54.00	20.55	H
4803.750	28.85	-37.75	32.01	34.59	54.00	25.15	H
4996.250	30.63	-37.78	32.49	35.92	54.00	23.37	H
7206.250	32.01	-36.95	35.71	33.25	54.00	21.99	V

8DPSK Ch 39

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)
2381.375	45.77	2.62	27.66	15.49	54.00	8.23	V
2496.125	45.60	2.74	27.70	15.16	54.00	8.40	V
3138.125	33.99	-38.74	29.15	43.58	54.00	20.01	H
4881.875	30.30	-37.76	32.21	35.86	54.00	23.70	V
4995.000	30.87	-37.76	32.49	36.15	54.00	23.13	H
7323.125	31.79	-36.91	35.98	32.71	54.00	22.21	H

8DPSK Ch 78

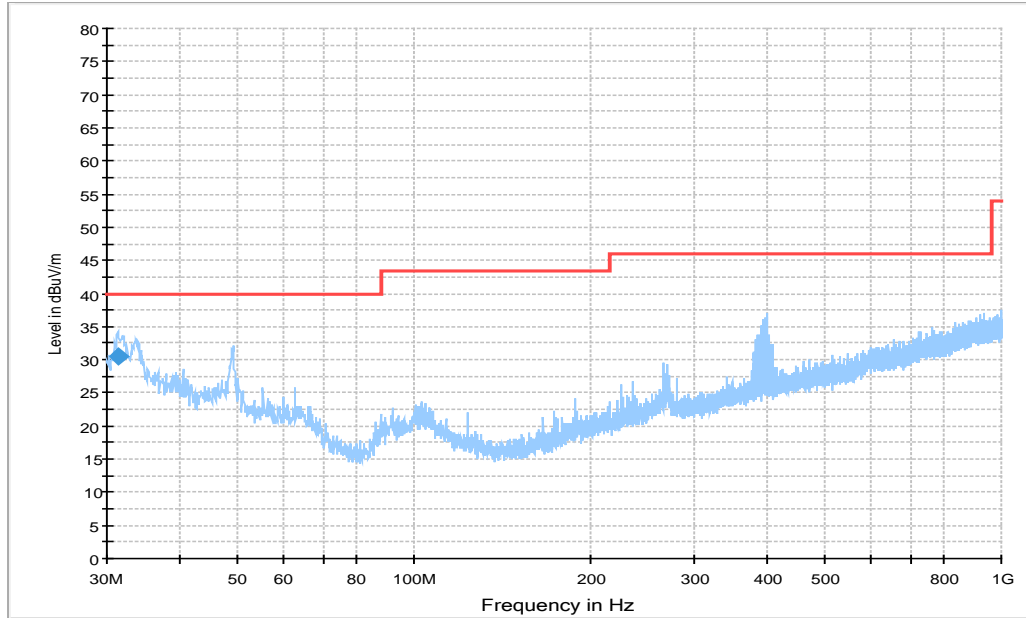
Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
2483.750	45.67	2.65	27.69	15.33	54.00	8.33	V
2493.875	45.63	2.72	27.70	15.21	54.00	8.37	V
3188.125	31.76	-38.76	29.20	41.32	54.00	22.24	V
4960.000	28.45	-37.89	32.40	33.95	54.00	25.55	V
4979.375	30.84	-37.65	32.45	36.03	54.00	23.16	H
7440.000	33.80	-36.59	36.26	34.13	54.00	20.20	H

Note: the spurious emission above 18G is noise only.

Conclusion: Pass

C.1.2 Radiated Spurious Emission- Below 1GHz

WOSRT CASE BELOW 1GHz



Final Result 1

Frequency (MHz)	QuasiPeak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)
31.3580	30.5	125.0	V	135.0	-2.7	9.5	40.0

BELOW 30MHz

No emissions were found within 20dB of the limit below 30MHz.

C.1.3 Band Edges Compliance– Radiated

SPEED

Mode	Channel	Frequency Range	Test Results	Conclusion
GFSK	0	2.31GHz ~2.45GHz	Fig.1	P
	78	2.45GHz ~2.5GHz	Fig.2	P

Mode	Channel	Frequency Range	Test Results	Conclusion
$\pi/4$ DQPSK	0	2.31GHz ~2.43GHz	Fig.3	P
	78	2.45GHz ~2.5GHz	Fig.4	P

Mode	Channel	Frequency Range	Test Results	Conclusion
8DPSK	0	2.31GHz ~2.45GHz	Fig.5	P
	78	2.45GHz ~2.5GHz	Fig.6	P

AWAN

Mode	Channel	Frequency Range	Test Results	Conclusion
GFSK	0	2.31GHz ~2.45GHz	Fig.7	P
	78	2.45GHz ~2.5GHz	Fig.8	P

Mode	Channel	Frequency Range	Test Results	Conclusion
$\pi/4$ DQPSK	0	2.31GHz ~2.43GHz	Fig.9	P
	78	2.45GHz ~2.5GHz	Fig.10	P

Mode	Channel	Frequency Range	Test Results	Conclusion
8DPSK	0	2.31GHz ~2.45GHz	Fig.11	P
	78	2.45GHz ~2.5GHz	Fig.12	P

Conclusion: PASS

Test graphs as below

SPEED

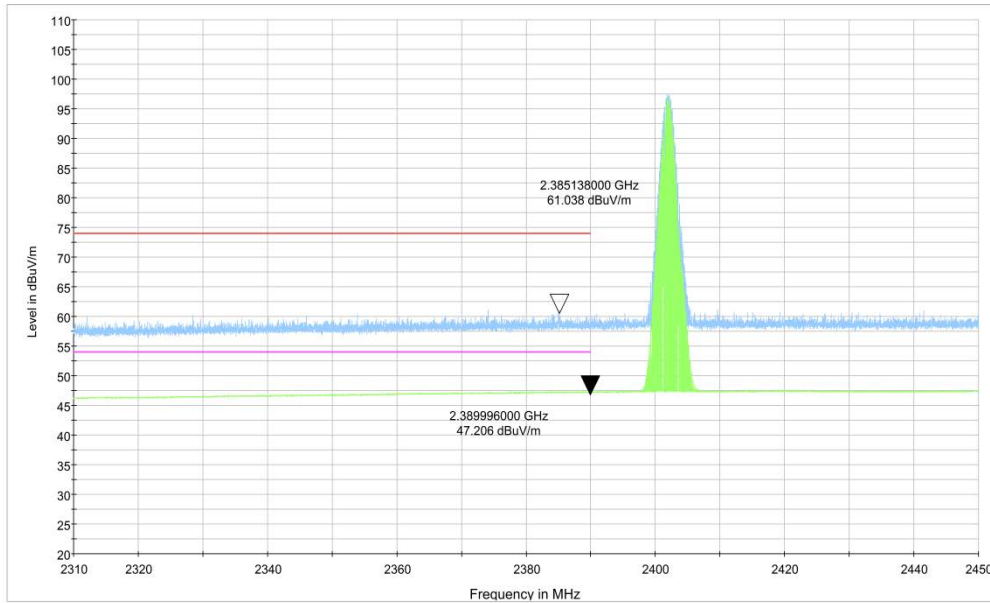


Fig.1. Frequency Band Edges: GFSK, Channel 0, 2.31 GHz – 2.45GHz

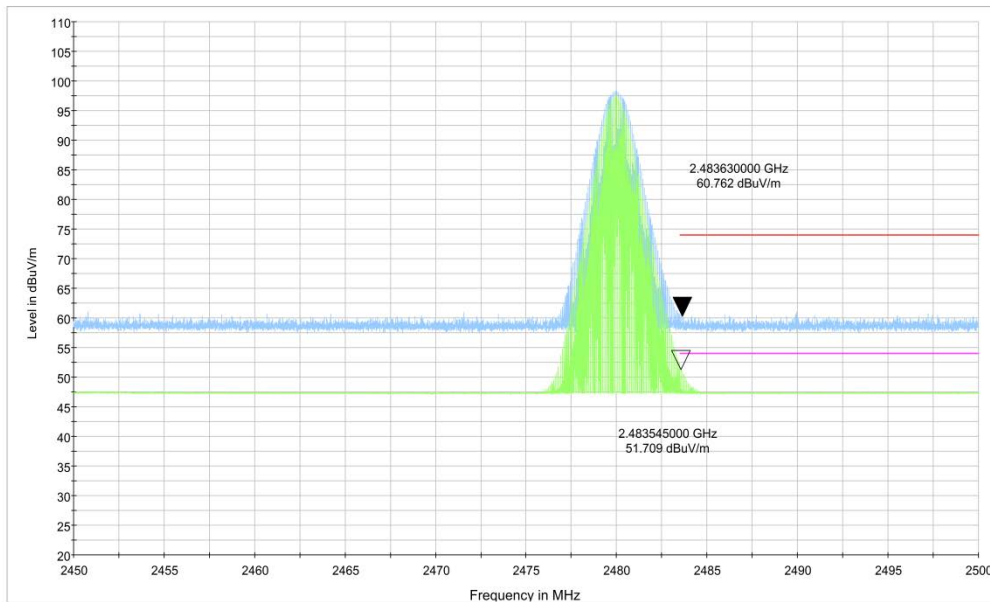


Fig.2. Frequency Band Edges: GFSK, Channel 78, 2.45 GHz - 2.50GHz

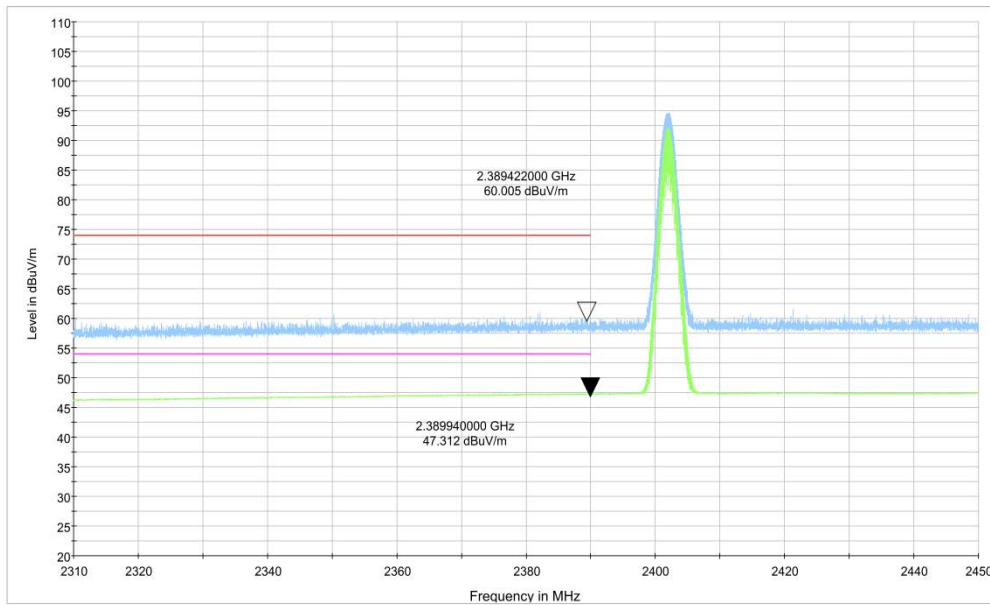


Fig.3. Frequency Band Edges: $\pi/4$ DQPSK, Channel 0, H2.31 GHz - 2.45GHz

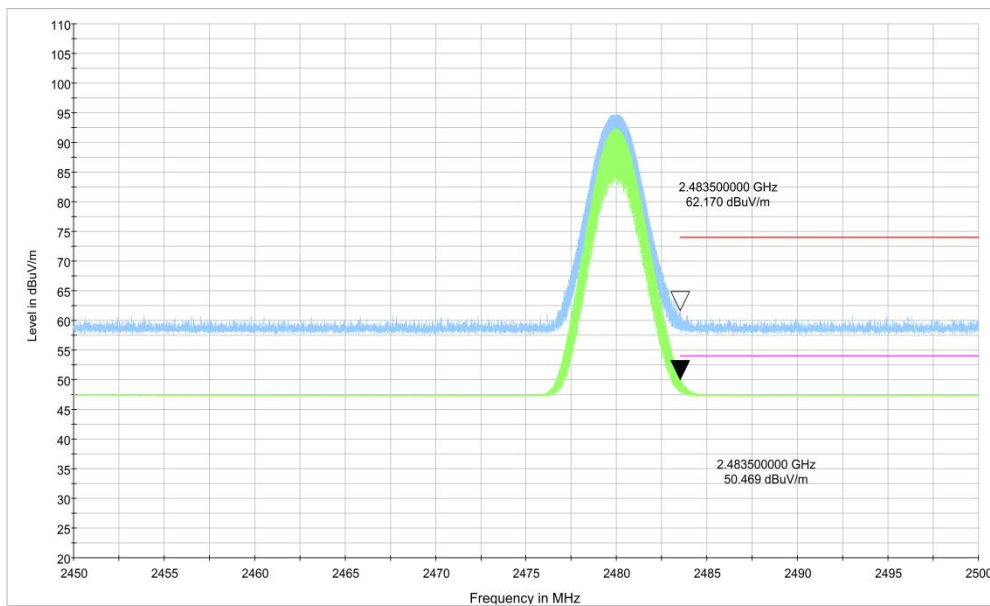


Fig.4. Frequency Band Edges: $\pi/4$ DQPSK, Channel 78, 2.45 GHz - 2.50GHz

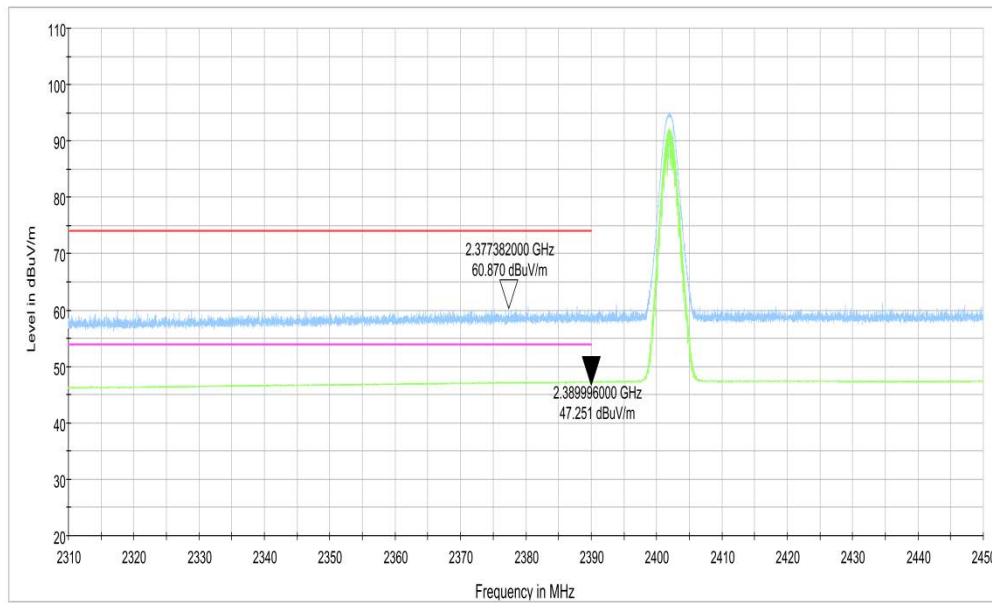


Fig.5. Frequency Band Edges: 8DPSK, Channel 0, 2.31 GHz - 2.45GHz

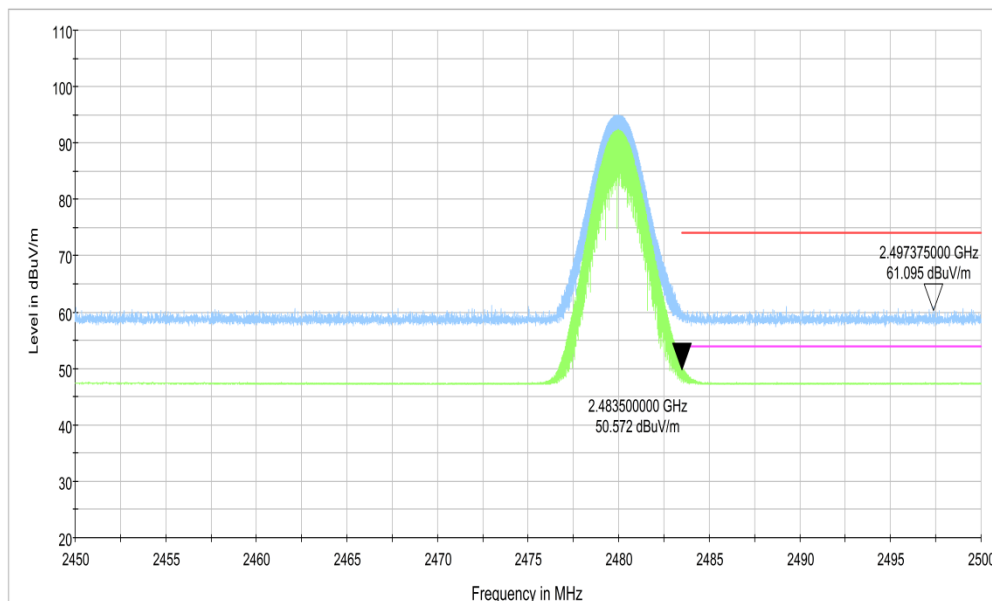


Fig.6. Frequency Band Edges: 8DPSK, Channel 78, 2.45 GHz - 2.50GHz

AWAN

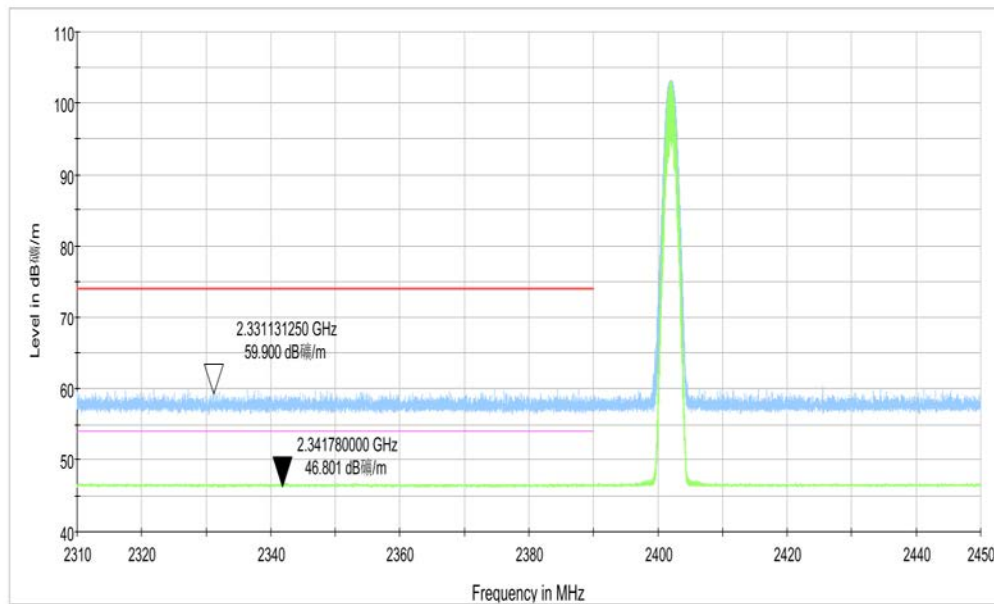


Fig.7. Frequency Band Edges: GFSK, Channel 0, Hopping Off, 2.31 GHz – 2.45GHz

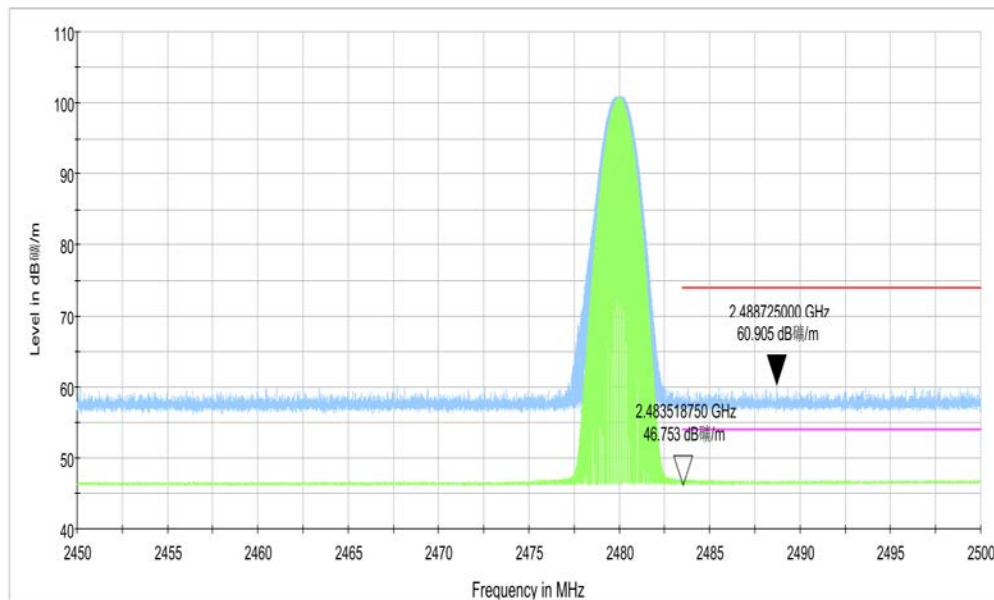


Fig.8. Frequency Band Edges: GFSK, Channel 78, Hopping Off, 2.45 GHz - 2.50GHz

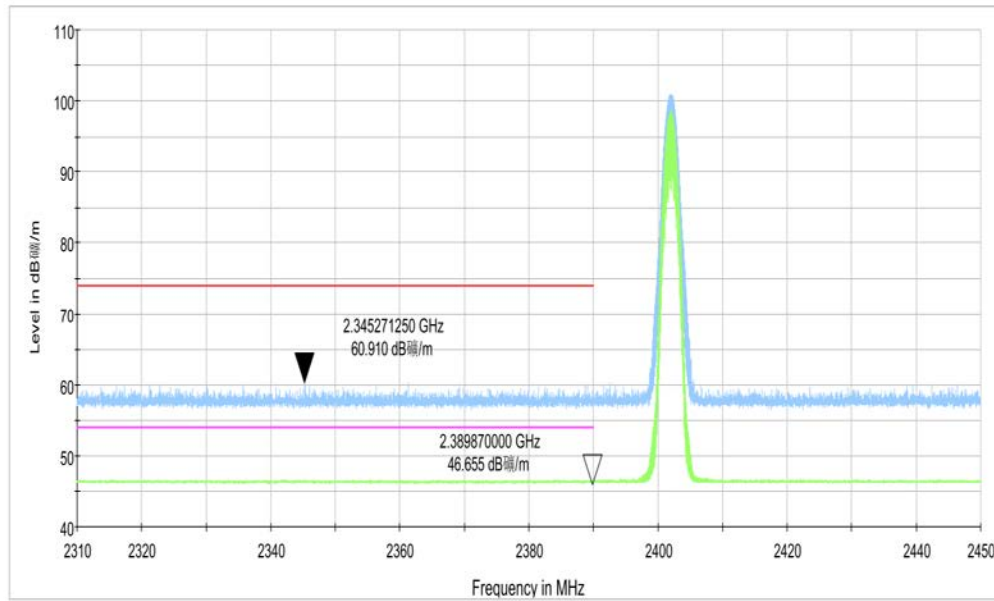


Fig.9. Frequency Band Edges: $\pi/4$ DQPSK, Channel 0, Hopping Off, 2.31 GHz - 2.45GHz

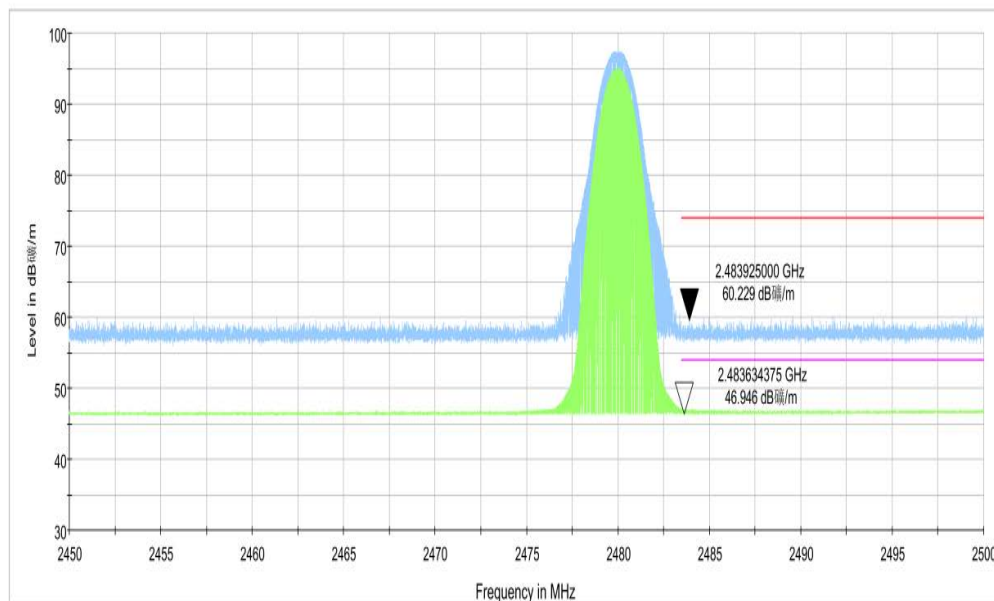


Fig.10. Frequency Band Edges: $\pi/4$ DQPSK, Channel 78, Hopping Off, 2.45 GHz - 2.50GHz

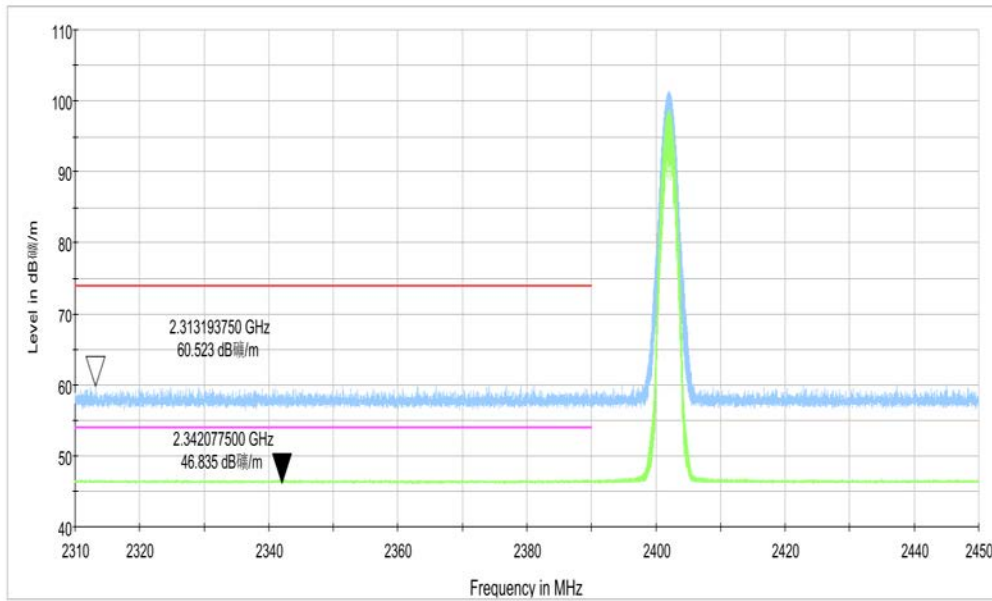


Fig.11. Frequency Band Edges: 8DPSK, Channel 0, 2.31 GHz - 2.45GHz

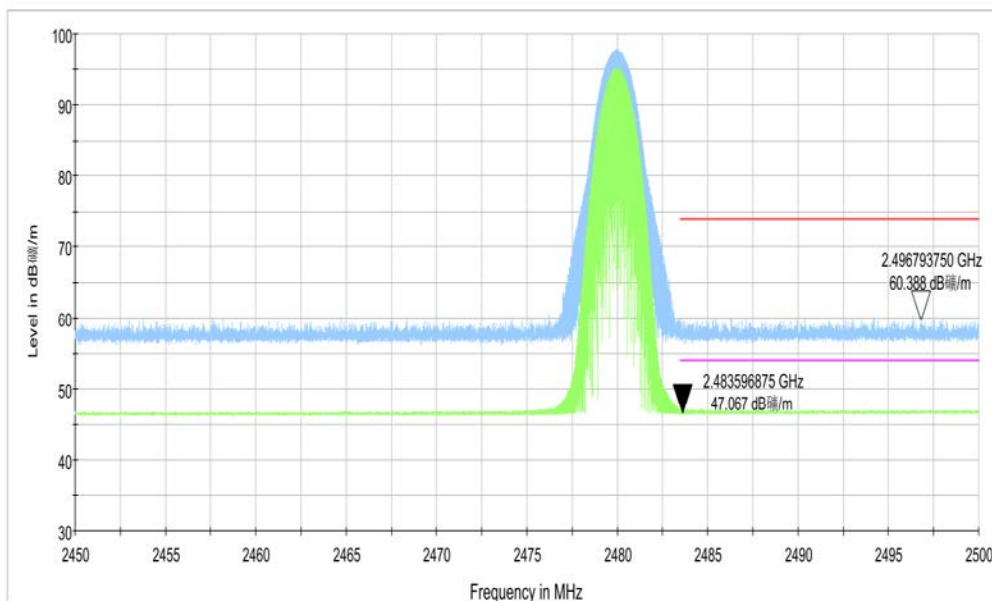


Fig.12. Frequency Band Edges: 8DPSK, Channel 78, 2.45 GHz - 2.50GHz

C.2. AC Powerline Conducted Emission

Specification Reference

FCC 47 CFR Part 15.207, 15.107

Method of Measurement:

See Clause 6.2 of ANSI C63.10-2013 specifically.

See Clause 4 and Clause 5 of ANSI C63.10-2013 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.

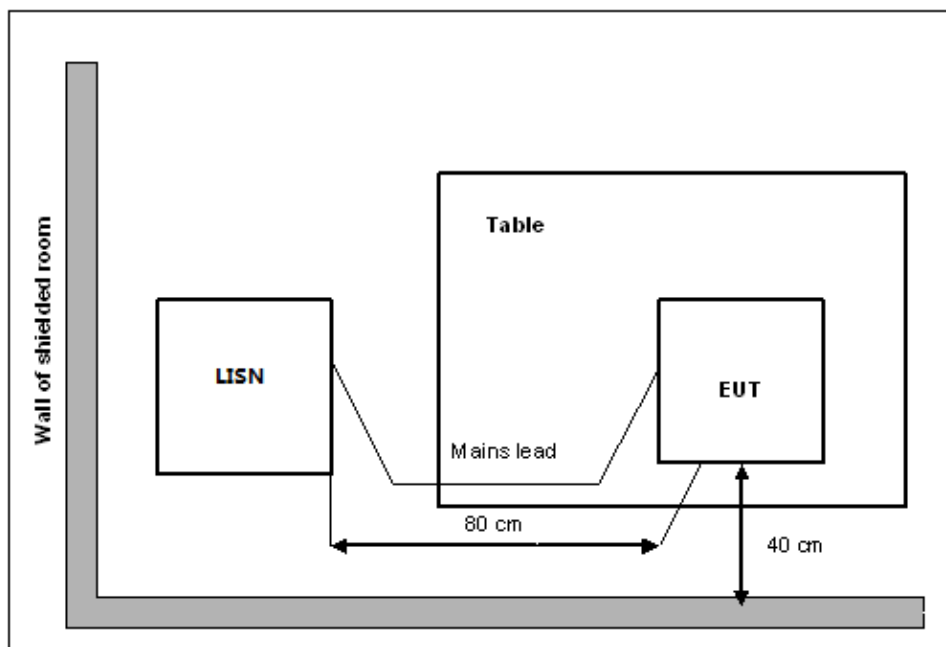
The measurement bandwidth is:

Frequency of Emission (MHz)	RBW/IF bandwidth	Sweep Time(s)
0.15-30	9kHz	1

Test Condition:

Voltage (V)	Frequency (Hz)
120	60

Measurement Setup



EUT Operating Mode and Test Conditions

The measurement of EUT is carried out under the transmit state.

The EUT is powered by an AC/travel adapter.

Measurement Result and limit:

Bluetooth (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dB μ V)	Result (dB μ V)		Conclusion
		With charger		
		bluetooth	Idle	
0.15 to 0.5	66 to 56	Fig.C.2.1	Fig.C.2.2	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.

Bluetooth (Average Limit)

Frequency range (MHz)	Average Limit (dB μ V)	Result (dB μ V)		Conclusion
		With charger		
		bluetooth	Idle	
0.15 to 0.5	56 to 46	Fig.C.2.1	Fig.C.2.2	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.

Note: all modes have been tested and the worst results shown here.

Conclusion: Pass

Test graphs as below:

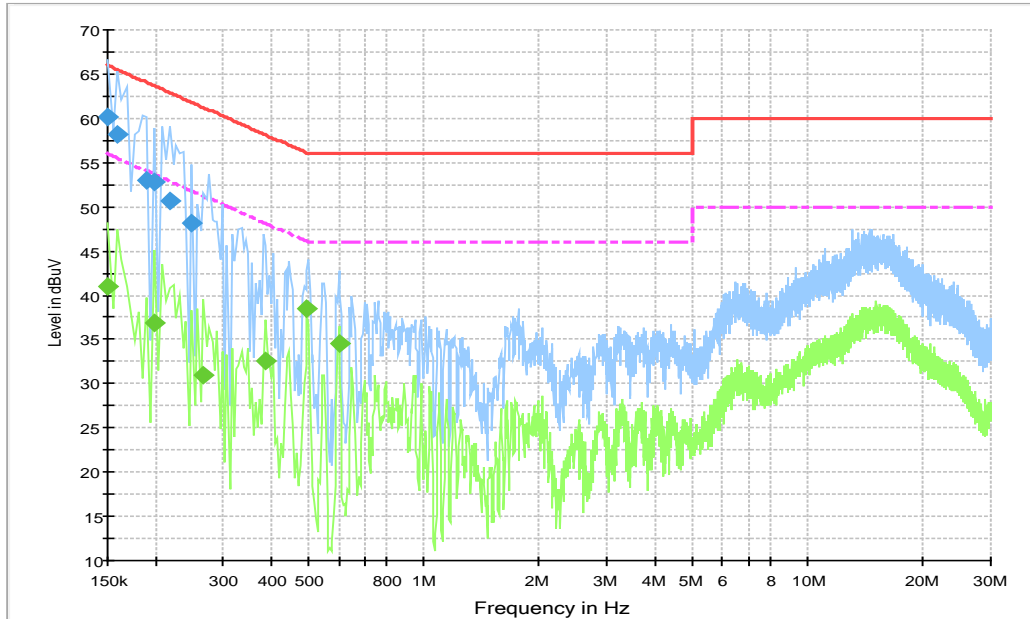


Fig.C.2.1 AC Power line Conducted Emission- Bluetooth

Note: The graphic result above is the maximum of the measurements for both phase line and neutral line.

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	60.2	1000.	9.000	L1	19.6	5.8	66.0
0.159000	58.2	1000.	9.000	L1	19.7	7.3	65.5
0.190500	52.9	1000.	9.000	L1	19.7	11.1	64.0
0.199500	52.7	1000.	9.000	L1	19.6	10.9	63.6
0.217500	50.7	1000.	9.000	L1	19.7	12.2	62.9
0.249000	48.2	1000.	9.000	L1	19.7	13.6	61.8

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	41.1	1000.0	9.000	L1	19.6	14.9	56.0
0.199500	36.9	1000.0	9.000	N	19.6	16.8	53.6
0.267000	30.9	1000.0	9.000	L1	19.7	20.3	51.2
0.388500	32.6	1000.0	9.000	L1	19.7	15.5	48.1
0.496500	38.5	1000.0	9.000	N	19.8	7.5	46.1
0.600000	34.5	1000.0	9.000	N	19.7	11.5	46.0

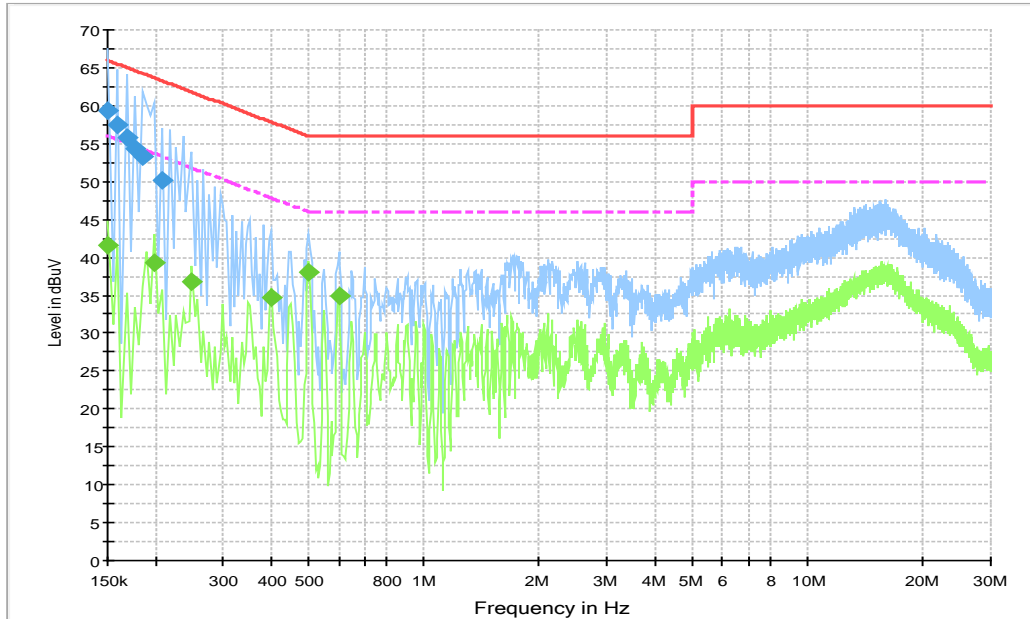


Fig.C.2.2 AC Power line Conducted Emission-Idle

Note: The graphic result above is the maximum of the measurements for both phase line and neutral line.

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	59.4	1000.	9.000	N	19.6	6.6	66.0
0.159000	57.4	1000.	9.000	N	19.6	8.1	65.5
0.168000	55.8	1000.	9.000	N	19.6	9.3	65.1
0.177000	54.3	1000.	9.000	N	19.6	10.3	64.6
0.186000	53.3	1000.	9.000	N	19.7	11.0	64.2
0.208500	50.1	1000.	9.000	N	19.6	13.1	63.3

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	41.6	1000.0	9.000	L1	19.6	14.4	56.0
0.199500	39.3	1000.0	9.000	L1	19.6	14.3	53.6
0.249000	36.8	1000.0	9.000	L1	19.7	15.0	51.8
0.402000	34.7	1000.0	9.000	N	19.8	13.1	47.8
0.501000	38.0	1000.0	9.000	N	19.8	8.0	46.0
0.600000	34.8	1000.0	9.000	L1	19.7	11.2	46.0

*****END OF REPORT*****