FCC PART 15C
TEST REPORT
No.I21Z70160-EMC08

for

Samsung Electronics Co., Ltd.

Notebook PC

NP760XDA, NP762XDA

with

FCC ID: ZCANP760XDA

Hardware Version: REV1.0

Software Version: Windows10-Pro

Issued Date: 2021-06-04

Note:

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I21Z70160-EMC08	Rev.0	1st edition	2021-06-04

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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: 2021-04-25

Testing End Date: 2021-05-30

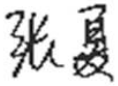
1.5. Signature

Li Yan

(Prepared this test report)

Zhang Ying

(Reviewed this test report)



Zhang Xia

Deputy Director of the laboratory

(Approved this test report)

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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:	/

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3. PRODUCT INFORMATION

3.1. About EUT

Description	Notebook PC
Model name	NP760XDA, NP762XDA
FCC ID	ZCANP760XDA

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
UT13a	2170160UT13a	REV1.0	Windows10-Pro
UT22a	2170160UT22a	REV1.0	Windows10-Pro

*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	Adapter	/	/
AE2	battery	/	/

AE1

Model	A20-135P1A
Manufacturer	Chicony Power Technology (Chong Qing) Co., Ltd.
Length	/

AE2

Model	AA-PBAN6TI
Manufacturer	SUNWODA Electronic Co., Ltd.

*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.

The difference of the model name is only for different marketing purposes.

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Antenna information

Item	Spec.	Type	Vendor	Vendor P/N	Sample under test
Antenna	Main antenna (Chain A)	PIFA	INPAQ	WA-F-LA-02-090	UT13a
	Auxiliary antenna (Chain B)	PIFA			
Antenna	Main antenna (Chain A)	PIFA	SPEED	F-0G-XZ-0272-000-00	UT22a
	Auxiliary antenna (Chain B)	PIFA			

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 Low Engegy 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

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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	2013
KDB 558074 D01	Federal Communications Commission Office of Engineering and Technology Laboratory Division 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.

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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℃
Voltage	V nom	4.0V
Humidity	H nom	20-75%

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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

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7. Measurement Uncertainty

Radiated Spurious Emission

Measurement Uncertainty:

Frequency Range	Uncertainty(dBm) (k=2)
9kHz-30MHz	/
30MHz ≤ f ≤ 1GHz	5.40
1GHz ≤ f ≤18GHz	4.32
18GHz ≤ f ≤40GHz	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

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ANNEX C: Detailed Test Results

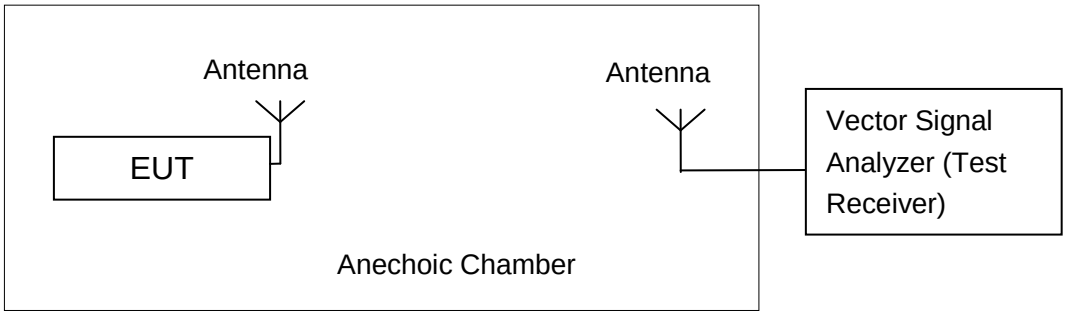
C.1. Radiated Spurious Emission

Specification Reference

FCC 47 CFR Part 15.247, 15.205, 15.209

Method of Measurement

Testing was performed in according with ANSI C63.10-2013 and KDB 558074.
The radiated emission test is performed in semi-anechoic chamber. The distance from the EUT to the reference point of measurement antenna is 3m. 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 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(μV/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

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Frequency of emission (MHz)	Field strength(dBμV/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/VBW
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:

Result=P_{Mea}+$A_{Rpl=}$ P_{Mea}+Cable Loss+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.

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C.1.1 Radiated Spurious Emission- above 1GHz

INPAQ

Peak Measurement results

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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)
2321.872	60.02	2.82	31.93	25.27	74.00	13.98	V
2376.752	60.22	2.86	31.99	25.37	74.00	13.78	V
4804.000	35.74	-33.27	34.12	34.89	74.00	38.26	V
7206.000	37.46	-31.17	35.78	32.85	74.00	36.54	H
9608.000	39.48	-30.55	36.65	33.38	74.00	34.52	V
12010.000	42.41	-28.93	38.71	32.63	74.00	31.59	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)
2373.800	44.65	-35.35	31.98	48.02	74.00	29.35	H
2501.000	44.67	-35.07	32.10	47.64	74.00	29.33	H
4882.000	37.55	-33.32	34.15	36.71	74.00	36.45	V
7323.000	38.80	-30.91	35.83	33.88	74.00	35.20	H
9764.000	40.95	-30.33	36.87	34.41	74.00	33.05	H
12205.000	44.56	-28.02	38.82	33.76	74.00	29.44	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)
2483.615	60.16	2.93	32.09	25.15	74.00	13.84	V
2484.025	60.34	2.93	32.09	25.32	74.00	13.66	V
4960.000	37.87	-33.60	34.18	37.28	74.00	36.13	V
7440.000	38.86	-31.69	35.88	34.67	74.00	35.14	H
9920.000	41.73	-30.00	37.09	34.63	74.00	32.27	H
12400.000	43.41	-28.10	38.94	32.57	74.00	30.59	V

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π/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)
2384.298	59.69	2.86	31.99	24.84	74.00	14.31	V
2386.880	59.90	2.86	32.00	25.04	74.00	14.10	H
4804.000	39.15	-33.27	34.12	38.30	74.00	34.85	V
7206.000	40.53	-31.17	35.78	35.92	74.00	33.47	V
9608.000	41.50	-30.55	36.65	35.40	74.00	32.50	V
12010.000	44.31	-28.93	38.71	34.53	74.00	29.69	V

π/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)
2371.200	43.91	-35.34	31.98	47.27	74.00	30.09	V
2513.800	44.85	-34.87	32.13	47.59	74.00	29.15	H
4882.000	39.86	-33.32	34.15	39.02	74.00	34.14	H
7323.000	39.91	-30.91	35.83	34.98	74.00	34.09	H
9764.000	41.72	-30.33	36.87	35.18	74.00	32.28	H
12205.000	43.90	-28.02	38.82	33.10	74.00	30.10	H

π/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)
2484.875	60.42	2.93	32.09	25.40	74.00	13.58	V
2486.250	60.71	2.93	32.09	25.69	74.00	13.29	V
4960.000	37.93	-33.60	34.18	37.34	74.00	36.07	H
7440.000	40.22	-31.69	35.88	36.04	74.00	33.78	H
9920.000	41.47	-30.00	37.09	34.38	74.00	32.53	V
12400.000	44.89	-28.10	38.94	34.05	74.00	29.11	H

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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)
2380.420	59.41	2.86	31.99	24.56	74.00	14.59	H
2389.464	59.75	2.87	32.00	24.88	74.00	14.25	H
4804.000	39.27	-33.27	34.12	38.42	74.00	34.73	H
7206.000	40.19	-31.17	35.78	35.58	74.00	33.81	V
9608.000	41.11	-30.55	36.65	35.01	74.00	32.89	H
12010.000	44.91	-28.93	38.71	35.13	74.00	29.09	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)
2363.600	44.01	-35.34	31.97	47.37	74.00	29.99	V
2510.800	44.78	-34.91	32.12	47.58	74.00	29.22	H
4882.000	39.32	-33.32	34.15	38.49	74.00	34.68	H
7323.000	40.95	-30.91	35.83	36.03	74.00	33.05	V
9764.000	41.61	-30.33	36.87	35.07	74.00	32.39	H
12205.000	44.75	-28.02	38.82	33.94	74.00	29.25	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)
2483.775	60.59	2.93	32.09	25.58	74.00	13.41	H
2484.425	59.23	2.93	32.09	24.21	74.00	14.77	H
4960.000	39.12	-33.60	34.18	38.53	74.00	34.88	H
7440.000	41.76	-31.69	35.88	37.58	74.00	32.24	H
9920.000	42.41	-30.00	37.09	35.32	74.00	31.59	V
12400.000	45.64	-28.10	38.94	34.79	74.00	28.36	V

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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)
2389.080	46.34	2.87	32.00	11.48	54.00	7.66	V
2389.980	46.30	2.87	32.00	11.44	54.00	7.70	V
4803.700	33.22	-33.27	34.12	32.36	54.00	20.78	V
7205.800	30.35	-31.17	35.78	25.73	54.00	23.65	V
9607.900	29.52	-30.55	36.65	23.41	54.00	24.48	V
12010.000	27.76	-28.93	38.71	17.98	54.00	26.24	H

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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)
2434.320	46.41	2.90	32.04	11.48	54.00	7.59	V
2449.860	46.48	2.91	32.05	11.52	54.00	7.52	V
4882.000	28.27	-33.32	34.15	27.44	54.00	25.73	H
7322.800	30.10	-30.91	35.83	25.18	54.00	23.90	V
9745.600	30.70	-30.33	36.85	24.18	54.00	23.30	H
12205.300	33.55	-28.02	38.82	22.74	54.00	20.45	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)
2483.520	46.49	2.93	32.09	11.48	54.00	7.51	V
2483.700	46.48	2.93	32.09	11.47	54.00	7.52	V
4960.300	27.46	-33.60	34.18	26.87	54.00	26.54	H
7439.800	29.29	-31.69	35.88	25.10	54.00	24.71	H
9920.200	31.09	-30.00	37.09	23.99	54.00	22.91	V
12399.700	33.22	-28.09	38.94	22.37	54.00	20.78	H

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π/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)
2389.140	46.31	2.87	32.00	11.45	54.00	7.69	V
2389.860	46.31	2.87	32.00	11.44	54.00	7.69	V
4803.700	27.77	-33.27	34.12	26.92	54.00	26.23	H
7205.800	29.55	-31.17	35.78	24.94	54.00	24.45	H
9607.900	30.40	-30.55	36.65	24.30	54.00	23.60	V
12010.000	33.24	-28.93	38.71	23.46	54.00	20.76	H

π/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)
2434.020	46.44	2.90	32.04	11.50	54.00	7.56	V
2446.560	46.40	2.91	32.05	11.44	54.00	7.60	V
4882.000	28.06	-33.32	34.15	27.23	54.00	25.94	H
7322.800	30.03	-30.91	35.83	25.11	54.00	23.97	V
9745.600	30.74	-30.33	36.85	24.22	54.00	23.26	H
12205.300	33.53	-28.02	38.82	22.72	54.00	20.47	V

π/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	46.55	2.93	32.09	11.53	54.00	7.45	V
2484.060	46.48	2.93	32.09	11.46	54.00	7.52	V
4960.300	27.47	-33.60	34.18	26.88	54.00	26.53	H
7439.800	29.33	-31.69	35.88	25.14	54.00	24.67	H
9920.200	31.19	-30.00	37.09	24.09	54.00	22.81	H
12399.700	33.34	-28.09	38.94	22.49	54.00	20.66	V

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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)
2389.260	46.33	2.87	32.00	11.47	54.00	7.67	V
2389.980	46.29	2.87	32.00	11.43	54.00	7.71	V
4803.700	27.83	-33.27	34.12	26.98	54.00	26.17	H
7205.800	29.53	-31.17	35.78	24.91	54.00	24.47	H
9607.900	30.37	-30.55	36.65	24.27	54.00	23.63	H
12010.000	33.33	-28.93	38.71	23.55	54.00	20.67	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)
2429.340	46.42	2.89	32.04	11.49	54.00	7.58	V
2450.280	46.49	2.91	32.05	11.53	54.00	7.51	V
4882.000	28.24	-33.32	34.15	27.40	54.00	25.76	H
7322.800	30.09	-30.91	35.83	25.17	54.00	23.91	V
9745.600	30.80	-30.33	36.85	24.28	54.00	23.20	V
12205.300	33.62	-28.02	38.82	22.82	54.00	20.38	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	46.51	2.93	32.09	11.49	54.00	7.49	V
2484.060	46.48	2.93	32.09	11.47	54.00	7.52	V
4960.300	27.55	-33.60	34.18	26.96	54.00	26.45	V
7439.800	29.40	-31.69	35.88	25.22	54.00	24.60	V
9920.200	31.15	-30.00	37.09	24.06	54.00	22.85	V
12399.700	33.35	-28.09	38.94	22.50	54.00	20.65	H

Conclusion: Pass

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

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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)
2346.414	60.35	2.84	31.96	25.56	74.00	13.65	V
2380.028	60.16	2.86	31.99	25.31	74.00	13.84	V
4804.000	39.46	-33.27	34.12	38.60	74.00	34.54	V
7206.000	41.23	-31.17	35.78	36.61	74.00	32.77	V
9608.000	41.25	-30.55	36.65	35.15	74.00	32.75	V
12010.000	44.27	-28.93	38.71	34.50	74.00	29.73	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)
2374.200	44.17	-35.35	31.98	47.53	74.00	29.83	V
2511.600	44.67	-34.90	32.12	47.45	74.00	29.33	V
4882.000	38.17	-33.32	34.15	37.33	74.00	35.83	H
7323.000	40.74	-30.91	35.83	35.82	74.00	33.26	H
9764.000	43.18	-30.33	36.87	36.64	74.00	30.82	V
12205.000	44.55	-28.02	38.82	33.75	74.00	29.45	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)
2485.535	60.15	2.93	32.09	25.13	74.00	13.85	V
2489.390	60.74	2.94	32.09	25.71	74.00	13.26	V
4960.000	38.04	-33.60	34.18	37.45	74.00	35.96	H
7440.000	40.41	-31.69	35.88	36.23	74.00	33.59	V
9920.000	42.72	-30.00	37.09	35.62	74.00	31.28	V
12400.000	45.22	-28.10	38.94	34.37	74.00	28.78	H

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π/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)
2369.500	60.48	2.85	31.98	25.65	74.00	13.52	V
2382.548	60.27	2.86	31.99	25.42	74.00	13.73	V
4804.000	38.16	-33.27	34.12	37.31	74.00	35.84	V
7206.000	41.02	-31.17	35.78	36.40	74.00	32.98	V
9608.000	41.24	-30.55	36.65	35.14	74.00	32.76	H
12010.000	44.20	-28.93	38.71	34.43	74.00	29.80	V

π/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)
2365.200	43.44	-35.34	31.98	46.80	74.00	30.56	V
2506.000	44.34	-34.99	32.11	47.22	74.00	29.66	V
4882.000	39.59	-33.32	34.15	38.75	74.00	34.41	V
7323.000	40.97	-30.91	35.83	36.04	74.00	33.03	V
9764.000	41.64	-30.33	36.87	35.10	74.00	32.36	H
12205.000	44.59	-28.02	38.82	33.78	74.00	29.41	H

π/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)
2484.145	60.24	2.93	32.09	25.22	74.00	13.76	V
2490.705	60.46	2.94	32.09	25.43	74.00	13.54	V
4960.000	39.85	-33.60	34.18	39.26	74.00	34.15	H
7440.000	40.59	-31.69	35.88	36.40	74.00	33.41	H
9920.000	43.17	-30.00	37.09	36.08	74.00	30.83	V
12400.000	43.56	-28.10	38.94	32.72	74.00	30.44	V

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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)
2356.074	59.81	2.84	31.97	25.00	74.00	14.19	V
2374.008	61.28	2.85	31.98	26.44	74.00	12.72	V
4904.000	38.63	-33.42	34.16	37.89	74.00	35.37	V
7206.000	41.53	-31.17	35.78	36.91	74.00	32.47	V
9608.000	41.01	-30.55	36.65	34.90	74.00	32.99	V
12010.000	45.88	-28.93	38.71	36.10	74.00	28.12	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)
2365.800	43.52	-35.34	31.98	46.88	74.00	30.48	V
2501.600	45.29	-35.06	32.10	48.25	74.00	28.71	V
4882.000	38.54	-33.32	34.15	37.70	74.00	35.46	H
7323.000	42.55	-30.91	35.83	37.63	74.00	31.45	H
9764.000	41.22	-30.33	36.87	34.68	74.00	32.78	V
12205.000	44.66	-28.02	38.82	33.86	74.00	29.34	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)
2487.875	61.05	2.93	32.09	26.03	74.00	12.95	V
2494.505	60.84	2.94	32.10	25.80	74.00	13.16	V
4960.000	38.66	-33.60	34.18	38.07	74.00	35.34	V
7440.000	39.33	-31.69	35.88	35.15	74.00	34.67	H
9920.000	42.57	-30.00	37.09	35.47	74.00	31.43	H
12400.000	44.98	-28.10	38.94	34.13	74.00	29.02	H

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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)
2387.100	46.27	2.9	32.0	11.41	54.0	7.7	V
2389.980	46.32	2.9	32.0	11.46	54.0	7.7	V
4804.500	27.53	-33.3	34.1	26.68	54.0	26.5	V
7206.000	29.11	-31.2	35.8	24.49	54.0	24.9	V
9607.500	30.00	-30.6	36.7	23.90	54.0	24.0	H
12010.500	32.85	-28.9	38.7	23.07	54.0	21.2	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)
2437.020	46.42	2.9	32.0	11.48	54.0	7.6	V
2445.720	46.50	2.9	32.1	11.54	54.0	7.5	V
4882.500	27.57	-33.3	34.2	26.73	54.0	26.4	V
7323.000	29.50	-30.9	35.8	24.57	54.0	24.5	V
9763.500	30.30	-30.3	36.9	23.76	54.0	23.7	H
12205.500	33.09	-28.0	38.8	22.28	54.0	20.9	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	49.38	2.9	32.1	14.36	54.0	4.6	V
2483.760	48.59	2.9	32.1	13.57	54.0	5.4	V
4960.500	27.27	-33.6	34.2	26.68	54.0	26.7	V
7440.000	28.73	-31.7	35.9	24.55	54.0	25.3	H
9919.500	30.77	-30.0	37.1	23.67	54.0	23.2	H
12400.500	32.92	-28.1	38.9	22.07	54.0	21.1	H

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π/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)
2386.860	46.32	2.9	32.0	11.46	54.0	7.7	V
2389.980	46.35	2.9	32.0	11.48	54.0	7.7	V
4804.500	27.66	-33.3	34.1	26.81	54.0	26.3	V
7206.000	29.28	-31.2	35.8	24.66	54.0	24.7	V
9607.500	30.18	-30.6	36.7	24.08	54.0	23.8	V
12010.500	32.88	-28.9	38.7	23.10	54.0	21.1	V

π/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)
2437.440	46.64	2.9	32.0	11.70	54.0	7.4	V
2445.060	46.63	2.9	32.1	11.67	54.0	7.4	V
4882.500	27.67	-33.3	34.2	26.84	54.0	26.3	V
7323.000	29.73	-30.9	35.8	24.81	54.0	24.3	V
9763.500	30.51	-30.3	36.9	23.97	54.0	23.5	H
12205.500	33.41	-28.0	38.8	22.60	54.0	20.6	H

π/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	48.73	2.9	32.1	13.71	54.0	5.3	V
2483.640	48.05	2.9	32.1	13.03	54.0	5.9	V
4960.500	27.46	-33.6	34.2	26.87	54.0	26.5	H
7440.000	28.88	-31.7	35.9	24.69	54.0	25.1	H
9919.500	30.94	-30.0	37.1	23.84	54.0	23.1	V
12400.500	33.04	-28.1	38.9	22.20	54.0	21.0	V

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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)
2388.180	46.30	2.9	32.0	11.44	54.0	7.7	V
2389.980	46.29	2.9	32.0	11.42	54.0	7.7	V
4804.500	27.69	-33.3	34.1	26.84	54.0	26.3	V
7206.000	29.34	-31.2	35.8	24.72	54.0	24.7	H
9607.500	30.25	-30.6	36.7	24.14	54.0	23.8	H
12010.500	33.02	-28.9	38.7	23.25	54.0	21.0	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)
2436.660	46.68	2.9	32.0	11.74	54.0	7.3	V
2445.360	46.90	2.9	32.1	11.94	54.0	7.1	V
4882.500	27.74	-33.3	34.2	26.90	54.0	26.3	V
7323.000	29.64	-30.9	35.8	24.71	54.0	24.4	V
9763.500	30.63	-30.3	36.9	24.09	54.0	23.4	V
12205.500	33.44	-28.0	38.8	22.63	54.0	20.6	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)
2483.520	48.76	2.9	32.1	13.75	54.0	5.2	V
2483.760	47.83	2.9	32.1	12.82	54.0	6.2	V
4960.500	27.47	-33.6	34.2	26.88	54.0	26.5	V
7440.000	29.08	-31.7	35.9	24.89	54.0	24.9	V
9919.500	31.00	-30.0	37.1	23.91	54.0	23.0	H
12400.500	33.17	-28.1	38.9	22.33	54.0	20.8	V

Conclusion: Pass

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

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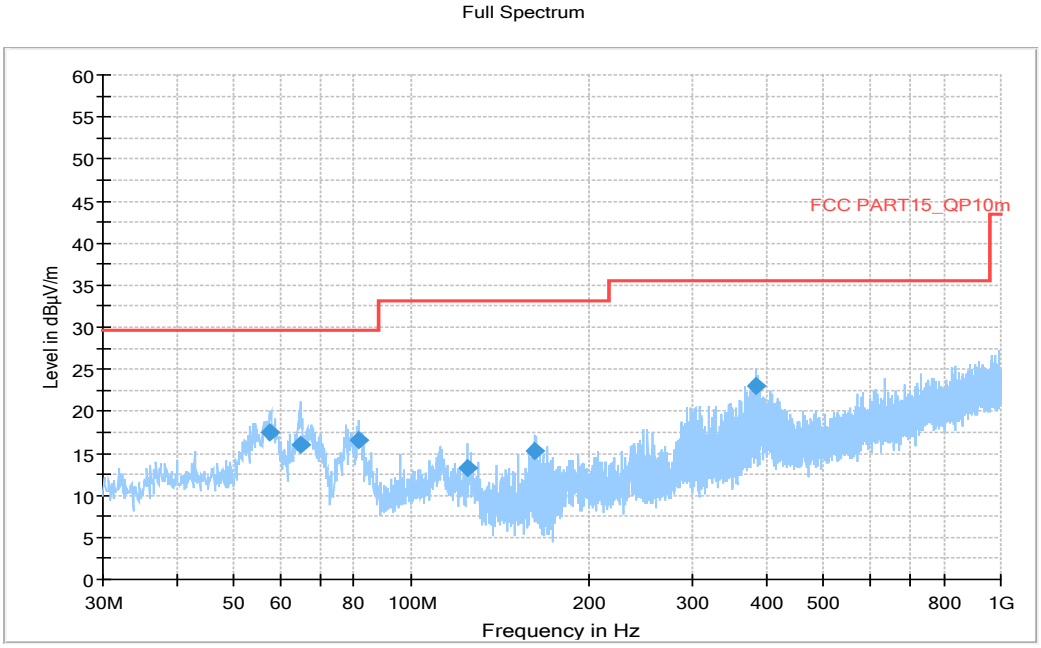
C.1.2 Radiated Spurious Emission- Below 1GHz

WOSRT CASE BELOW 1GHz



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
57.645	17.44	29.5	12.06	1000	120	101	V	3
65.017	15.95	29.5	13.55	1000	120	101	V	-26
81.507	16.49	29.5	13.01	1000	120	188	V	23
124.769	13.2	33.1	19.9	1000	120	112	V	150
162.502	15.3	33.1	17.8	1000	120	183	V	300
383.856	22.93	35.6	12.67	1000	120	101	V	86

Note: 10 meters' limit is got by converting from 3 meters test distance.
Limit (10m) = limit (3m) + 20(log (3/10))

BELOW 30MHz

There are no emissions found below 30MHz with in 20dB of the limit.

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C.1.3 Band Edges Compliance– Radiated

INPAQ

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
π/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

SPEED

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
π/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

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INPAQ

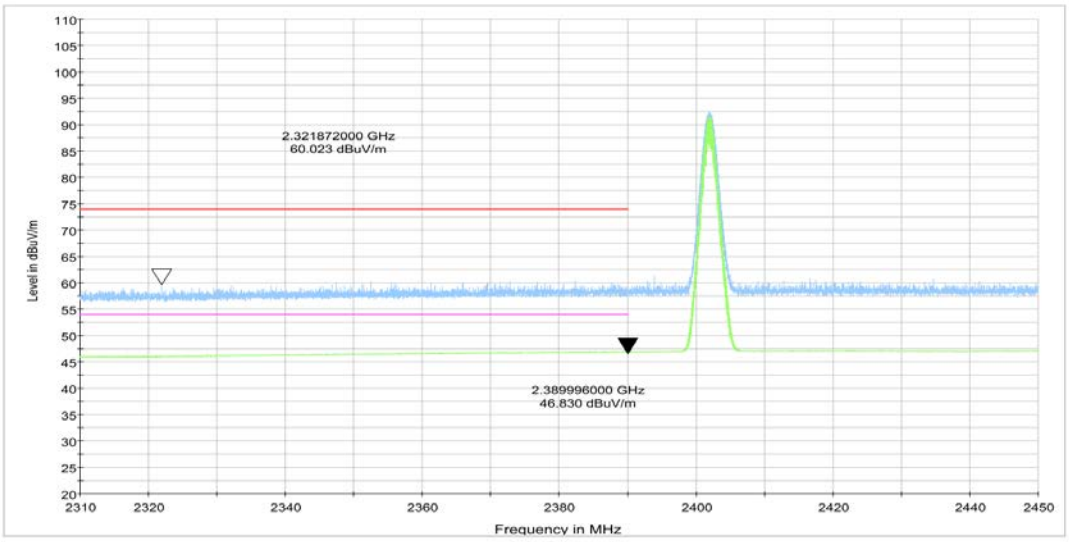

Fig.1. Frequency Band Edges: GFSK, Channel 0, 2.31 GHz – 2.45GHz

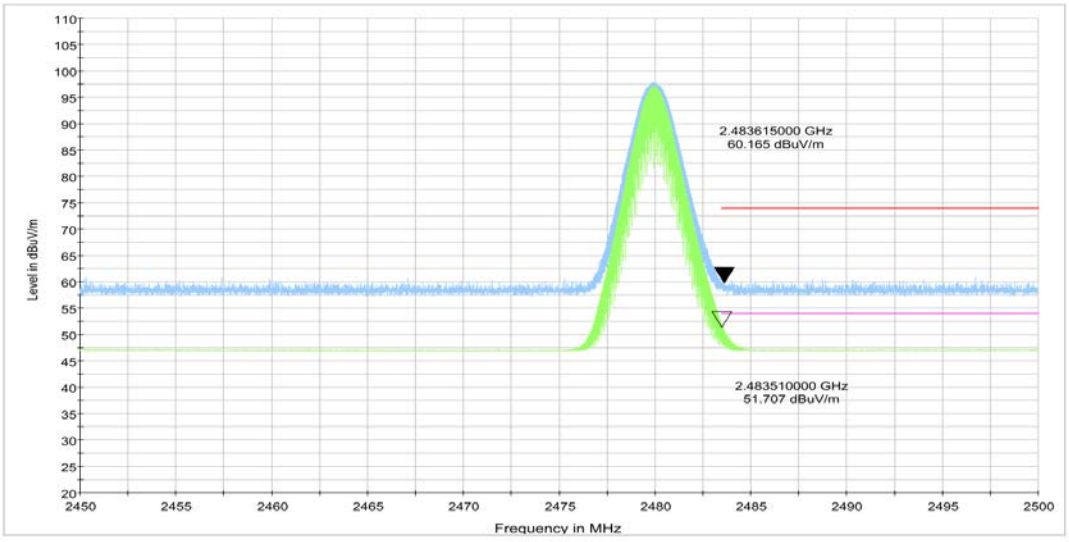

Fig.2. Frequency Band Edges: GFSK, Channel 78, ch11, 2.45 GHz - 2.50GHz

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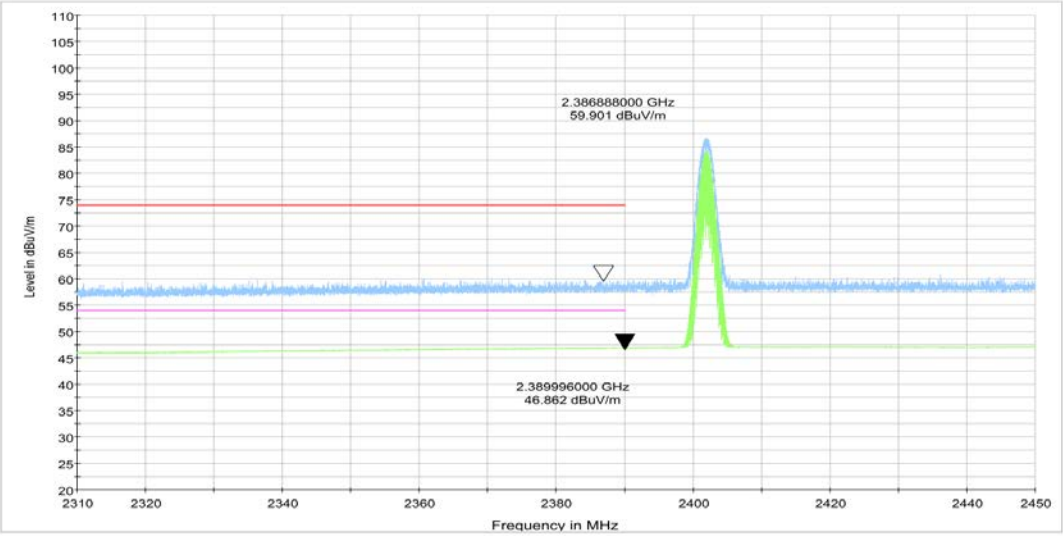

Fig.3. Frequency Band Edges: π/4 DQPSK, Channel 0, 2.31 GHz - 2.45GHz

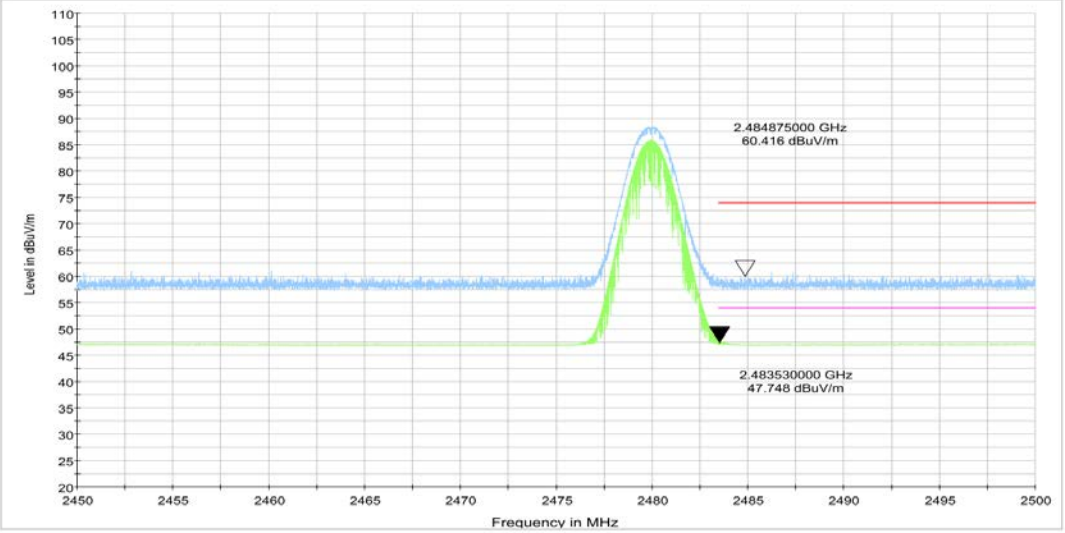

Fig.4. Frequency Band Edges: π/4 DQPSK, Channel 78, 2.45 GHz - 2.50GHz

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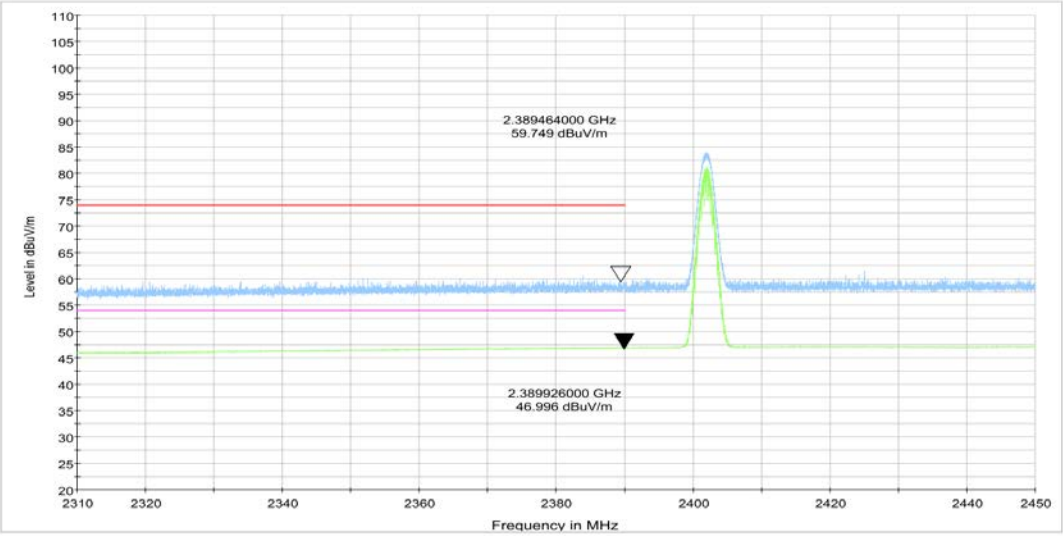

Fig.5. Frequency Band Edges: 8DPSK, Channel 0, 2.38 GHz - 2.45GHz

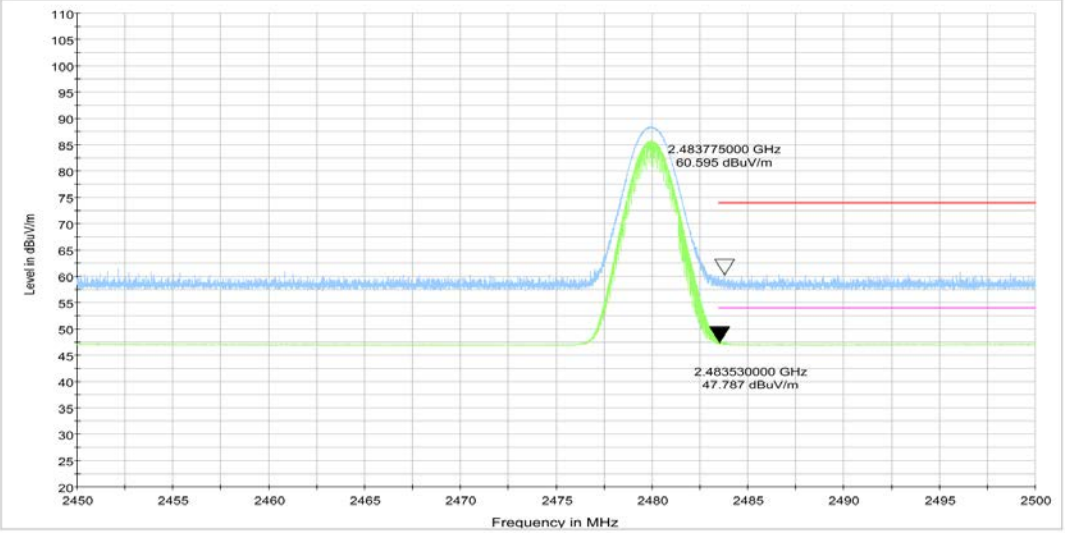

Fig.6. Frequency Band Edges: 8DPSK, Channel 78, 2.45 GHz - 2.50GHz

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SPEED

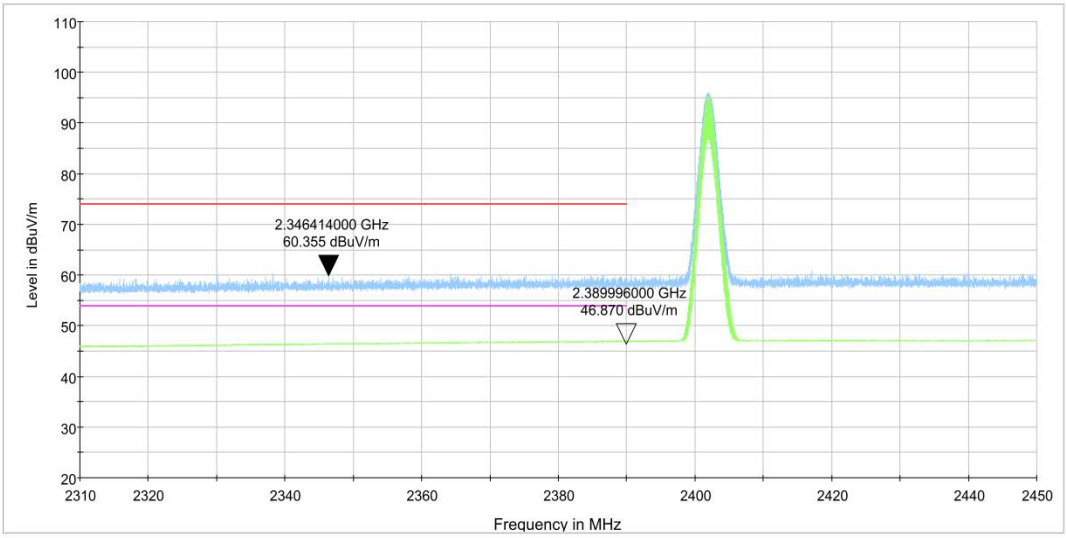

Fig.7. Frequency Band Edges: GFSK, Channel 0, 2.31 GHz – 2.45GHz

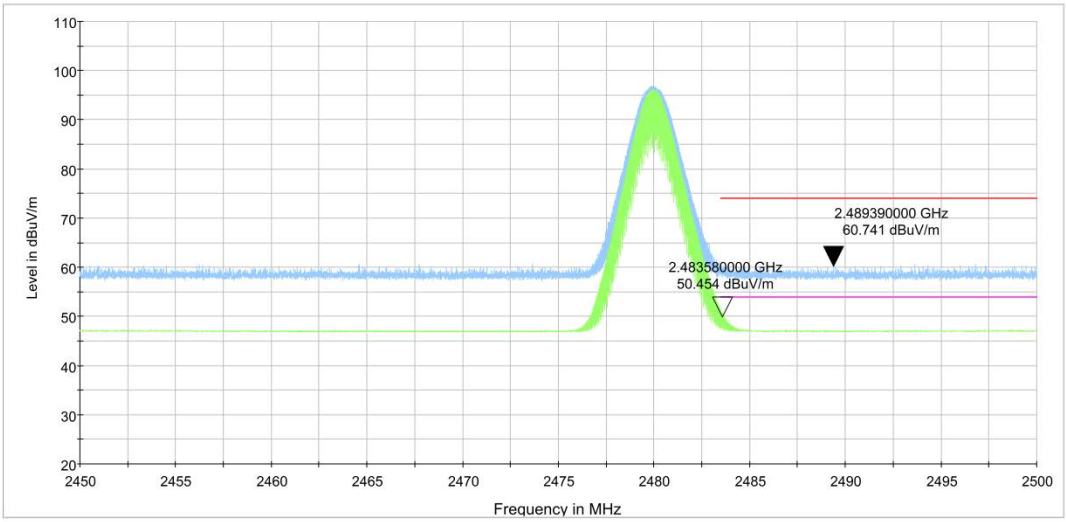

Fig.8. Frequency Band Edges: GFSK, Channel 78, ch11, 2.45 GHz - 2.50GHz

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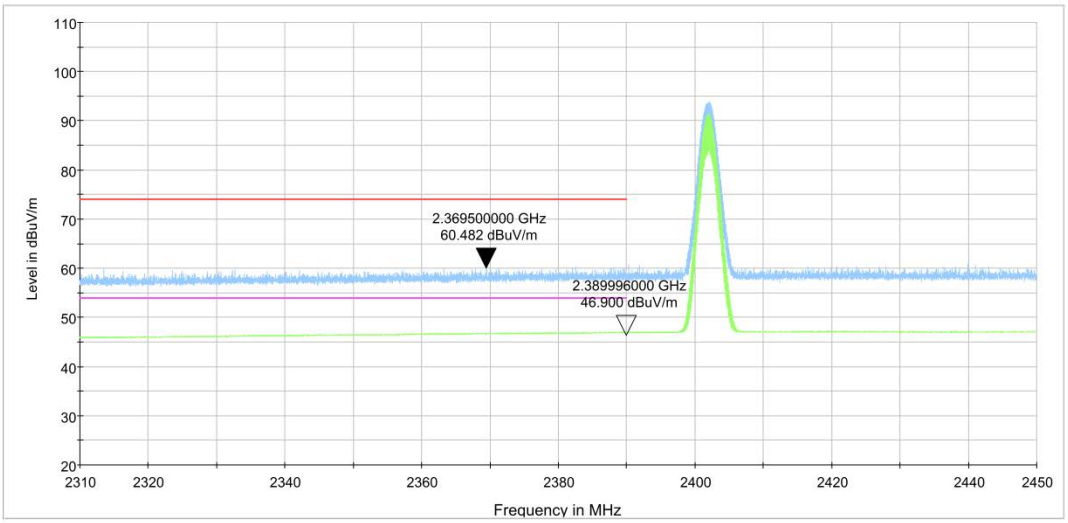

Fig.9. Frequency Band Edges: π/4 DQPSK, Channel 0, 2.31 GHz - 2.45GHz

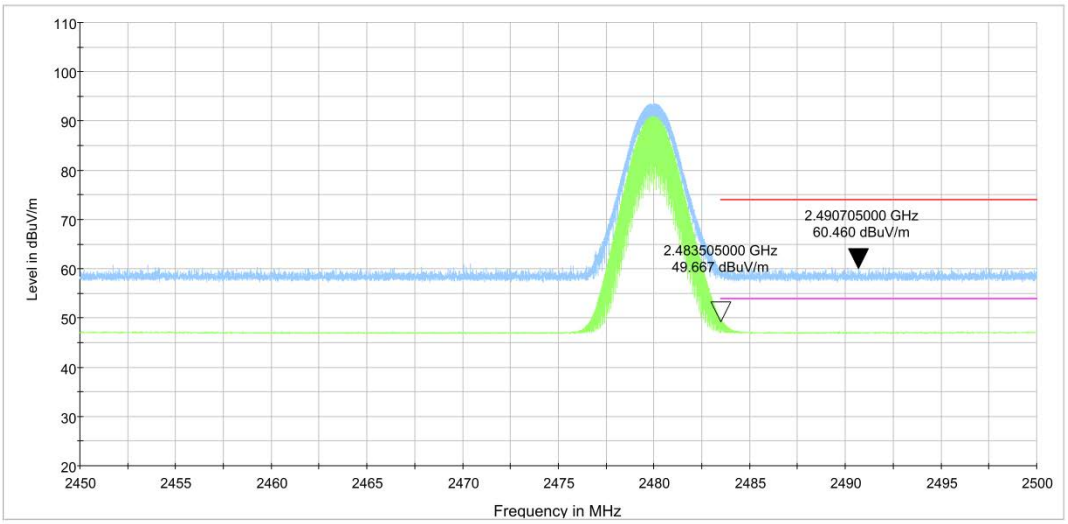

Fig.10. Frequency Band Edges: π/4 DQPSK, Channel 78, 2.45 GHz - 2.50GHz

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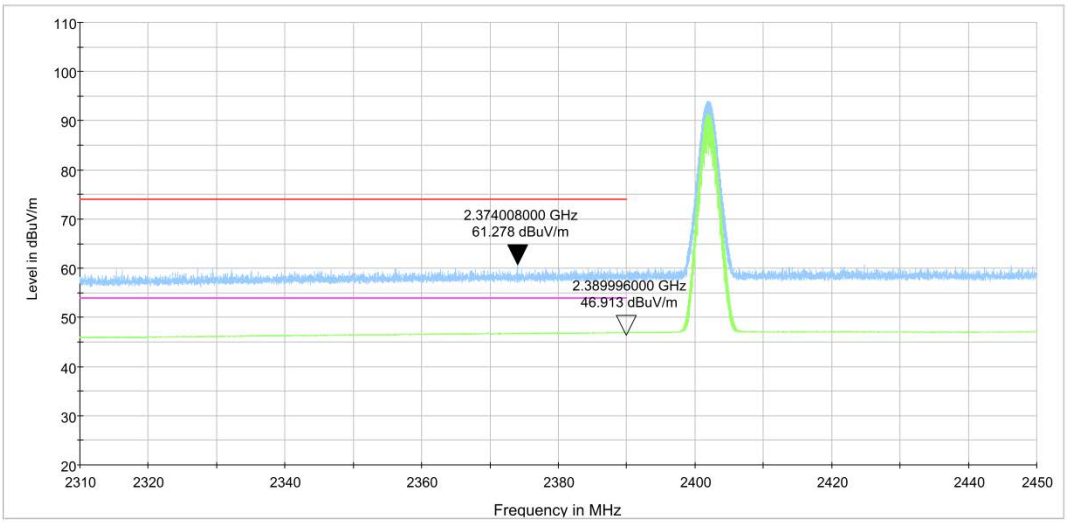

Fig.11. Frequency Band Edges: 8DPSK, Channel 0, 2.38 GHz - 2.45GHz

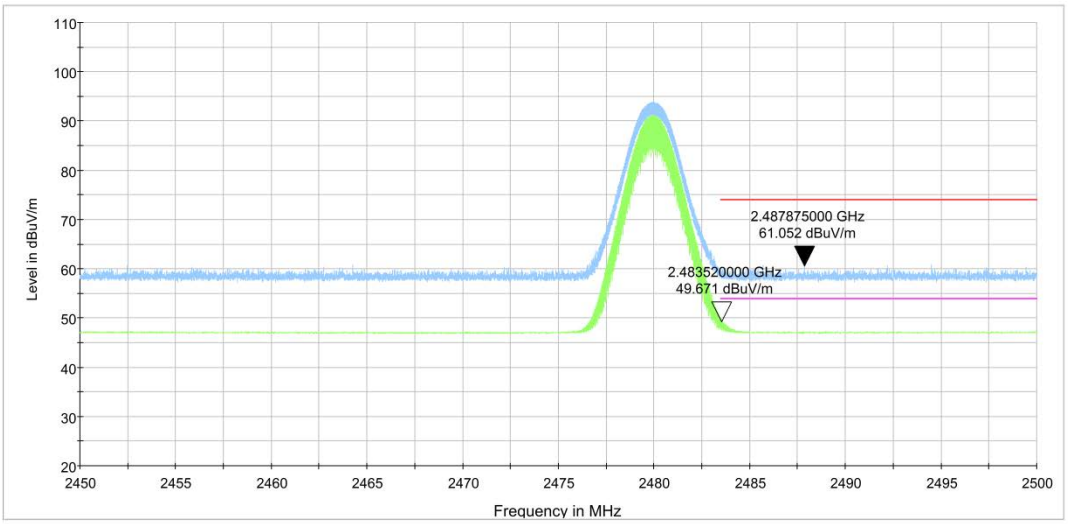

Fig.12. Frequency Band Edges: 8DPSK, Channel 78, 2.45 GHz - 2.50GHz

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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.

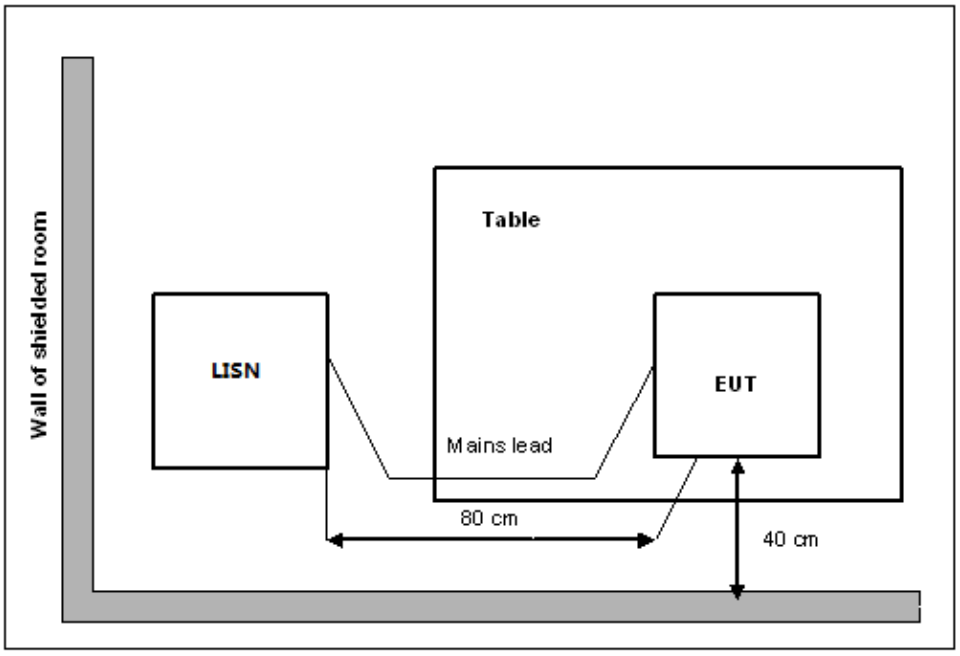
The measurement bandwidth is:

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

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.

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Measurement Result and limit:

Bluetooth (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV)		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 (dBμV)	Result (dBμV)		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:

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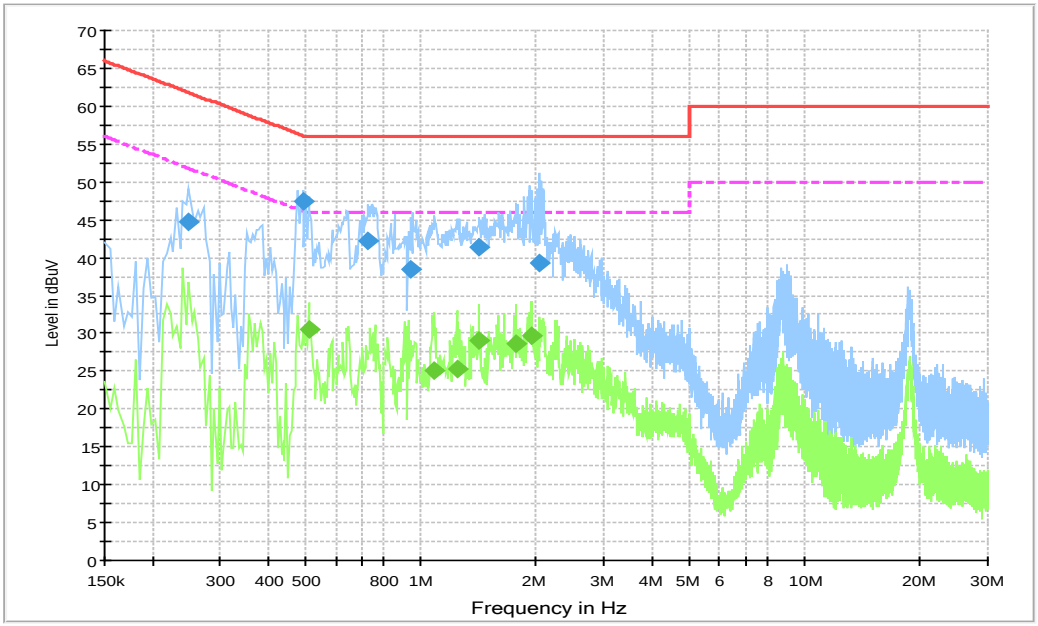

Fig.C.2.1 AC Powerline Conducted Emission- bluetooth

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)
0.249000	44.7	1000.	9.000	L1	19.7	17.1	61.8
0.492000	47.4	1000.	9.000	L1	19.8	8.8	56.1
0.730500	42.1	1000.	9.000	L1	19.7	13.9	56.0
0.942000	38.4	1000.	9.000	N	19.7	17.6	56.0
1.423500	41.4	1000.	9.000	L1	19.6	14.6	56.0
2.040000	39.3	1000.	9.000	N	19.6	16.7	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.510000	30.6	1000.0	9.000	L1	19.8	15.4	46.0
1.086000	25.1	1000.0	9.000	L1	19.7	20.9	46.0
1.239000	25.3	1000.0	9.000	L1	19.7	20.7	46.0
1.414500	29.1	1000.0	9.000	L1	19.6	16.9	46.0
1.770000	28.7	1000.0	9.000	L1	19.7	17.3	46.0
1.945500	29.8	1000.0	9.000	L1	19.7	16.2	46.0

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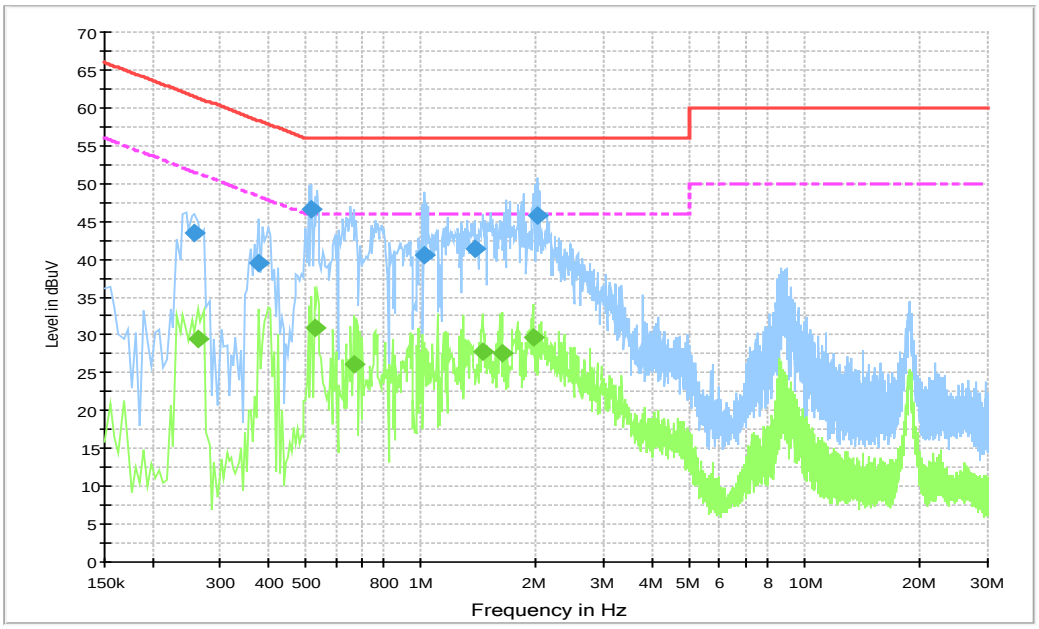

Fig.C.2.2 AC Powerline Conducted Emission-Idle

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)
0.258000	43.5	1000.	9.000	L1	19.7	18.0	61.5
0.379500	39.6	1000.	9.000	L1	19.8	18.7	58.3
0.519000	46.7	1000.	9.000	L1	19.8	9.3	56.0
1.023000	40.5	1000.	9.000	L1	19.6	15.5	56.0
1.383000	41.3	1000.	9.000	L1	19.6	14.7	56.0
2.017500	45.8	1000.	9.000	L1	19.6	10.2	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.262500	29.4	1000.0	9.000	L1	19.7	21.9	51.4
0.528000	31.0	1000.0	9.000	L1	19.8	15.0	46.0
0.667500	26.1	1000.0	9.000	L1	19.7	19.9	46.0
1.446000	27.8	1000.0	9.000	N	19.6	18.2	46.0
1.626000	27.5	1000.0	9.000	N	19.6	18.5	46.0
1.959000	29.6	1000.0	9.000	L1	19.7	16.4	46.0

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

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