



FCC PART 15C TEST REPORT No.I22Z70125-EMC03

for

Samsung Electronics Co., Ltd.

Notebook PC

Model Name: NP755XDA

With

FCC ID: ZCANP755XDA

Hardware Version: REV1.0

Software Version: Windows10-Pro

Issued Date: 2022-05-25

Note:

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I22Z70125-EMC03	Rev.0	1st edition	2022-05-25

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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

Location: CTTL (Huayuan North Road)

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

1.3. Testing Environment

Normal Temperature: 15-35°C

Relative Humidity: 20-75%

1.4. Project data

Testing Start Date: 2022-03-28

Testing End Date: 2022-05-10

1.5. Signature



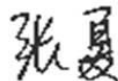
Li Yan

(Prepared this test report)



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2. Client Information

2.1. Applicant Information

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2.2. Manufacturer Information

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3. PRODUCT INFORMATION

3.1. About EUT

Description	Notebook PC
Model name	NP755XDA
FCC ID	ZCANP755XDA

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	2270125UT13a	REV1.0	Windows10-Pro
EUT2	2270125UT15a	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	Travel Adapter	/	/
AE2	Data Cable	/	/
AE3	battery	/	Inbuilt

AE1

Model	EP-TA865
Manufacturer	SOLU-M
Length of cable	/

AE2

Model	/
Manufacturer	/
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.

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

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.	2021
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	June,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	15-35°C
Voltage	V nom	15.4V
Humidity	H nom	20-75%

6. Test Facilities Utilized

Radiated emission test system

No.	Equipment	Model	Manufacturer	Serial Number	Calibration Period	Calibration Due date
1	Test Receiver	ESW44	R&S	103023	1 year	2022-10-18
2	Analytical Spectrometer	FSV40	R&S	101407	1 year	2022-06-03
3	EMI Antenna	VULB 9163	SCHWARZBECK	483	1 year	2022-08-24
4	EMI Antenna	3115	ETS-Lindgren	00167250	1 year	2022-07-01
5	EMI Antenna	3116	ETS-Lindgren	2663	1 year	2022-08-11
6	Loop Antenna	HFH2-Z2	R&S	829324/007	1 year	2022-12-22

AC Power Line Conducted Emission

No.	Equipment	Model	Manufacturer	Serial Number	Calibration Period	Calibration Due date
1	LISN	ENV216	R&S	101200	1 year	2022-05-30
2	Test Receiver	ESCI	R&S	100344	1 year	2023-03-21

7. Measurement Uncertainty

Radiated Spurious Emission

Measurement Uncertainty:

Frequency Range	Uncertainty(dBm) (k=2)
9kHz-30MHz	4.92
$30\text{MHz} \leq f \leq 1\text{GHz}$	5.15
$1\text{GHz} \leq f \leq 18\text{GHz}$	5.54
$18\text{GHz} \leq f \leq 40\text{GHz}$	5.26

AC Power-line Conducted Emission

Measurement Uncertainty (k=2)	3.08dB
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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

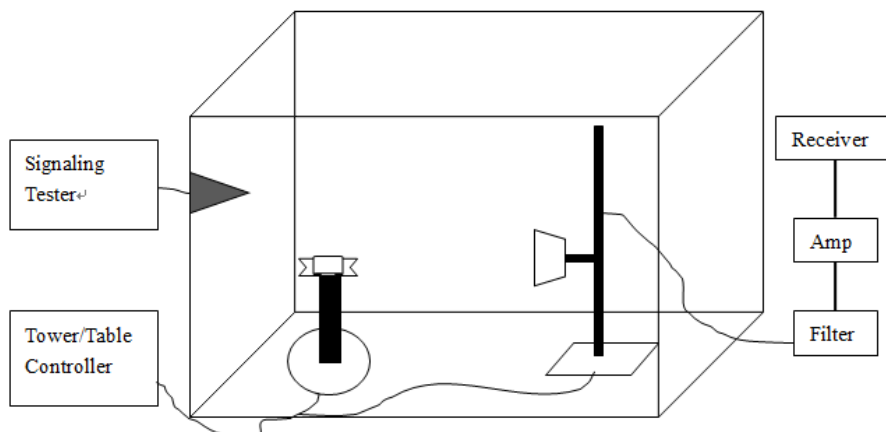
Specification Reference

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 (uV/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

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:

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

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

Average Measurement results

GFSK 2402MHz

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)
17609.500	41.78	-25.70	46.00	21.58	54.00	12.22	H
13761.000	39.18	-29.10	40.90	27.38	54.00	14.82	V
12857.500	37.00	-30.70	39.10	28.50	54.00	17.00	H
9307.500	34.40	-33.90	38.00	30.30	54.00	19.60	H
7228.000	33.06	-35.50	36.40	32.16	54.00	20.94	V
2374.600	44.37	-20.10	28.00	36.37	54.00	9.63	V

GFSK 2440MHz

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)
17718.500	41.79	-25.70	46.00	21.59	54.00	12.21	H
13744.000	39.32	-29.10	40.90	27.52	54.00	14.68	H
12859.500	37.08	-30.70	39.10	28.58	54.00	16.92	H
9129.500	34.15	-33.80	38.10	29.95	54.00	19.85	H
7997.500	32.98	-34.80	37.10	30.68	54.00	21.02	V
4976.500	29.09	-36.60	33.40	32.29	54.00	24.91	V

GFSK 2480MHz

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)
17618.500	41.58	-25.70	46.00	21.38	54.00	12.42	H
13606.500	39.04	-29.50	40.40	28.14	54.00	14.96	H
12839.000	37.51	-30.70	39.10	29.01	54.00	16.49	H
9724.000	34.36	-33.00	38.00	29.36	54.00	19.64	H
7820.000	33.36	-35.10	37.00	31.46	54.00	20.64	V
2492.300	47.60	-20.00	28.30	39.30	54.00	6.40	H

Peak Measurement results
GFSK 2402MHz

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)
17206.500	52.70	-26.60	43.40	35.90	74.00	21.30	V
14212.000	50.56	-29.00	42.00	37.56	74.00	23.44	V
12844.000	48.47	-30.70	39.10	39.97	74.00	25.53	V
9103.500	45.79	-33.80	38.10	41.39	74.00	28.21	H
7228.500	43.81	-35.50	36.40	42.91	74.00	30.19	H
2378.800	56.44	-20.00	28.10	48.44	74.00	17.56	V

GFSK 2440MHz

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)
17628.000	53.58	-25.70	46.00	33.38	74.00	20.42	V
13653.000	51.22	-29.50	40.40	40.32	74.00	22.78	V
12834.000	47.73	-30.70	39.10	39.23	74.00	26.27	H
9070.000	46.36	-33.80	38.10	41.96	74.00	27.64	H
6945.500	44.39	-35.70	36.00	44.09	74.00	29.61	V
4698.500	39.45	-37.40	32.90	43.95	74.00	34.55	V

GFSK 2480MHz

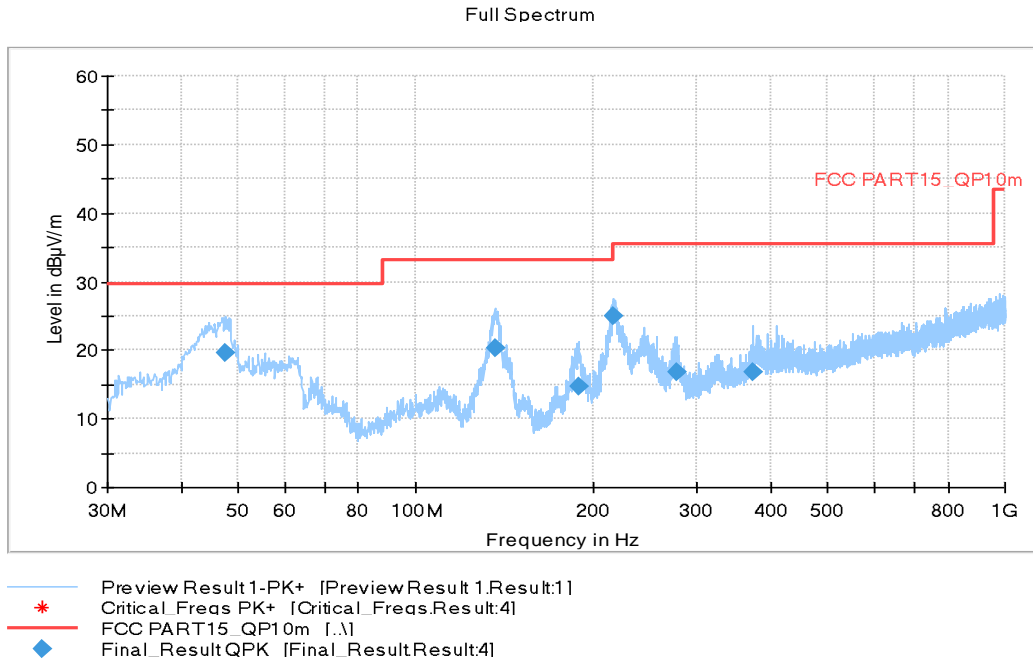
Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17944.500	52.56	-25.50	46.70	31.36	74.00	21.44	V
13845.000	50.21	-29.50	41.30	38.41	74.00	23.79	V
12924.000	48.41	-30.50	39.20	39.71	74.00	25.59	V
9812.000	46.19	-33.50	38.00	41.69	74.00	27.81	H
7927.000	44.47	-34.80	37.10	42.17	74.00	29.53	V
2494.100	58.81	-20.00	28.30	50.51	74.00	15.19	H

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

Conclusion: PASS

C.1.2 Radiated Spurious Emission- Below 1GHz

WOSRT CASE BELOW 1GHz



Note: 10 meters' limit is got by converting from 3 meters test distance.

$$\text{Limit (10m)} = \text{limit (3m)} + 20(\log(3/10))$$

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)
47.65400	19.58	29.54	9.96	2000.0	120.000	110.0	V	270.0
136.2150	20.30	33.06	12.76	2000.0	120.000	125.0	V	1.0
189.5650	14.73	33.06	18.33	2000.0	120.000	110.0	V	132.0
216.9190	25.09	35.56	10.47	2000.0	120.000	325.0	H	66.0
277.1560	16.90	35.56	18.66	2000.0	120.000	325.0	H	16.0
374.6410	16.78	35.56	18.78	2000.0	120.000	100.0	V	182.0

BELOW 30MHz

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

C.1.3 Band Edges Compliance– Radiated

Mode	Channel	Frequency Range	Test Results	Conclusion
GFSK	0	2.31GHz ~2.45GHz	Fig.1	P
	39	2.45GHz ~2.5GHz	Fig.2	P

Conclusion: PASS

Test graphs as below

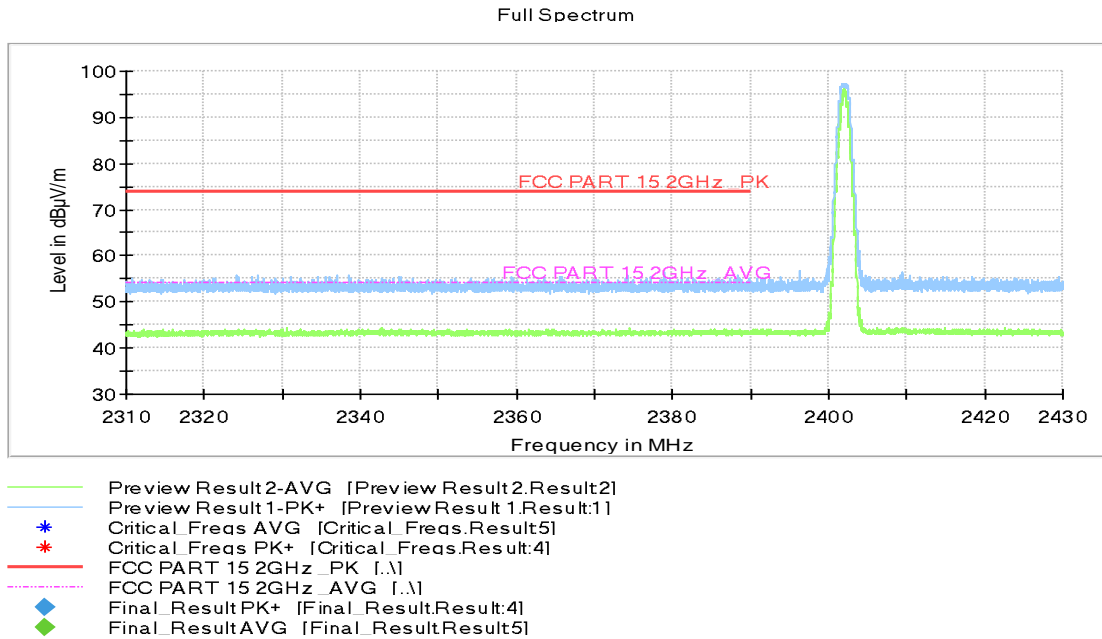


Fig.1. Frequency Band Edges: GFSK, 2402 MHz, 2.31 GHz – 2.45GHz

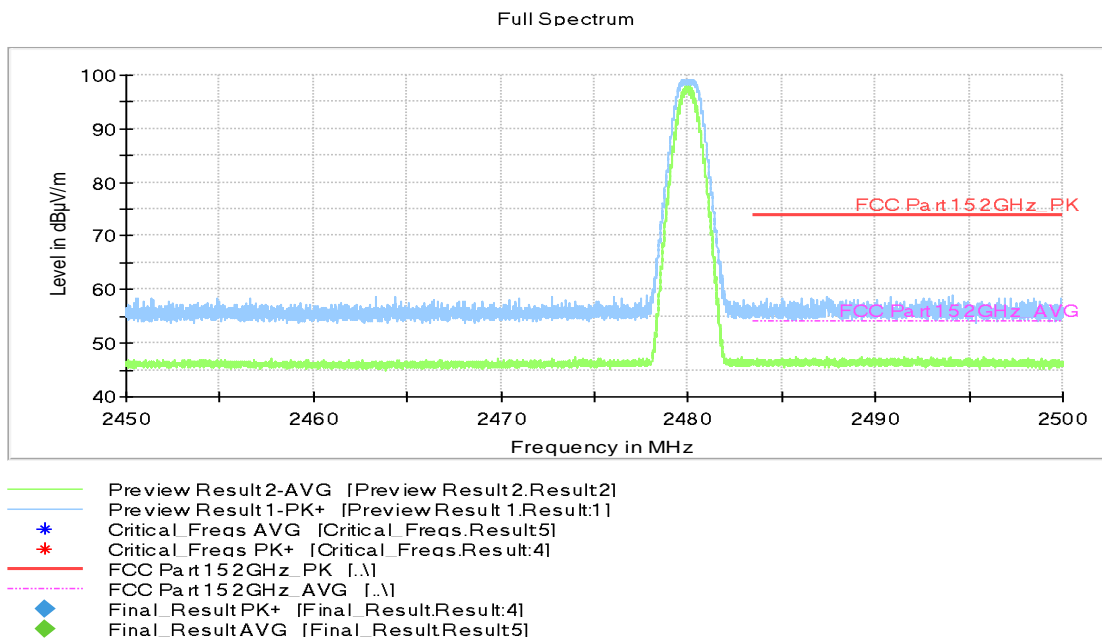


Fig.2. Frequency Band Edges: GFSK, 2480 MHz, 2.45 GHz - 2.50GHz

C.2. AC Power line 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.

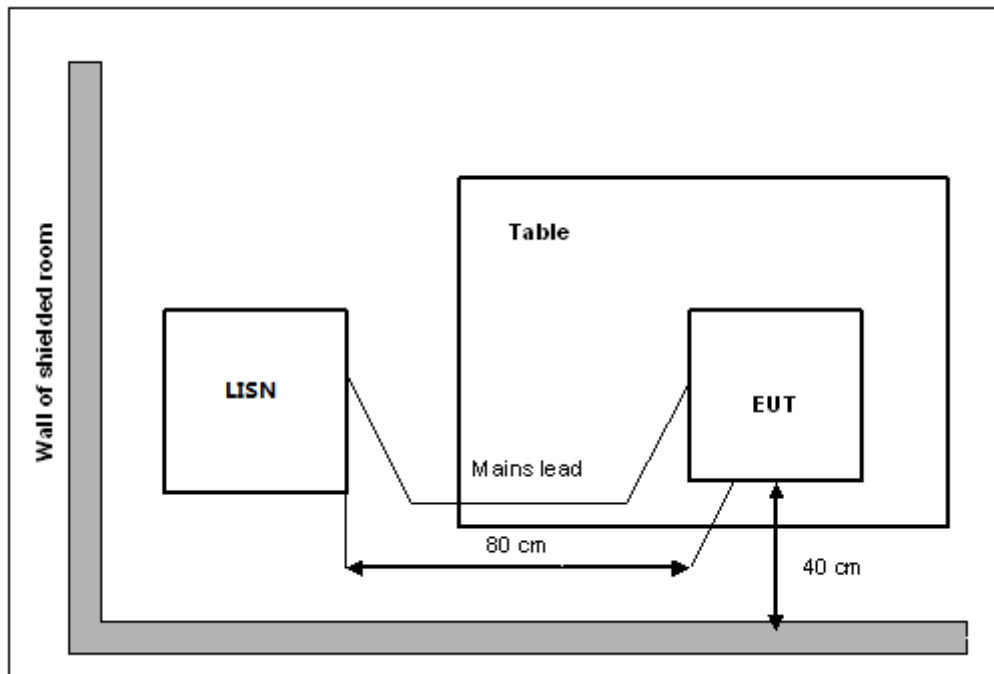
The measurement bandwidth is:

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 transmitting state.

The EUT is powered by an AC/DC 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:

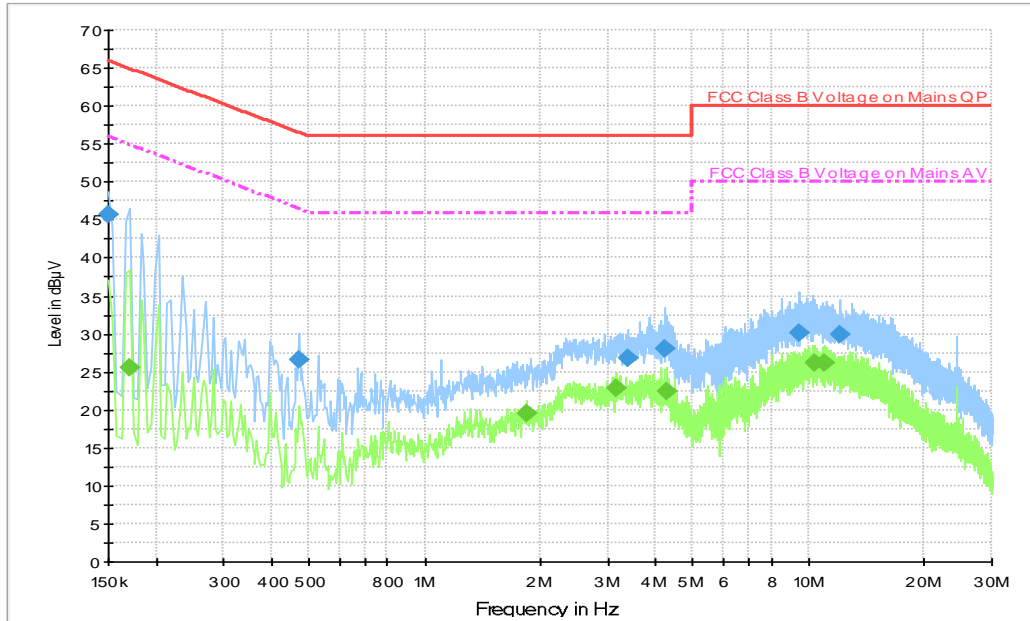


Fig.C.2.1 AC Power line Conducted Emission- bluetooth

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	45.7	5000.	9.000	N	20.0	20.3	66.0
0.470000	26.6	5000.	9.000	N	20.0	29.9	56.5
3.398000	26.9	5000.	9.000	L1	19.5	29.1	56.0
4.238000	28.0	5000.	9.000	L1	19.6	28.0	56.0
9.434000	30.1	5000.	9.000	L1	19.6	29.9	60.0
12.030000	29.8	5000.	9.000	L1	19.6	30.2	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.170000	25.5	5000.0	9.000	L1	20.0	29.4	55.0
1.838000	19.4	5000.0	9.000	N	19.7	26.6	46.0
3.162000	22.8	5000.0	9.000	L1	19.5	23.2	46.0
4.282000	22.5	5000.0	9.000	L1	19.6	23.5	46.0
10.390000	26.3	5000.0	9.000	L1	19.7	23.7	50.0
10.994000	26.3	5000.0	9.000	L1	19.6	23.7	50.0

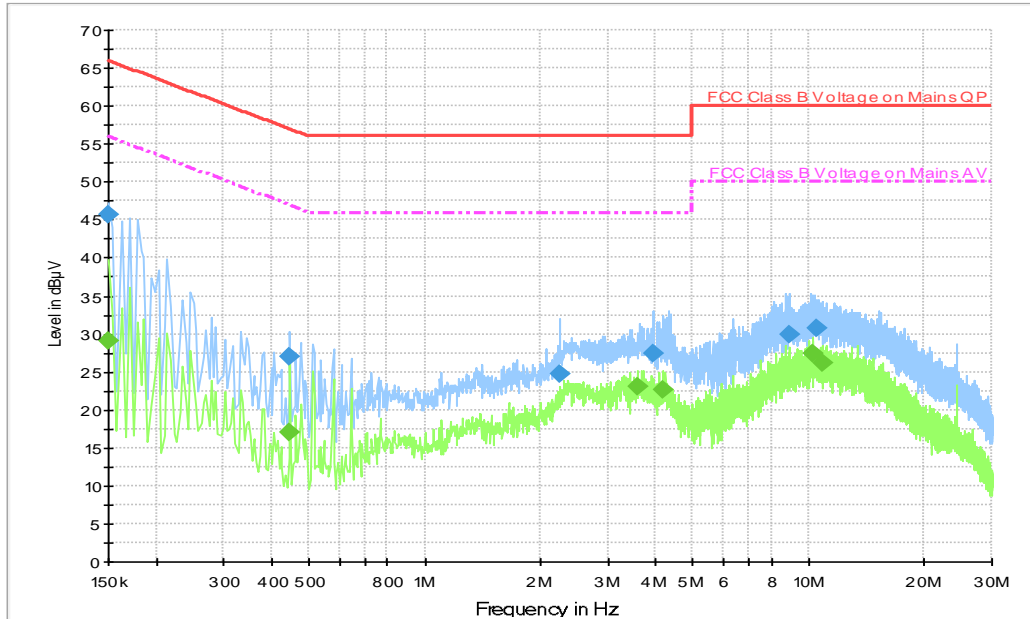


Fig.C.2.2 AC Power line Conducted Emission-Idle

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	45.7	5000.	9.000	N	20.0	20.3	66.0
0.446000	27.0	5000.	9.000	L1	19.9	30.0	56.9
2.246000	24.8	5000.	9.000	L1	19.5	31.2	56.0
3.954000	27.4	5000.	9.000	L1	19.6	28.6	56.0
8.866000	29.9	5000.	9.000	L1	19.6	30.1	60.0
10.486000	30.8	5000.	9.000	L1	19.7	29.2	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	29.1	5000.0	9.000	N	20.0	26.9	56.0
0.446000	17.1	5000.0	9.000	L1	19.9	29.8	46.9
3.582000	23.1	5000.0	9.000	L1	19.5	22.9	46.0
4.158000	22.6	5000.0	9.000	L1	19.6	23.4	46.0
10.242000	27.5	5000.0	9.000	L1	19.7	22.5	50.0
10.894000	26.2	5000.0	9.000	L1	19.7	23.8	50.0

END OF REPORT