



# EMC TEST REPORT

<b>Project No.</b>	LBE20210167	<b>Issue No.</b>	0
<b>Applicant</b>	<b>Name of organization</b>	Samsung Electronics Co., Ltd.	
	<b>Address</b>	(Maetan-dong) 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea	
	<b>Date of receipt</b>	March 17, 2021	
<b>EUT</b>	<b>Type of device</b>	<input type="checkbox"/> All other Receivers subject to part15 <input checked="" type="checkbox"/> Class B Personal Computers and peripherals <input type="checkbox"/> Other Class B digital devices and peripherals <input type="checkbox"/> FM Broadcast Receiver	
	<b>Equipment authorization</b>	<input checked="" type="checkbox"/> Certification <input type="checkbox"/> Supplier's Declaration of Conformity	
	<b>FCC ID</b>	A3LNP340XLA	
	<b>Kind of product</b>	Notebook Computer	
	<b>Model No.</b>	NP340XLA	
	<b>Variant Model No.</b>	Refer to clause 4.6	
	<b>Manufacturer</b>	<b>Samsung Electronics Vietnam Co., Ltd.</b> Yenphong 1 - I.P YenTrung Commune, Yenphong Dist., Bac Ninh Province, Vietnam	
<b>Applied Standards</b>	47 CFR Part 15, Subpart B, Class B / ANSI C63.4-2014		
<b>Test Period</b>	March 17, 2020 ~ March 23, 2020		
<b>Issue date</b>	March 25, 2020		
<b>Test result : Complied</b> The equipment under test has found to be compliant with the applied standards. (Refer to the attached test result for more detail.)			
<b>Tested by</b> : Ji-Yeon Lee 		<b>Reviewed by</b> : Sun-Ho Kim 	
The test results in this report only apply to the tested sample. This report must not be reproduced, except in full, without written permission from Global CS Center.			
<b>Samsung Electronics Co Ltd, Global CS Center</b> (Maetan dong) 129, Samsung-ro, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do 16677, Korea			

# Table of contents

## 1. Report Information

1.1 Revision history .....	3
----------------------------	---

## 2. Summary of test results

2.1 Emission .....	3
--------------------	---

## 3. General Information

3.1 Test facility .....	3
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## 4. Test Configuration

4.1 Test Peripherals .....	4
4.2 EUT operating mode .....	5
4.3 Details of Sampling .....	5
4.4 Used cable description .....	6
4.5 Test arrangement .....	6
4.6 EUT Description .....	7
4.7 EUT Frequencies .....	7
4.8 Test configuration and condition .....	8
4.9 Measurement uncertainty .....	8

## 5. Result of individual tests

5.1 Conducted Emission .....	9
5.2 Radiated Emission .....	12

## 1. Report Information

### 1.1 Revision history

No.	Date of Issue	Revised detailed information
Issue 0	25 March, 2021	There are no revisions and this version is basic test report.

## 2. Summary of test results

### 2.1 Emission

The EUT has been tested according to the following specifications:

Applied	Test type	Applied standard	Result
<input checked="" type="checkbox"/>	Conducted Emission (Mains port)	47 CFR Part 15 Subpart B / ANSI C63.4-2014 (Class B)	Complied
<input checked="" type="checkbox"/>	Radiated Emission		Complied

## 3. General Information

### 3.1 Test facility

The Global CS Center is located on Samsung Electronics Co., Ltd. at (Maetan-dong) 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea.

All testing are performed in Semi-anechoic chambers conforming to the site attenuation characteristics defined by ANSI C63.4, CISPR 32, CISPR 16-1-4 and Shielded rooms. And all antennas are properly calibrated using ANSI C63.5:2017.

The Global CS Center is an ISO/IEC 17025 accredited testing laboratory by the National Radio Research Agency with designation No. KR0004. for EMC testing.

## 4. Test Setup configuration

### 4.1 Test Peripherals

The cables used for these peripherals are either permanently attached by the peripheral manufacturer or coupled with an assigned cable as defined below.

The following is a listing of the EUT and peripherals utilized during the performance of EMC test:

Mark	Description	Model No.	Serial No.	Manufacturer / Trademark	FCC ID
A	Notebook Computer	NP340XLA	-	SAMSUNG	A3LNP340XLA
B	Battery	AA-PBAN2HE	-	SDI	-
C	Headset	EHS64AVFWE	-	CRESYN	-
D	Data Cable	EP-DW767	-	RF Tech	-
E	Travel Adapter	EP-TA800	R37R32A00WADK3	DONGYANG	-
F	micro SD Card	64 GB	-	SAMSUNG	DoC
G	Mouse	AA-SM7PCPB	CNBA5903634ADV8J 31O3050	SAMSUNG	DoC
		SNJ-B138	Z5F8353	SAMSUNG	DoC
H	DP Monitor	27UD88	711NTQD8H004	LG	DoC
I	DP Monitor AC Adapter	LCAP31	EH8NN629490055062	LG	DoC
J	DP Cable	JCA141	BW2K1709000770	J5CREATE	DoC

## 4.2 EUT operating mode

To achieve compliance applied standard specification including CXX and JBC requirement, the following mode(s) were made during compliance testing:

No.	Operating mode
1	eUFS(Internal storage) & micro SD Card Read/Write + Display Port + Camera preview + Scrolled H-character on video + Digital white noise sound + Charging(w/ TA)

## 4.3 Details of Sampling

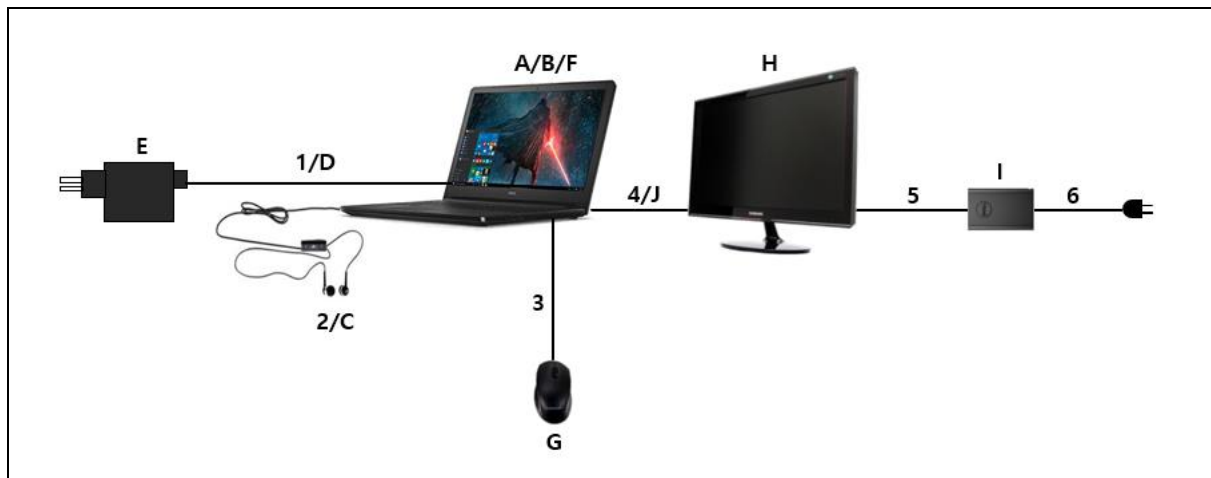
Customer selected, single unit.

#### 4.4 Used cable description

The EUT is configured, installed, arranged and operated in a manner consistent with typical applications. Interface cables/loads/devices are connected to at least one of each type of interface port of the EUT, and where practical, each cable shall be terminated in a device typical of actual usage. The type(s) of interconnecting cables to be used and the interface port (of the EUT) to which these were connected:

No.	Connected cable	Length [m]	Shielded [Y/N]	Note
1	Data Cable	1.8	Y	From EUT to Travel Adapter
2	Headset	1.3	N	For EUT
3	USB	1.8	Y	From EUT to Mouse
4	DP Cable	1.1	Y	From EUT to DP Monitor
5	Power	1.2	N	From DP Monitor to DP Monitor AC Adapter
6	Power	1.8	N	For DP Monitor AC Adapter

#### 4.5 Test arrangement



## 4.6 EUT Description

The EUT is a notebook computer which incorporates a Bluetooth, Wi-Fi(802.11 a/b/g/n/ac), Camera, Audio, Video, DP and micro SD Card.

Item	Specification	Remarks
CPU	Qualcomm, SC7180	-
Main Memory	Samsung, LPDDR4X, 4 GB	-
Graphic Controller	Qualcomm, Adreno 618	-
Display	AUO, B140HTN02.0, 14 inch, FHD(1 920 x 1 080)	-
eUFS	Samsung eUFS, 128GB	-
WLAN/Bluetooth	Qualcomm WCN3991 Chipset, 802.11a/b/g/n/ac(MIMO), Bluetooth 5.1	-
Battery	SAMSUNG SDI, AA-PBAN2HE, 5 320 mAh	-
Camera	Chicony, HD Camera, 1D-MIC	-
Input Devices	Keyboard, Touchpad	-
Ports	USB Type-C x 2, USB 2.0 x 1, MIC In/HP-Out x 1, micro SD Slot x 1	-
H/W Version	REV. 0.4	-
S/W Version	NP340XLA.001 (Windows 10)	

### 4.6.1 The variant models

- None

## 4.7 EUT Frequencies

The highest frequencies (Generated and used)	Frequency [ MHz ]
Wi-Fi	5 825
CPU	2 550
DDR4	2 133

## 4.8 Test configuration and condition

The system was configured for testing in a typical fashion that a customer would normally use.

The EUT exercise program was tested using the Burn-In test program for Windows.

Cables were attached to each of the available I/O ports. Where applicable, peripherals were attached to the I/O cables. All the external I/O ports was exercised, as well as internal and external (if available) storage, by writing and reading arbitrary data and charging with TA.

The screen of EUT was open and a scrolled H-character continuously displays on external monitor through display out function using direct DP cable.

The digital white noise sound was repetitively played with the headset connected.

The camera of the EUT was operated continuously.

Power source for the EUT operating was supplied by CVCF made by the Pacific Corp.

**- Test Voltage : AC 120 V, 60 Hz**

## 4.9 Measurement uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus: (According to CISPR 16-4-2 and UKAS M3003)

Test type		Measurement uncertainty (C.L. approximately 95 %, $k = 2$ )
Conducted Emission	AC Mains	2.83 dB
Radiated Emission (Below 1 GHz)	Horizontal	4.08 dB
	Vertical	4.58 dB
Radiated Emission (Above 1 GHz)	Horizontal	5.21 dB
	Vertical	5.22 dB

\* Remark

- 1) The values for uncertainty of conducted and radiated emissions are less than the corresponding values of  $U_{cispr}$  given in CISPR 16-4-2. Therefore no adjustment of measurement results is necessary when comparing them with the relevant limits.



## 5. Results of individual test

### 5.1 Conducted Emission

The EUT is connected to a LISN via travel adapter. If the EUT is connected to the Laptop Computer USB port, the Laptop AC adapter is connected to a LISN.

Both conducted lines are measured in Quasi-Peak and CISPR-Average mode, including the worst-case data points for each tested configuration. The EUT measured in accordance with the methods described in standards.

#### Limits for conducted emission at the mains ports of Class B

Frequency range Limits [ MHz ]	Resolution Bandwidth [ kHz ]	Limits [ dB(μV) ]	
		Quasi-peak	Average
0.15 to 0.50	9	66 to 56	56 to 46
0.50 to 5	9	56	46
5 to 30	9	60	50

NOTE 1 The lower limit shall apply at the transition frequency.  
NOTE 2 The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

#### 5.1.1 Test instrumentation

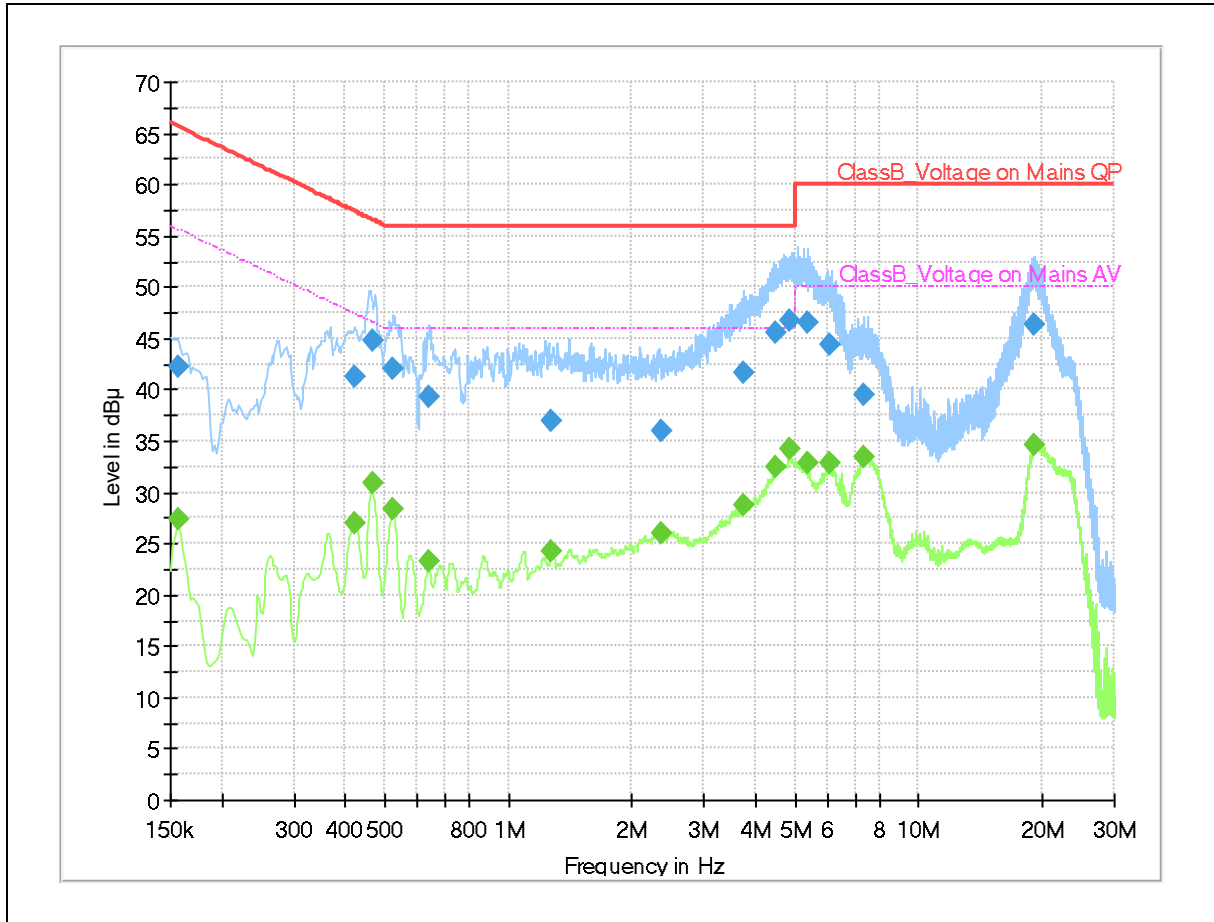
EMC No.	Test Instrument	Model name	Manufacturer	Serial No.	Next Calibration	
					Date	Interval (Month)
E5I-015	EMI Test Receiver	ESU8	R&S	100481	2021-07-01	12
E5I-127	Two-Line V-Network	ENV216	R&S	102061	2021-07-29	12
E5I-043	Two-Line V-Network	ENV216	R&S	101630	2021-08-14	12
-	Test software	EMC32	R&S	Ver 9.26.01	-	-

#### 5.1.2 Temperature and humidity condition

Test date	2021-03-23	Test engineer	Ji-Yeon Lee
Climate condition	Ambient temperature	(23.6 ± 0.5) °C	Limit (15.0 to 35.0) °C
	Relative humidity	(43.7 ± 0.5) % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	(101.4 ± 0.5) kPa	Limit (86.0 to 106.0) kPa
Test place	Shield Room (SR8)		

### 5.1.3 Test results

#### Operating Mode 1: AC Mains



QP / CAV final measurement results table:

Frequency (MHz)	QP (dB $\mu$ V)	CAV (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Line	Corr. (dB)
0.157	---	27.29	55.63	28.34	L1	10.1
0.157	42.31	---	65.63	23.32	L1	10.1
0.422	---	26.98	47.40	20.42	L1	10.2
0.422	41.33	---	57.40	16.07	L1	10.2
0.465	---	30.82	46.60	15.78	N	10.2
0.465	44.74	---	56.60	11.86	N	10.2
0.521	---	28.39	46.00	17.61	N	10.2
0.521	41.98	---	56.00	14.02	N	10.2
0.643	---	23.21	46.00	22.79	N	10.2
0.643	39.29	---	56.00	16.71	N	10.2
1.273	37.00	---	56.00	19.00	N	10.0
1.273	---	24.32	46.00	21.68	N	10.0
2.360	36.05	---	56.00	19.95	L1	9.9
2.360	---	26.07	46.00	19.93	L1	9.9
3.728	---	28.66	46.00	17.34	N	10.0
3.728	41.68	---	56.00	14.32	N	10.0
4.493	45.48	---	56.00	10.52	N	10.0
4.493	---	32.38	46.00	13.62	N	10.0
4.853	---	34.13	46.00	11.87	L1	10.0
4.853	46.65	---	56.00	9.35	L1	10.0
5.343	46.57	---	60.00	13.43	N	10.0
5.343	---	32.92	50.00	17.08	N	10.0
6.065	44.37	---	60.00	15.63	N	10.0
6.065	---	32.92	50.00	17.08	N	10.0
7.393	39.59	---	60.00	20.41	L1	10.0
7.393	---	33.48	50.00	16.52	L1	10.0
19.073	46.30	---	60.00	13.70	N	10.6
19.073	---	34.66	50.00	15.34	N	10.6

Note 1) Two graphs measured for both Live(L1) and Neutral(N) of the LISN are combined into one graph.

Note 2) Level (QP and/or CAV) = Meter Reading (QP and/or CAV) + Corr. (LISN Insertion Loss + Cable Loss)

Margin (QP and/or CAV) = Limit – Level (QP and/or CAV)

QP = Quasi-Peak, CAV = CISPR-Average, Corr. = Correction Factor

## 5.2 Radiated Emission

The following data lists the significant emission frequencies, measured levels, correction factors (for antenna and cables), orientation of table, polarization and height of antenna, the corrected reading, the limit, and the amount of margin.

Peak measurements were made over the changeable frequency range 30 MHz to 1 GHz at a measurement distance of 10 m for the following antenna and turntable arrangements:

Antenna Height [ cm ]	Antenna Polarisation	Resolution Bandwidth [ kHz ]	Video Bandwidth [ kHz ]	Turntable position [ degrees ]
100 ~ 400	Horizontal, Vertical	120	300	Continuous

Measurements within 6 dB of the limit were then maximized by adjusting turntable position. Final measurements were made using quasi-peak detector.

Peak/CISPR-Average measurements were made over the changeable frequency range 1 GHz to 40 GHz or 5th harmonics of the highest frequency generated or used in the device or on which the device operates or tunes at a measurement distance of 3 m for the following antenna and turntable arrangements. The measurements above 1 GHz were performed with the bore-sighting antenna aimed at the EUT.

Antenna Height [ cm ]	Antenna Polarisation	Resolution Bandwidth [ MHz ]	Video Bandwidth [ MHz ]	Turntable position
100 ~ 400	Horizontal, Vertical	1	3	Continuous

Measurements within 6 dB of the limit were then maximized by adjusting turntable position. Final measurements were made using peak and CISPR-average detectors.

### Limits for radiated emission of Class B at a measuring distance of 3 m and 10 m

Frequency range Limits [ MHz ]	Field Strength		
	3 m [ $\mu\text{V/m}$ ]	3 m [ dB( $\mu\text{V/m}$ ) ]	10 m [ dB( $\mu\text{V/m}$ ) ]
30 to 88	100	40.0	29.5
88 to 216	150	43.5	33.0
216 to 960	200	46.0	35.5
Above 960	500	54.0	43.5

Note) Distance correction formula from  $D_1(3\text{m})$  to  $D_2(10\text{m})$   
: Limit at  $D_2 = \text{Limit at } D_1 + 20\text{Log}(D_1 / D_2)$

Results checked manually; and points close to the limit line were re-measured.

## 5.2.1 Test instrumentation

EMC No.	Test Instrument	Model name	Manufacturer	Serial No.	Next Calibration	
					Date	Interval (Month)
E5I-020	EMI Test Receiver	ESU40	R&S	100375	2021-09-14	12
E5I-018	EMI Test Receiver	ESU8	R&S	100484	2021-05-22	12
E5I-069	BiLog Antenna	CBL6112D	TESEQ	35382	2021-08-30	24
E5I-071	BiLog Antenna	CBL6112D	TESEQ	35384	2021-08-30	24
E5I-075	Preamplifier	310N	SONOMA	332018	2021-05-28	12
E5I-076	Preamplifier	310N	SONOMA	332019	2021-05-28	12
E5I-036	Horn Antenna	HF907	R&S	100507	2022-04-23	24
E5I-039	Signal Conditioning Unit	SCU-18	R&S	10211	2022-01-21	12
E5I-037	WideBand Horn Antenna	WBH 18-40K	R&S	11201	2023-02-15	24
E5I-042	Signal Conditioning Unit	SCU-40A	R&S	10004	2021-09-09	12
-	Test software	EP7RE	TOYO	Ver 5.8.2	-	-
-	Test software	EMC32	R&S	Ver 9.25.00	-	-

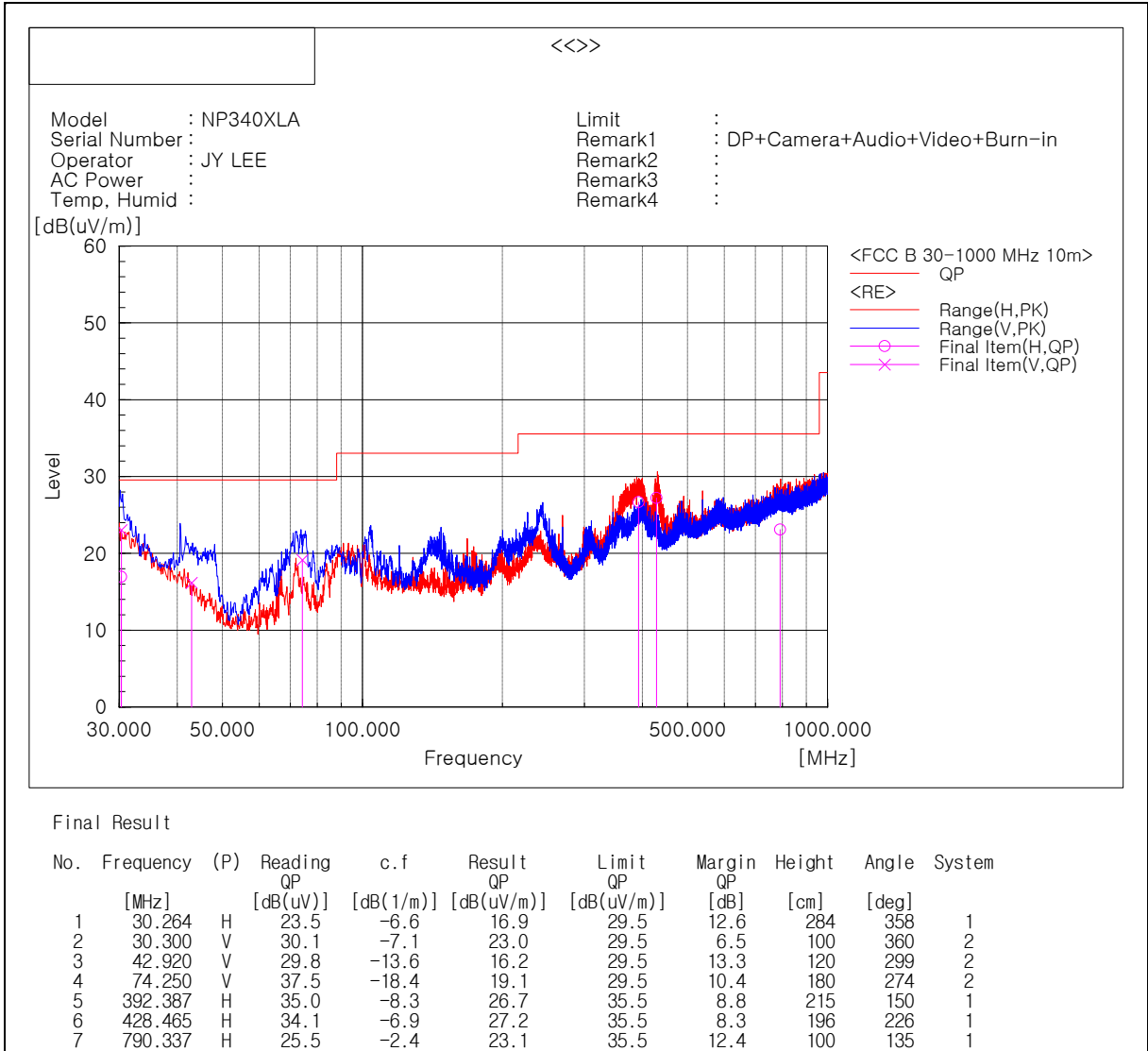
## 5.2.2 Temperature and humidity condition

<b>Test date</b>	2021-03-17 ~ 2021-03-18	<b>Test engineer</b>	Ji-Yeon Lee
<b>Climate condition</b>	Ambient temperature	(24.1 ± 0.5) °C	Limit (15.0 to 35.0) °C
	Relative humidity	(44.2 ± 0.5) % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	(101.5 ± 0.5) kPa	Limit (86.0 to 106.0) kPa
<b>Test place</b>	Semi-Anechoic Chamber (SAC4)		

### 5.2.3 Test results

Operating Mode 1

- Frequencies below 1 GHz



Note1) Receiving antenna polarization : Horizontal, Vertical

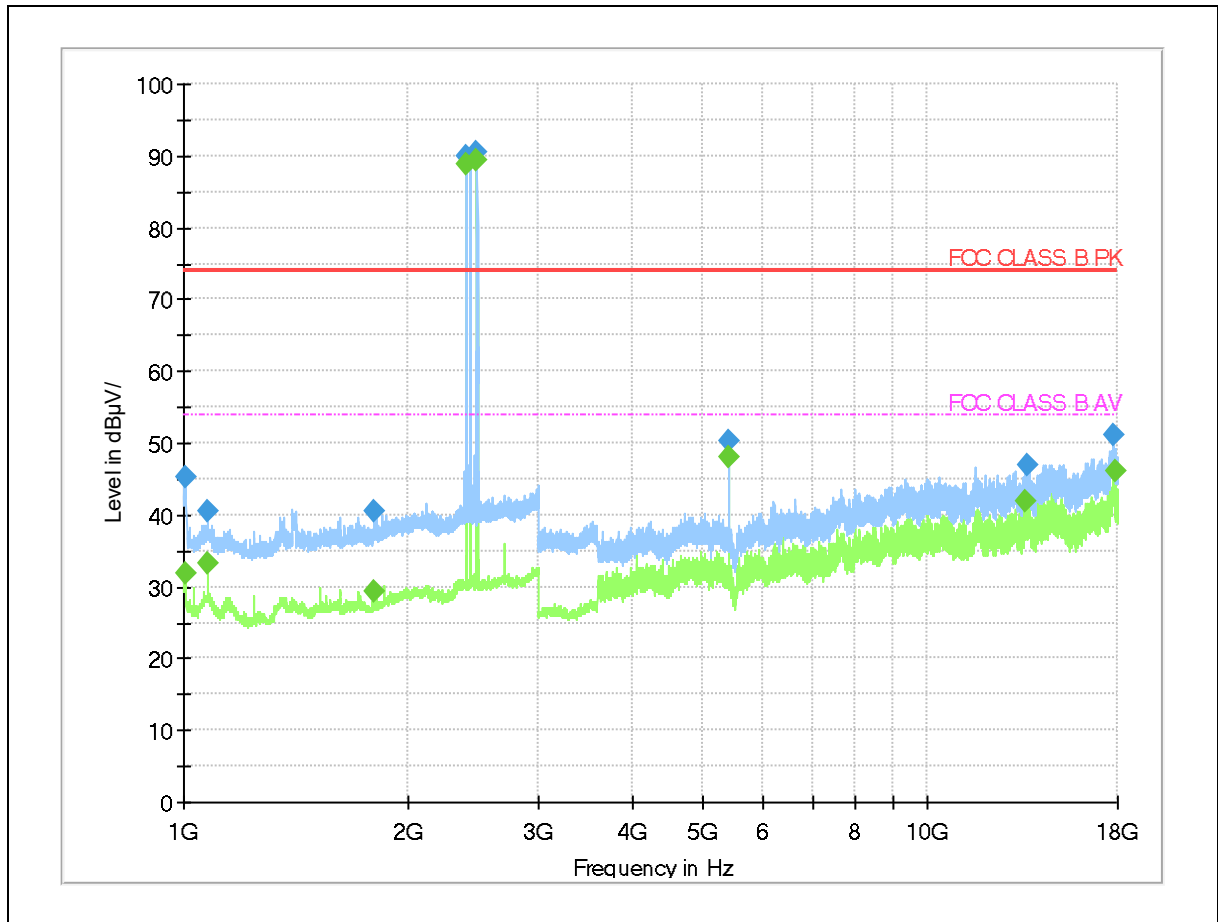
Test Distance : 10 m, Antenna Height : 1 to 4 meters

Result (QP) = Reading (QP) + c.f (Antenna Factor + Cable Loss - Amp. Gain)

Margin (QP) = Limit - Level (QP)

QP = Quasi-Peak, c.f = Correction Factor

- Frequencies above 1 GHz



Frequency (MHz)	PK (dB $\mu$ V/)	CAV (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1 006.400	45.22	---	74.00	28.78	102.4	H	40.0	7.4
1 007.600	---	31.94	54.00	22.06	101.5	H	40.0	7.4
1 077.200	---	33.17	54.00	20.83	194.1	H	220.0	7.1
1 077.600	40.45	---	74.00	33.55	196.7	H	215.0	7.1
1 800.000	---	29.21	54.00	24.79	100.0	H	30.0	10.9
1 800.400	40.43	---	74.00	33.57	101.2	V	68.0	11.0
2 402.000	---	88.80	54.00	-34.80	105.4	H	256.0	13.7
2 402.400	89.95	---	74.00	-15.95	106.1	H	256.0	13.7
2 480.000	---	89.39	54.00	-35.39	167.4	H	200.0	14.2
2 480.400	90.46	---	74.00	-16.46	165.9	V	0.0	14.2
5 399.500	---	48.12	54.00	5.88	214.0	H	94.0	7.3
5 399.500	50.27	---	74.00	23.73	221.1	H	94.0	7.3
13 542.500	---	41.88	54.00	12.12	101.2	V	252.0	26.5
13 647.000	46.80	---	74.00	27.20	100.9	V	239.0	26.7
17 802.000	51.00	---	74.00	23.00	183.7	H	326.0	36.2
17 845.500	---	46.06	54.00	7.94	186.4	H	119.0	35.3

Note 1) We have also tested from 18 GHz to 30 GHz and found no emissions.

Note 2) Receiving antenna polarization : Horizontal, Vertical

Test Distance : 3 m, Antenna Height : 1 to 4 meters

Level (PK and/or CAV) = Reading (PK and/or CAV) + Corr. (Antenna Factor + Cable Loss - Amp. Gain)

Margin (PK and/or CAV) = Limit – Level (PK and/or CAV)

PK = Peak, CAV = CISPR-Average, Corr. = Correction Factor

Note 3) Radiated emissions (Tx / Rx frequency) from the transceiver shall be ignored.

- Data transmission in the 2.4 GHz ISM band (Bluetooth/Wi-Fi 802.11b/g/n)

: Operating frequencies (2 400 ~ 2 483.5) MHz