

EMC TEST REPORT

Project No.	LBE20164041	Issue No.	0
Applicant	Name of organization	Samsung Electronics Co., Ltd.	
	Address	(Maetan-dong) 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Republic of Korea	
	Date of application	January 2, 2017	
EUT	Type of device	☒ Class B personal computers and peripherals ☐ All other devices	
	Equipment authorization	☐ Declaration of Conformity ☒ Certification ☐ Verification	
	FCC ID	A3LSMW727V	
	Kind of product	Portable Device	
	Model No.	SM-W727V	
	Variant Model No.	Refer to clause 4.6	
	Manufacturer	SAMSUNG ELECTRONICS VIETNAM CO., LTD. 730-722 Yenphong 1-I.P, YenTrung Commune, Yenphong Dist. Bacninh Province Vietnam	
Applied Standards		47 CFR Part 15, Subpart B, Class B / ANSI C63.4-2014	
Test Period		January 12, 2017 ~ January 19, 2017	
Issue date		January 23, 2017	

Test result : Complied

The equipment under test has found to be compliant with the applied standards.
(Refer to the attached test result for more detail.)

Tested by : Jeong-Soo Kim



Reviewed by : Young-Hun Kim



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CS & Environment Center of Samsung Electronics Co., Ltd.

(Maetan dong) 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-so, 16677, Republic of Korea

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1. Report Information

1.1 Revision history

No.	Revised detailed information
Issue 0	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
☒	Conducted Disturbance (Mains port)	47 CFR Part 15 Subpart B / ANSI C63.4-2014 (Class B)	Complied
☒	Radiated Disturbance		Complied

3. General Information

3.1 Test facility

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

All testing are performed in Semi-anechoic chambers conforming to the site attenuation characteristics defined by ANSI C63.4, CISPR 22, 16-1 and 16-2. and Shielded rooms. And all antennas are properly calibrated using ANSI C63.5:2006.

The CS & Environment Center is operated as testing laboratory in accordance with the requirements of ISO/IEC 17025:2005.

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 / DoC
A	Portable Device	SM-W727V	-	SAMSUNG	A3LSMW727V
B	Keyboard	EJ-CW720	-	SAMSUNG	-
C	Battery	EB-BW720ABA	-	SAMSUNG	-
D	Headset	EO-EG920BW	-	SAMSUNG	-
E	Data Cable	EP-DW720CWZ	-	SAMSUNG	-
F	Travel Adapter	EP-TA300	-	SAMSUNG	-
G	Micro SD Card	64G	-	SANDISK	-
H	Bluetooth Mouse	SMB-9100B	TAKS701184B	SAMSUNG	-
I	UHD Monitor	LU32D97K	0VDQH3EG200117M	SAMSUNG	-
J	LAN Dongle	-	-	KANGWON	-

This tablet device does not contain the minimum number of ports required for personal computer testing per ANSI C63.4, but the EUT is attached to a computer through its only available port, which represents worst case emissions. All other aspects of C63.4 testing requirements were maintained.

4.2 EUT operating mode

To achieve compliance applied standard specification, the following mode(s) were made during compliance testing:

Operating Mode 1	Charging Mode (External/Internal Memory Read & Write, Front Camera, H pattern on video, Audio play, Wi-Fi(5G), Bluetooth communication, GPS, Charging)
Operating Mode 2	DP Mode (External/Internal Memory Read & Write, Rear Camera, H pattern on video, Audio play, Wi-Fi(2.4G), Bluetooth communication, Charging, DP display)
Operating Mode 3	LAN Mode (External/Internal Memory Read & Write, Rear Camera, H pattern on video, Audio play, Bluetooth communication, Charging, LAN)

4.3 Details of Sampling

Customer selected, single unit.

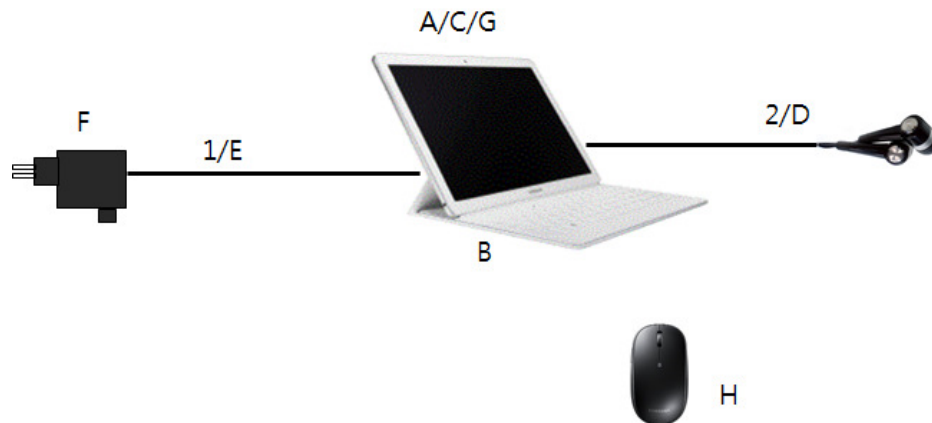
4.4 Used cable description

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:

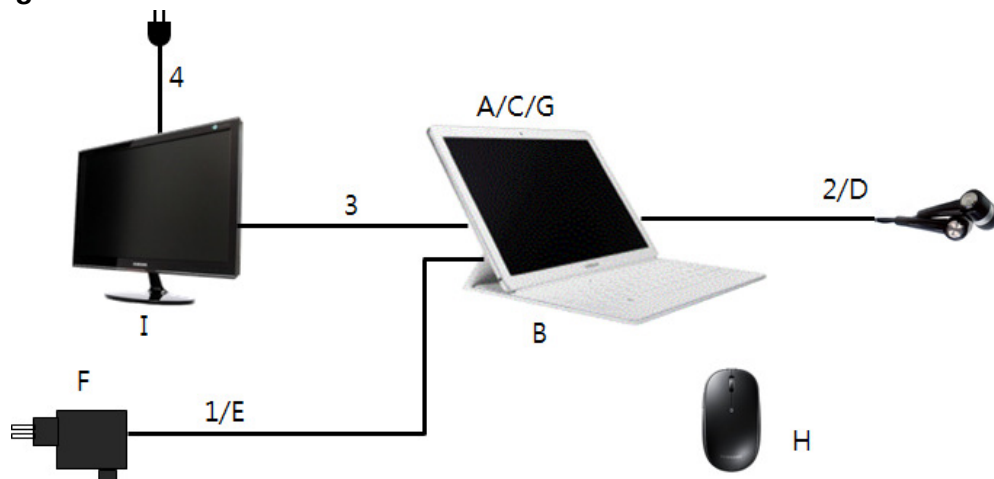
No.	Connected cable	Length [m]	Shielded [Y/N]	Note
1	Data Cable	1.5	Yes	From EUT to Travel Adapter
2	Headset	1.2	No	For EUT
3	DP Cable	1.8	Yes	From EUT to UHD Monitor
4	Power	1.8	No	For UHD Monitor
5	LAN	2.5	No	From LAN Dongle to Local Area Network

4.5 Test arrangement

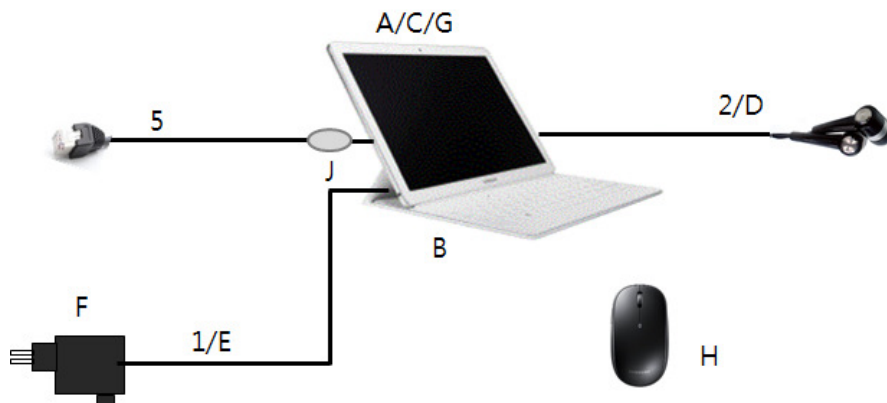
Operating Mode 1



Operating Mode 2



Operating Mode 3



4.6 EUT Description

Item	Specification	Remarks
CPU	Intel Kabylake-U Corei5-7200	-
Main Memory	LPDDR3, Onboard, 4 GB	-
LCD DISPLAY	12" AMOLED, 2166X1440	-
Graphic Controller	Intel HD Graphics	-
SSD	128GB SSD, M.2 SATA	-
LAN	N/A	-
WLAN/Bluetooth	Qualcomm QCA6174A-5, 802.11b/g/n/a/ac, BT4.1	-
Adapter	SOLUM, EP-TA300, 25W	-
Battery	EB-BW720ABA, Li-ion, 39.04Wh (5070mAh)	-
Camera	REAR: 13M CMOS, Front : 5M CMOS	-
Input Devices	Keyboard Cover, PS2 touch pad	-
Ports	2xUSB3.0 C-Type port, 1xSIM/microSD	-
S-Pen	CP-903-02B	

4.6.1 The variant models

- None

4.7 Clock Frequencies

Kind of Clocks	Frequency [MHz]
CPU	3 100
Wi-Fi	5 825

4.8 Test configuration and condition

The EUT exercise program was tested using the Samsung special test program for Windows. While the EMC testing was being done, the LCD panel was open and a pattern of “H” characters was written to the display on the LCD panel.

The system was configured for testing in a typical fashion that a customer would normally use. 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 is exercised, as well as internal and the external SD card, by writing and reading a continuous stream of “H” characters.

The music was repetitively played connected to the earphone. The webcam of the EUT was operated continuously.

The EUT's GPS function was placed in a receiving before the test and then checked at the end of the test to see that the position and speed were correctly displayed.

The EUT's Wi-Fi and Bluetooth functions connected to the Wi-Fi router and Bluetooth mouse.

The EUT was connected to Local Area Network through the Ethernet port with Unshielded Twisted Pair Ethernet cable.

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 and UKAS Lab 34.)

4.9.1 Emission

Test type		Measurement uncertainty (C.L. 95 %, $k = 2$)
Conducted disturbance	AC Mains	2.85 dB
Radiated Disturbance (30 MHz ~ 1 GHz)	Horizontal	4.99 dB
	Vertical	4.90 dB
Radiated Disturbance (1 GHz ~ 6 GHz)	Horizontal	4.83 dB
	Vertical	4.84 dB
Radiated Disturbance (6 GHz ~ 18 GHz)	Horizontal	5.30 dB
	Vertical	5.30 dB

5. Results of individual test

5.1 Conducted disturbance

Both conducted lines are measured in Quasi-Peak and 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 disturbance at the mains ports of Class B ITE

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

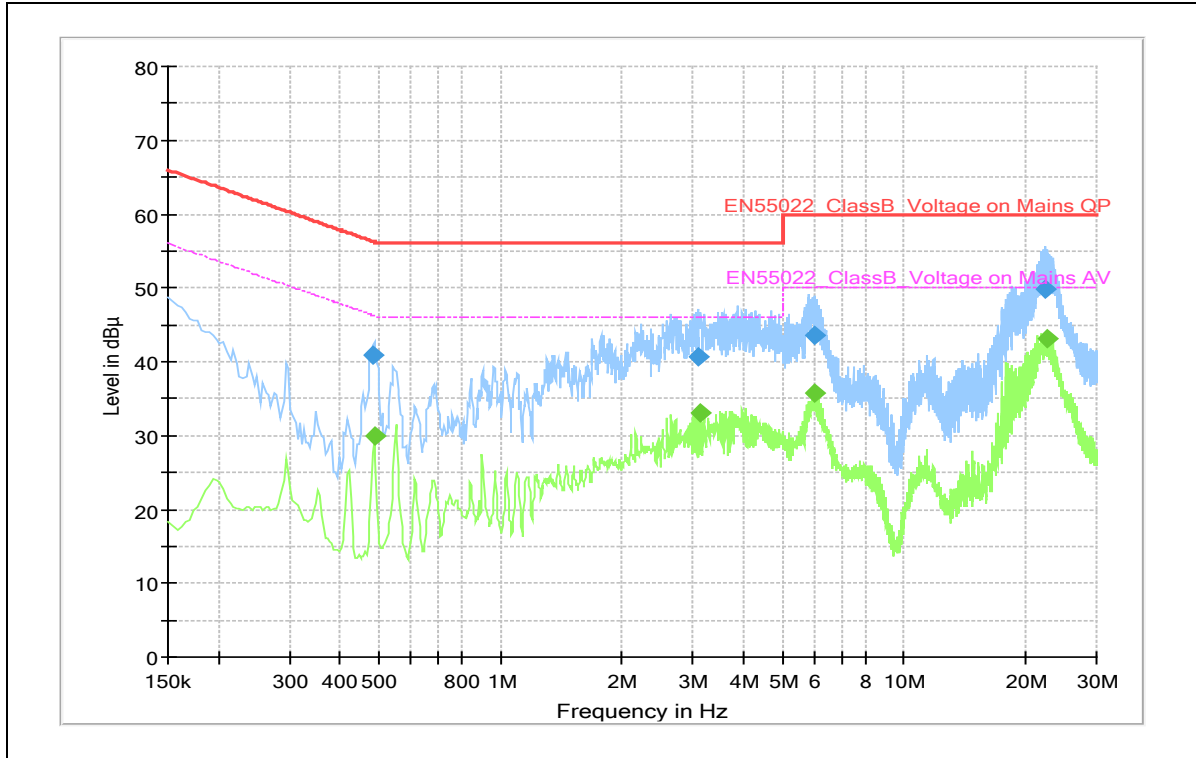
EMC No.	Test Instrument	Model name	Manufacturer	Serial No.	Calibration	
					Date	Interval (Month)
E5I-043	LISN	ENV216	R&S	101630	2016-08-05	12
E5I-018	EMI Test Receiver	ESU8	R&S	100484	2016-05-13	12
E5I-127	LISN	ENV216	R&S	102061	2016-06-24	12
E5I-100	Notebook Computer	NT-BONEXT-AS2	SAMSUNG	Z9H893GS200016D	-	-
E5I-108	Wi-Fi Router	R7000	NETGEAR	3LN1437W00AA7	-	-
-	Test Software	EMC32	R&S	Ver 9.26.01	-	-

5.1.2 Temperature and humidity condition

Test date	2017-01-19	Test engineer	Jeong-Soo Kim
Climate condition	Ambient temperature	(21.5 ~ 21.7) °C	Limit (15.0 to 35.0) °C
	Relative humidity	(42.8 ~ 43.1) % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	(101.1 ~ 101.3) kPa	Limit (86.0 to 106.0) kPa
Test place	Shield Room (SR14)		

5.1.3 Test results

☐ Operating Mode 1: AC Mains



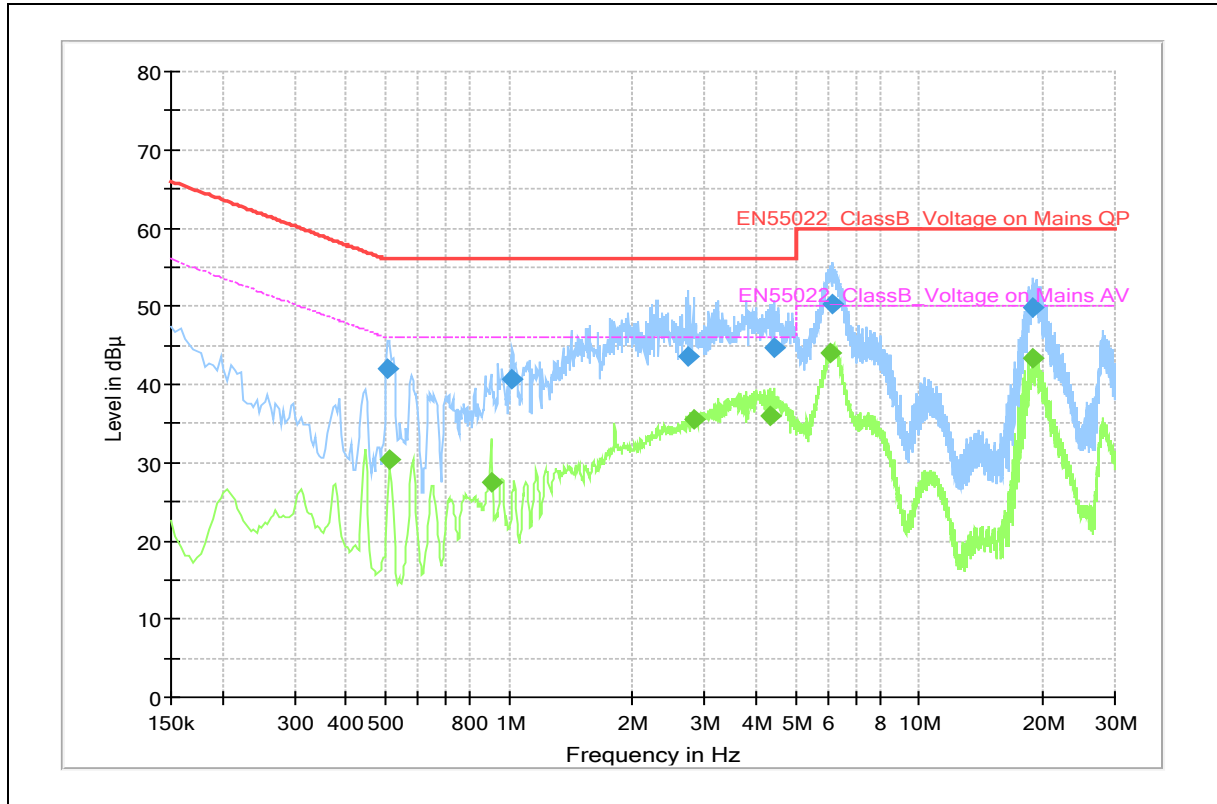
Note 1) Two graphs measured for both Live(L1) and Neutral(N) of the LISN are combined into one graph.

QP /CAV final measurement results table:

Frequency (MHz)	QP (dBμV)	CAV (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
0.482	40.9	---	56.3	15.4	L1	10.3
0.486	---	29.9	46.2	16.3	N	10.3
3.078	40.8	---	56.0	15.2	L1	10.0
3.134	---	33.1	46.0	12.9	L1	10.0
6.014	43.7	---	60.0	16.3	L1	10.1
6.018	---	35.8	50.0	14.2	L1	10.1
22.406	49.8	---	60.0	10.2	N	11.0
22.758	---	43.2	50.0	6.8	N	11.0

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

□ Operating Mode 2: AC Mains



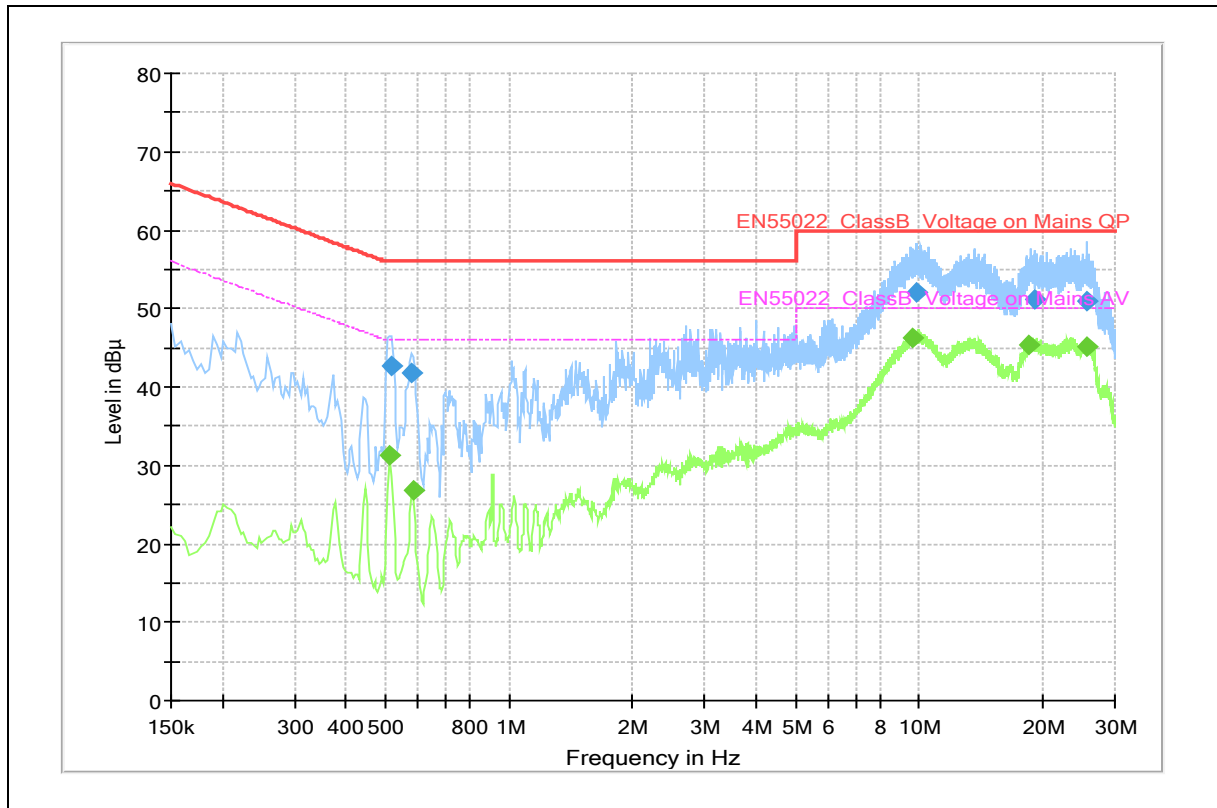
Note 1) Two graphs measured for both Live(L1) and Neutral(N) of the LISN are combined into one graph.

QP /CAV final measurement results table:

Frequency (MHz)	QP (dBμV)	CAV (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
0.506	42.1	---	56.0	13.9	N	10.3
0.514	---	30.4	46.0	15.6	N	10.3
0.910	---	27.5	46.0	18.5	N	10.1
1.018	40.8	---	56.0	15.2	N	10.0
2.742	43.6	---	56.0	12.4	N	9.9
2.842	---	35.5	46.0	10.5	N	9.9
4.334	---	35.9	46.0	10.1	N	10.0
4.442	44.7	---	56.0	11.3	N	10.0
6.098	---	43.9	50.0	6.1	N	10.1
6.150	50.3	---	60.0	9.7	N	10.1
18.986	49.8	---	60.0	10.2	N	10.8
18.990	---	43.4	50.0	6.6	N	10.8

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

□ Operating Mode 3: AC Mains



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

QP /CAV final measurement results table:

Frequency (MHz)	QP (dBμV)	CAV (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
0.514	---	31.3	46.0	14.7	L1	10.3
0.518	42.7	---	56.0	13.3	L1	10.3
0.578	41.8	---	56.0	14.2	L1	10.3
0.582	---	26.7	46.0	19.3	L1	10.3
9.682	---	46.2	50.0	3.8	N	10.3
9.846	52.1	---	60.0	7.9	N	10.4
18.518	---	45.5	50.0	4.5	N	10.8
19.058	51.3	---	60.0	8.7	N	10.8
25.510	---	45.2	50.0	4.8	N	11.1
25.618	51.0	---	60.0	9.0	N	11.1

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 disturbance

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 in accordance with internal maximum operating frequency 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 [degrees]
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 disturbance of Class B ITE at a measuring distance of 3 m and 10 m

Frequency range Limits [MHz]	Field Strength		
	3 m [$\mu\text{V/m}$]	3 m [$\text{dB}(\mu\text{V/m})$]	10 m [$\text{dB}(\mu\text{V/m})$]
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

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.	Calibration	
					Date	Interval (Month)
E5I-015	EMI Test Receiver	ESU8	R&S	100481	2016-05-13	12
E5I-020	EMI Test Receiver	ESU40	R&S	100375	2016-06-01	12
E5I-036	Horn Antenna	HF907	R&S	100507	2016-05-03	24
E5I-039	Signal Conditioning Unit	SCU-18	R&S	10211	2016-01-21	12
E5I-093	Preamplifier	310N	SONOMA	273122	2016-01-21	12
E5I-094	Preamplifier	310N	SONOMA	282363	2016-01-21	12
E5I-069	BiLog Antenna	CBL6112D	TESEQ	35382	2015-06-15	24
E5I-071	BiLog Antenna	CBL6112D	TESEQ	35384	2015-05-11	24
E5I-037	WideBand Horn Antenna	WBH 18-40K	R&S	11201	2015-09-04	24
E5I-042	Signal Conditioning Unit	SCU-40A	R&S	10004	2016-09-12	12
E5I-100	Notebook Computer	NT-BONEXT-AS2	SAMSUNG	Z9H893GS200016D	-	-
E5I-108	Wi-Fi Router	R7000	NETGEAR	3LN1437W00AA7	-	-
-	Test Software	EP7/RE	Toyo	Ver 5.8.2	-	-
-	Test Software	EMC32	R&S	Ver 9.25.00	-	-

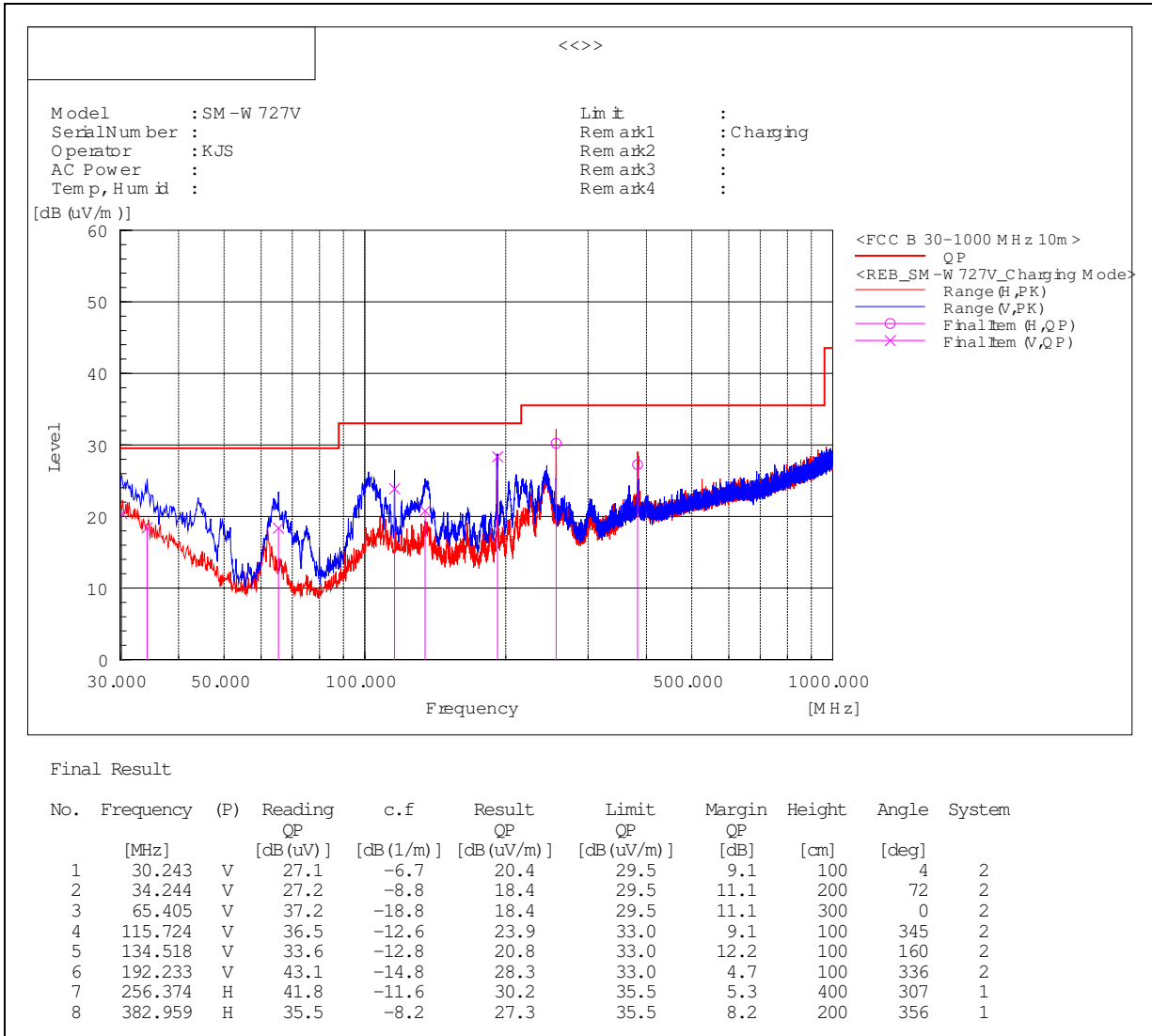
5.2.2 Temperature and humidity condition

Test date	2017-01-12 ~ 2017-01-16	Test engineer	Jeong-Soo Kim
Climate condition	Ambient temperature	(21.4 ~ 22.4) °C	Limit (15.0 to 35.0) °C
	Relative humidity	(42.6 ~ 46.2) % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	(100.9 ~ 101.6) kPa	Limit (86.0 to 106.0) kPa
Test place	Semi-Anechoic Chamber (SAC8)		

5.2.3 Test results

- Frequencies below 1 GHz

☐ Operating Mode 1



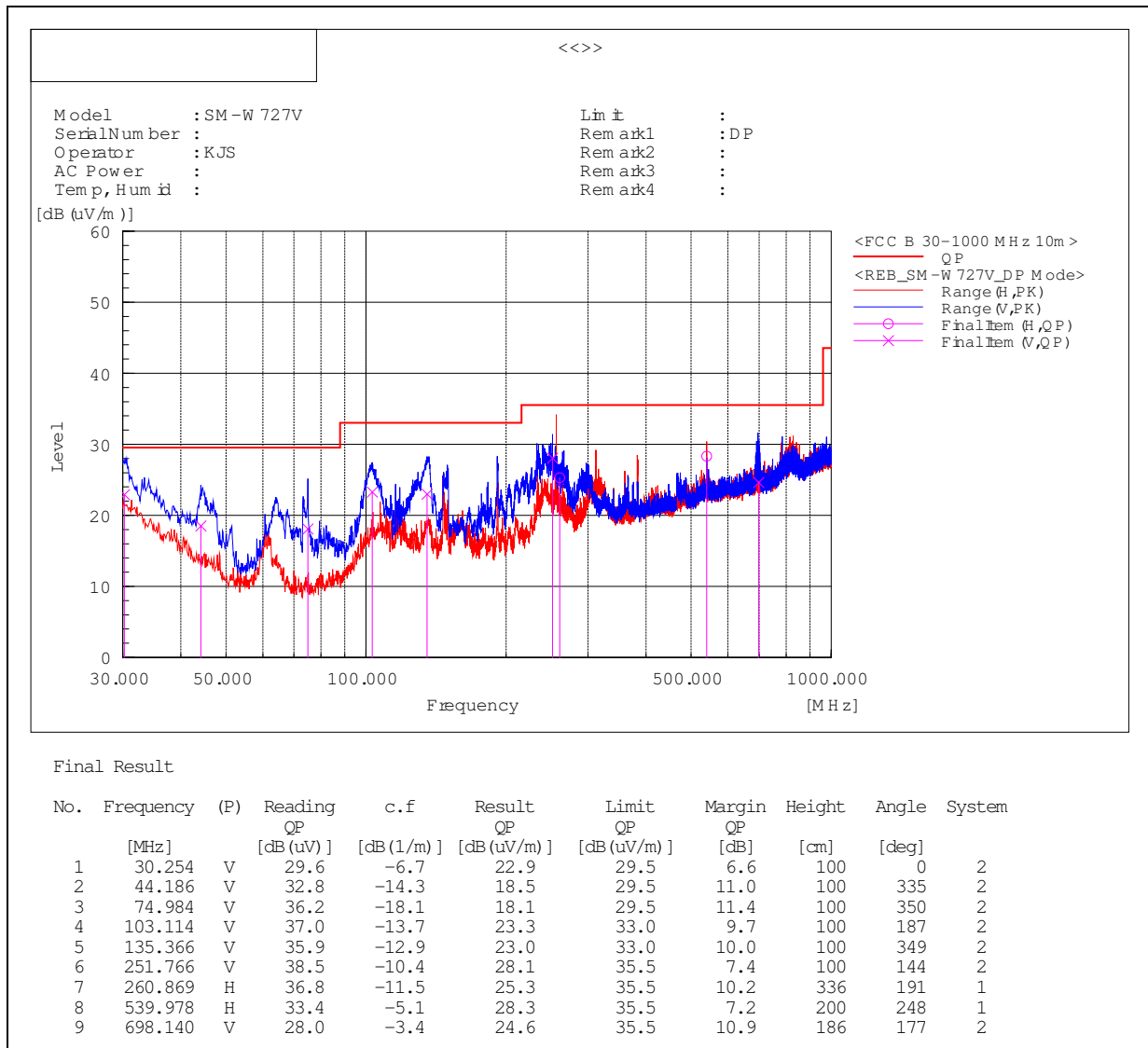
Note) Receiving antenna polarization : Horizontal, Vertical

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

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

Margin (QP) = Limit - Level (QP)

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

☐ Operating Mode 2

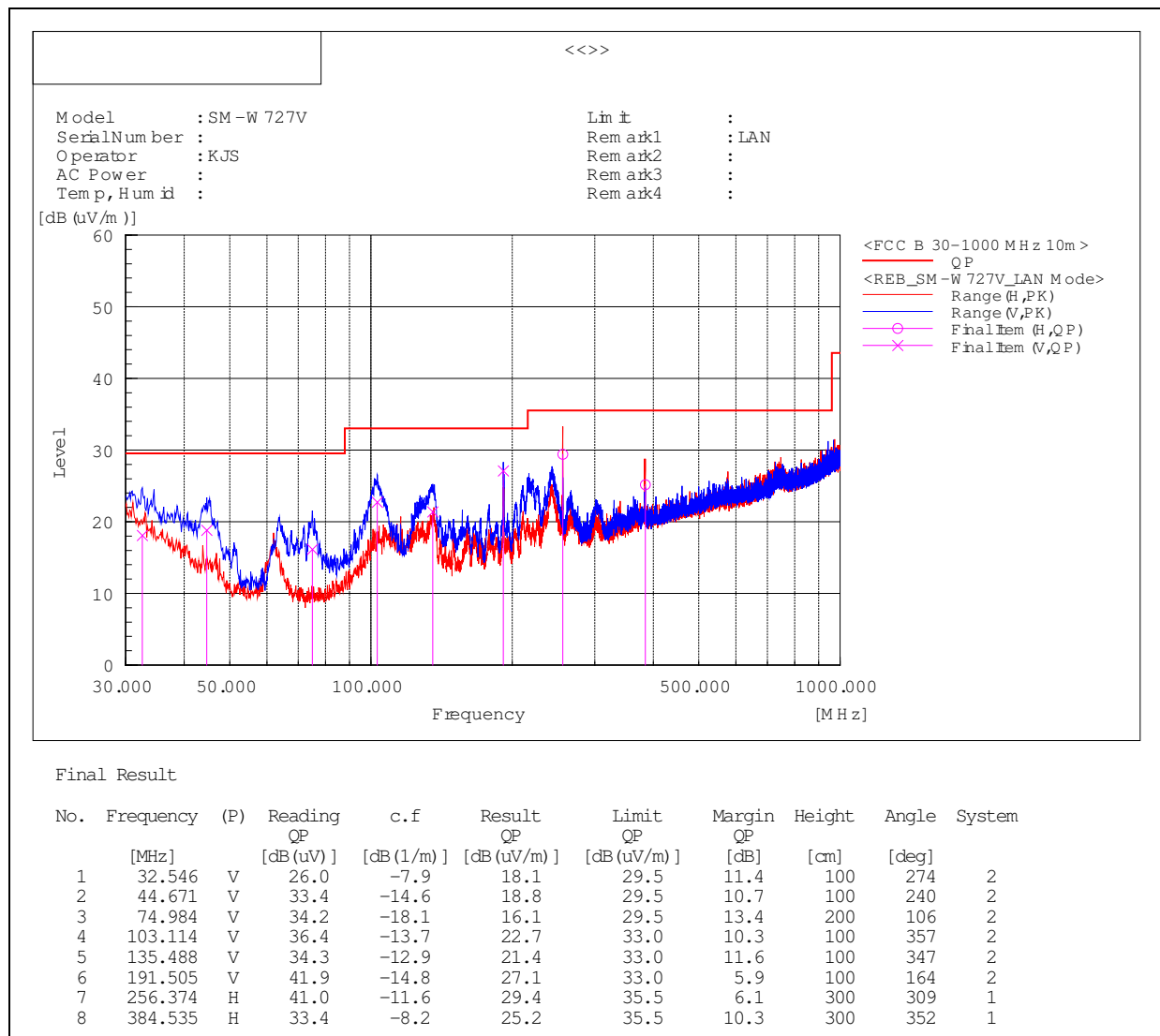
Note) Receiving antenna polarization : Horizontal, Vertical

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

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

Margin (QP) = Limit - Level (QP)

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

☐ Operating Mode 3

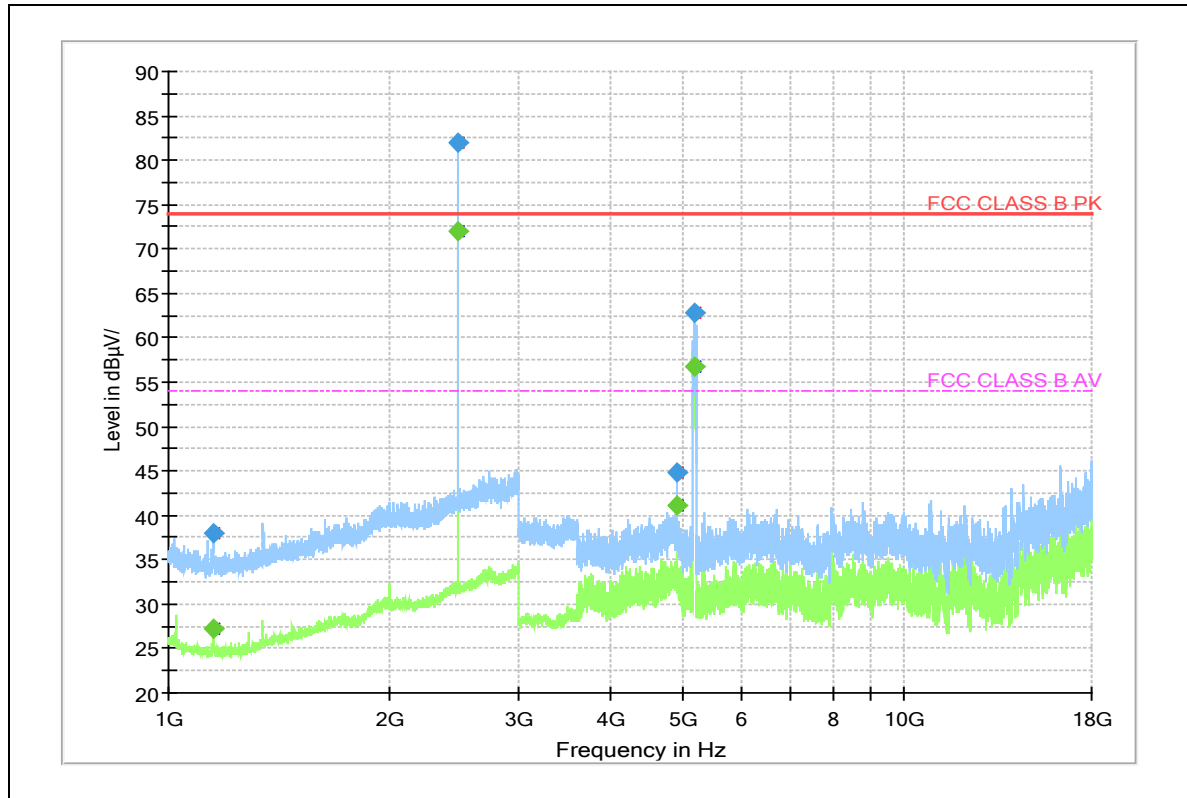
Note) Receiving antenna polarization : Horizontal, Vertical

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

Level (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☐ **Operating Mode 1**

* Remark: Radiated emissions (Tx / Rx frequency and Harmonics) from the transceiver shall be ignored.

PK /CAV final measurement results table:

Frequency (MHz)	PK (dBμV/m)	CAV (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1 150.800	38.0	---	74.0	36.0	100.0	H	0.0	6.6
1 151.200	---	27.1	54.0	26.9	100.0	H	0.0	6.6
2 475.600	81.9	---	74.0	-7.9	100.0	H	318.0	14.3
2 476.000	---	71.9	54.0	-17.9	100.0	H	318.0	14.3
4 926.000	---	41.2	54.0	12.8	100.0	V	158.0	6.1
4 926.000	44.9	---	74.0	29.1	100.0	V	158.0	6.1
5 198.000	---	56.8	54.0	-2.8	100.0	H	0.0	6.3
5 202.000	62.7	---	74.0	11.3	100.0	H	0.0	6.3

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

Note 2) Receiving antenna polarization : Horizontal, Vertical

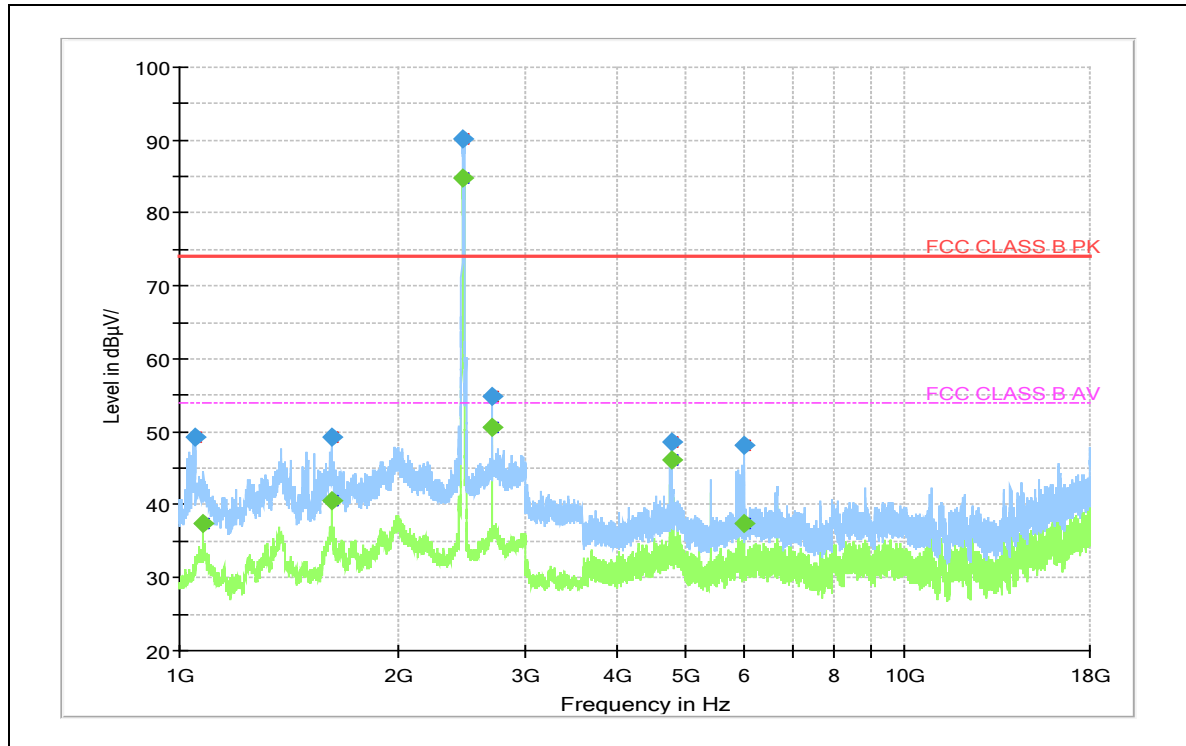
Test Distance : 3 m, Antenna Height : 1 to 4 meters

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

□ Operating Mode 2



* Remark: Radiated emissions (Tx / Rx frequency and Harmonics) from the transceiver shall be ignored.

PK /CAV final measurement results table:

Frequency (MHz)	PK (dBμV/m)	CAV (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1 052.400	49.3	---	74.0	24.7	100.0	V	144.0	6.7
1 079.600	---	37.5	54.0	16.5	100.0	V	0.0	6.7
1 620.000	---	40.5	54.0	13.5	100.0	V	144.0	10.3
1 620.000	49.3	---	74.0	24.7	100.0	V	144.0	10.3
2 456.400	90.1	---	74.0	-16.1	100.0	V	144.0	14.2
2 459.200	---	84.9	54.0	-30.9	100.0	H	96.0	14.2
2 700.000	54.8	---	74.0	19.2	100.0	V	221.0	15.9
2 700.000	---	50.7	54.0	3.3	100.0	V	221.0	15.9
4 770.500	---	46.2	54.0	7.8	100.0	V	230.0	5.8
4 771.000	48.6	---	74.0	25.4	100.0	V	174.0	5.8
6 015.000	---	37.5	54.0	16.5	100.0	V	136.0	8.2
6 015.000	48.2	---	74.0	25.8	100.0	V	136.0	8.2

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

Note 2) Receiving antenna polarization : Horizontal, Vertical

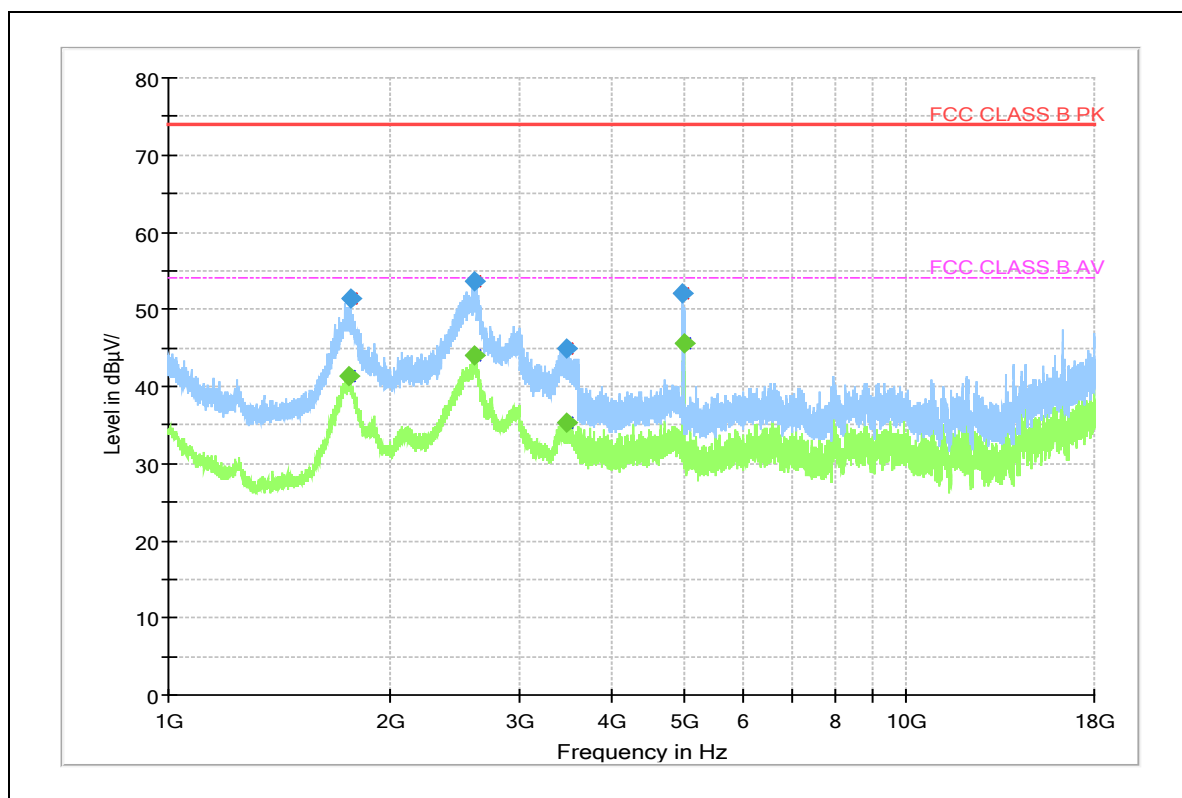
Test Distance : 3 m, Antenna Height : 1 to 4 meters

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

□ Operating Mode 3



* Remark: Radiated emissions (Tx / Rx frequency and Harmonics) from the transceiver shall be ignored.

PK /CAV final measurement results table:

Frequency (MHz)	PK (dBμV/m)	CAV (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1 759.200	---	41.5	54.0	12.5	100.0	V	282.0	10.9
1 762.800	51.3	---	74.0	22.7	100.0	V	282.0	10.9
2 596.800	---	44.1	54.0	9.9	100.0	V	230.0	15.0
2 603.200	53.7	---	74.0	20.3	100.0	V	224.0	15.0
3 459.500	---	35.3	54.0	18.7	100.0	V	240.0	1.5
3 472.000	45.0	---	74.0	29.0	100.0	V	240.0	1.5
4 985.500	52.0	---	74.0	22.0	100.0	V	208.0	6.0
4 999.000	---	45.7	54.0	8.3	100.0	V	208.0	6.0

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