CERTIFICATION TEST REPORT

Report Number. : 4790558569-E3V3

Applicant	:	SAMSUNG ELECTRONICS CO., LTD. 129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI, GYEONGGI-DO, 16677, KOREA
Model	:	SM-A236V
FCC ID	:	A3LSMA236V
EUT Description	:	GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac and NFC
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C

Date Of Issue:
2022-11-24

Prepared by:
UL Korea, Ltd.
26th floor, 152, Teheran-ro, Gangnam-gu Seoul, 06236, Korea

Suwon Test Site: UL Korea, LTD. Suwon Laboratory
218 Maeyeong-ro, Yeongtong-gu
Suwon-si, Gyeonggi-do, 16675, Korea
TEL: (031) 337-9902
FAX: (031) 213-5433

ACCREDITED
Testing Laboratory
TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2022-11-11	Initial issue	Minju Cha
V2	2022-11-18	Updated to address TCB's question	Minju Cha
V3	2022-11-24	Updated to address TCB's question	Minju Cha

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

TABLE OF CONTENTS

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION:	GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac and NFC
MODEL NUMBER:	SM-A236V
SERIAL NUMBER:	664a0edc42347ece, 664a125001347ece (CONDUCTED); 664a1250e6347ece, 664a124c06347ece (RADIATED);
DATE TESTED:	2022-09-06 ~ 2022-11-11;

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Complies

UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for infor mational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Korea, Ltd. By:

Seokhwan Hong
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:

Minju Cha
Suwon Lab Technician
UL Korea, Ltd.

2. TEST METHODOLOGY

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 558074 D01 DTS Meas Guidance v05r02.
4. ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro
☒ Chamber 1(3m semi-anechoic chamber)
☒ Chamber 2(3m semi-anechoic chamber)
☒ Chamber 3(3m semi-anechoic chamber)
☐ Chamber 4(3m Full-anechoic chamber)
☐ Chamber 5(3m Full-anechoic chamber)

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at https://www.iasonline.org/wp-content/uploads/2017/05/TL-637-cert-New.pdf.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
28.9 dBuV/m = 36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB

AC Corrected Reading (dBuV) = Measured Voltage (dBuV) + Extension Cord Loss (dB) + Cable Loss (dB)
44.72 dBuV = 34.72 dBuV + 9.9 dB + 0.1 dB

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.02 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.05 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.78 dB
Radiated Disturbance, 18 GHz to 40 GHz	5.58 dB

Uncertainty figures are valid to a confidence level of 95%.

4.4. DECISION RULE

Decision rule for statement(s) of conformity is based on Procedure 2, Clause 4.4.3 in IEC Guide 115:2021.

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The EUT is a GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac and NFC.
This test report addresses the DTS (WLAN) operational mode.

WiFi operating mode

Frequency rage	Mode	ANT 1
2.4GHz (2412 MHz ~ 2472 MHz)	802.11b SISO	TX/RX
	802.11g SISO	TX/RX
	802.11n(HT20) SISO	TX/RX

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum total conducted average output power as follows:

Frequency Range [MHz]	Mode	Output Power [dBm]	Output Power [mW]
2412 - 2472	802.11b SISO	20.51	112.46
	802.11g SISO	18.44	69.82
	802.11n(HT20) SISO	18.76	75.16

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

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.

The internal antenna was Permanently attached.
Therefore this E.U.T Complies with the requirement of §15.203.

Frequency	ANT Gain [dBi]
2 412 ~ 2 472	-4.51

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

5.4. TESTED CHANNELS LIST

Ch.	Frequency [MHz]	11b [SISO]	11g [SISO]	11n(HT20) [SISO]
1	2 412	O	O	O
6	2 437	O	O	O
11	2 462	O	O	O
12	2 467	O	O	O
13	2 472	O	O	O

Note: Tested channels are applied to all test items.

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission below 1GHz and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.
Radiated emission above 1GHz was performed with the EUT set to transmit low/mid/High Channels.

Worst case of antenna axis: Y
Based on the baseline scan, the worst-case data rates were:
802.11b mode: 1 Mbps 1TX
802.11g mode: 6 Mbps 1TX
802.11n HT20 mode: MCS0 1TX

All radiated and power line conducted tests were performed attached with travel adapter for the worst case condition mode.

Test case configuration for 802.11b, g, n HT20 modes: Conducted, Radiated

SISO Target[dBm]				
Ch.	Freq.	802.11b	802.11g	802.11n HT20
1	2412	20	18	18
6	2437	20	18	18
11	2462	20	18	18
12	2467	7	5	5
13	2472	7	5	5

Radiated Band-Edge, Conducted Band-Edge
Radiated Band-Edge, Radiated Spurious Emission, Conducted Band-Edge, Conducted Spurious Emission, PSD
Radiated Spurious Emission, Conducted Spurious Emission, PSD

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Charger	SAMSUNG	EP-TA800	R37MANQ1E72SE3	N/A
Data Cable	SAMSUNG	EP-DN980	GH39-02115A BWE	N/A
Earphone	SAMSUNG	GH59-15055A	EHS64AVFWE	N/A

I/O CABLE

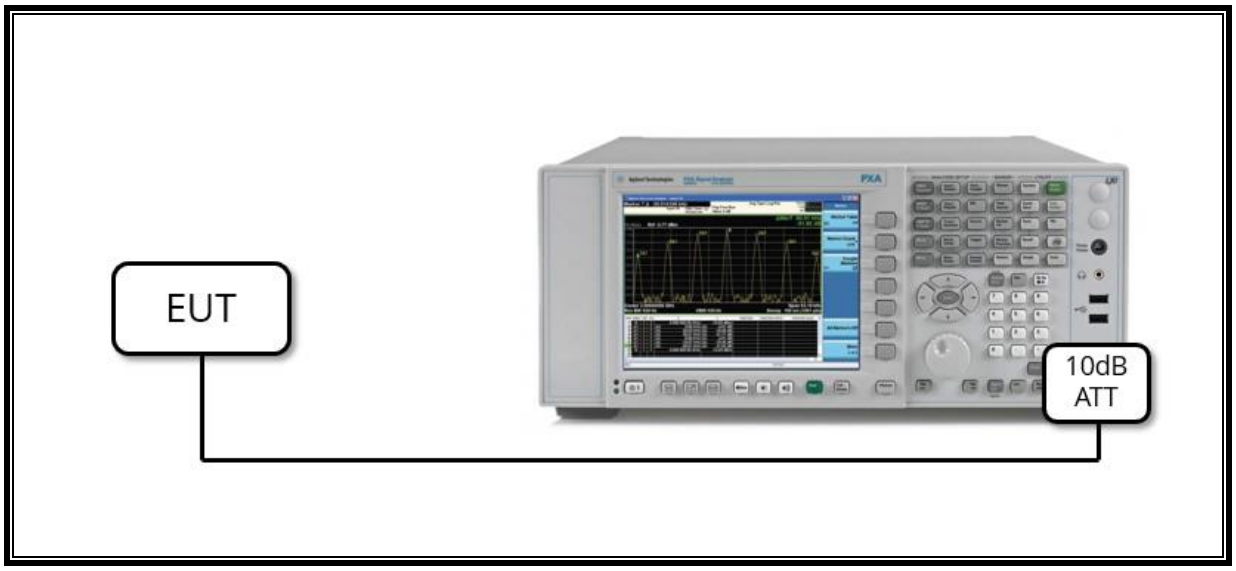
I/O Cable List						
Cable No.	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC Power	1	C Type	Shielded	1.0 m	N/A
2	Audio	2	Mini-Jack	Unshielded	0.7 m	N/A

TEST SETUP

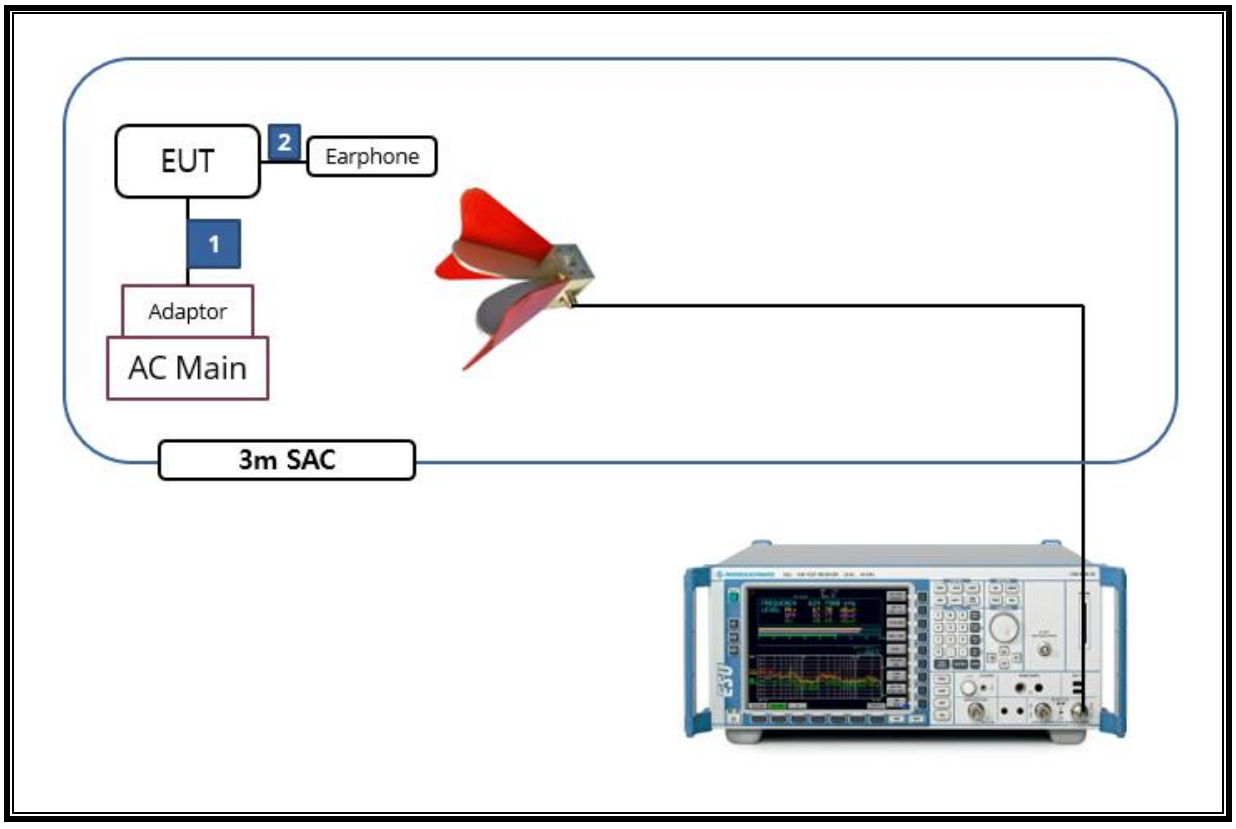
The EUT is a stand-alone unit during the tests.
Test software in hidden menu exercised the EUT to enable DTS mode.

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



6. MEASUREMENT METHOD

6 dB BW : ANSI C63.10-2013, Section 11.8.2 Option 2

OUTPUT POWER : ANSI C63.10-2013, Section 11.9.2.3.1 Method AVGPM

POWER SPECTRAL DENSITY : ANSI C63.10-2013, Section 11.10.3 & 11.10.5 Method AVGPSD-1 and Method AVGPSD-2

Out-of-band Emissions (Conducted) : ANSI C63.10-2013, Section 11.11 Emissions in nonrestricted frequency bands

Out-of-band Emissions in Non-restricted Bands: ANSI C63.10-2013, Section 11.11 Emissions in nonrestricted frequency bands

Out-of-band Emissions in Restricted Bands : ANSI C63.10-2013, Section 11.12 Emissions in restricted frequency bands

AC Power Line Conducted Emission : ANSI C63.10-2013, Section 6.2

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List				
Description	**Manufacturer**	**Model**	**S/N**	**Cal Due**
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	2024-08-15
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	2024-08-15
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	2024-08-15
Antenna, Horn, 18 GHz	ETS	3115	00167211	2024-08-04
Antenna, Horn, 18 GHz	ETS	3115	00161451	2024-08-21
Antenna, Horn, 18 GHz	ETS	3117	00168724	2024-08-04
Antenna, Horn, 18 GHz	ETS	3117	00168717	2024-08-21
Antenna, Horn, 40 GHz	ETS	3116C	00166155	2024-08-02
Preamplifier	ETS	3116C-PA	00168841	2023-08-04
Preamplifier, 1000 MHz	Sonoma	310N	341282	2023-08-02
Preamplifier, 1000 MHz	Sonoma	310N	351741	2023-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	2023-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	2023-08-01
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	2023-08-01
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	2023-08-03
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	2023-08-01
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030B	MY60070693	2023-01-18
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9040B	MY60080268	2023-01-19
Average Power Sensor	Agilent / HP	U2000A	MY54270007	2023-08-03
Average Power Sensor	Agilent / HP	U2000A	MY54260010	2023-08-03
Attenuator	PASTERNACK	PE7087-10	A001	2023-08-03
Attenuator	PASTERNACK	PE7087-10	A008	2023-08-03
Attenuator	PASTERNACK	PE7004-10	2	2023-08-01
Attenuator	PASTERNACK	PE7087-10	A009	2023-08-03
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2023-08-02
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2023-07-29
EMI Test Receive, 3 GHz	R&S	ESR3	101832	2023-08-01
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	2023-08-02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	2023-08-01
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	020	2023-08-01
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	2023-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	2023-08-01
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	2023-08-02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	021	2023-08-01
LISN	R&S	ENV-216	101837	2023-08-04
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2023-10-06

UL Software			
Description	**Manufacturer**	**Model**	**Version**
Radiated software	UL	UL EMC	Ver 9.5
AC Line Conducted software	UL	UL EMC	Ver 9.5

8. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
15.247 (a)(2)	Occupied Bandwidth(6dB)	> 500kHz	Conducted	PASS
2.1051, 15.247(d)	Band Edge / Conducted Spurious Emission	-30 dBc		PASS
15.247 (b)(3)	TX conducted output power	< 30 dBm		PASS
15.247(e)	PSD	< 8 dBm/3kHz		PASS
15.207(a)	AC Power Line conducted emissions	Section 11	Power Line conducted	PASS
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m(Av)	Radiated	PASS

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

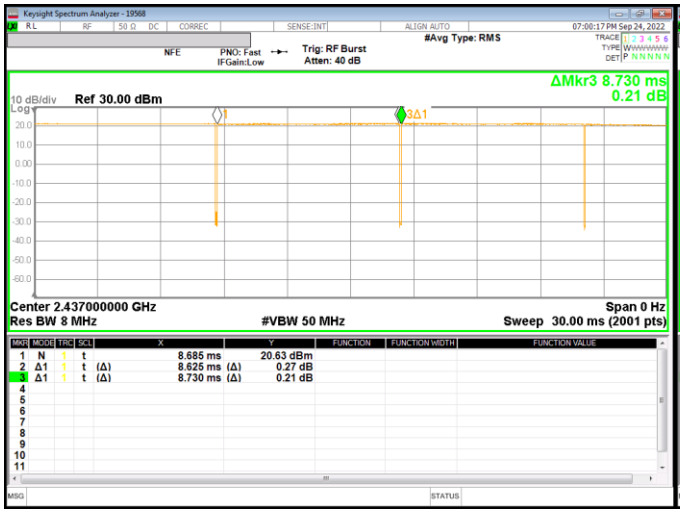
LIMITS

None; for reporting purposes only.

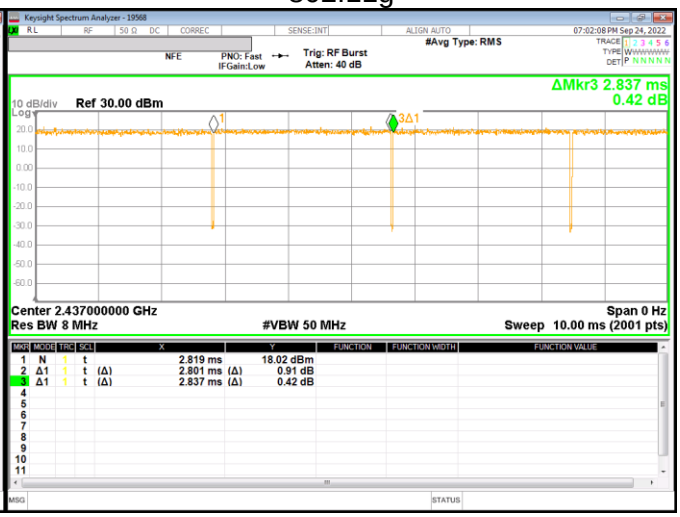
Mode	On Time [ms]	Period [ms]	Duty Cycle X [Linear]	Duty Cycle X [%]	Duty Cycle Correction Factor[dB]	1/T Minimum VBW[kHz]
802.11b SISO	8.625	8.730	0.988	98.797	-	0.116
802.11g SISO	2.801	2.837	0.987	98.731	-	0.357
802.11n(HT20) SISO	2.601	2.642	0.984	98.448	-	0.384

Note. According to ANSI C63.10 Section 11.6, do not apply the Duty Cycle Correction Factor judging that a duty cycle of greater than or equal to 98% is continuous signal.

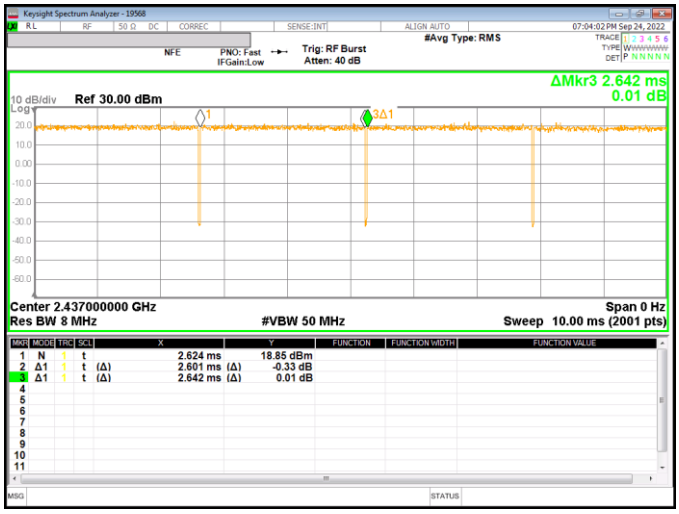
802.11b



802.11g



802.11n



9.2. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)
The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

Reference to KDB 558074 D01 15.247 Meas Guidance: The transmitter output is connected to a spectrum analyzer with the RBW set to100 kHz, the VBW >= 3 x RBW, peak detector and max hold.

ANSI C63.10-2013, Section 11.8.1

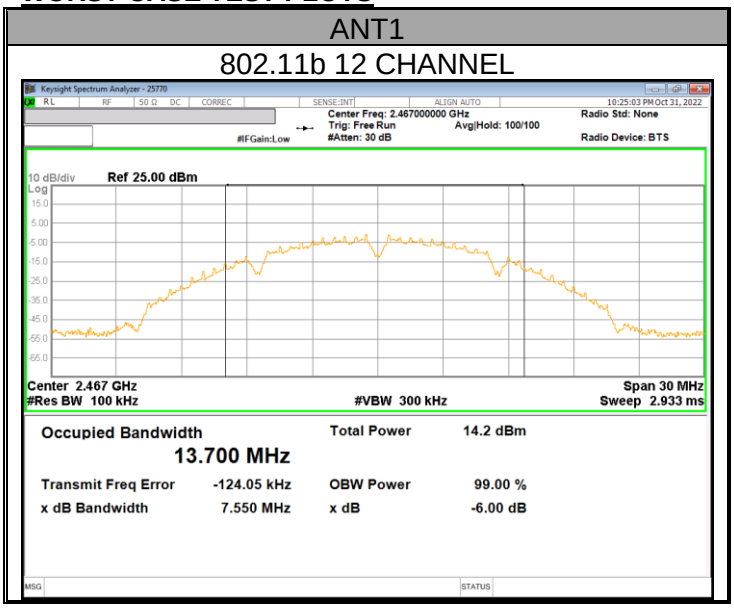
RESULTS

- Please refer to the next page

WORST CASE TEST PLOTS

ANT1

802.11b 12 CHANNEL



9.2.1. 802.11b MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
		ANT 1	
1	2 412	8.088	0.5
6	2 437	8.527	
11	2 462	7.614	
12	**2 467**	**7.550**	
13	2 472	8.065	
Worst		**7.550**	

9.2.2. 802.11g MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
		ANT 1	
1	2 412	12.560	0.5
6	**2 437**	**11.030**	
11	2 462	13.850	
12	2 467	11.360	
13	2 472	12.550	
Worst		**11.030**	

9.2.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
		ANT 1	
1	2 412	12.600	0.5
6	2 437	12.560	
11	2 462	11.380	
12	**2 467**	**11.340**	
13	2 472	12.560	
Worst		**11.340**	

9.3. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

Measurements perform using a wideband RF frame average power sensor.
The cable assembly insertion loss and duty cycle correction factor was entered as an offset in the power sensor to allow for direct reading of power.
Output power measurement was performed utilizing the 8.3.2.3 under KDB558074 D01 15.247 Meas Guidance.

ANSI C63.10-2013, Section 11.9.2.3.1 Method AVGPM

9.3.1. TEST RESULTS

- 802.11b,g,n mode

Mode	Channel	Frequency [MHz]	Average Power [dBm]	Power Limit [dBm]
802.11b	1	2 412	20.37	30.00
	6	2 437	20.51	
	11	2 462	20.25	
	12	2 467	7.25	
	13	2 472	7.70	
Worst Case			20.51	
802.11g	1	2 412	18.34	
	6	2 437	18.05	
	11	2 462	18.44	
	12	2 467	5.49	
	13	2 472	5.87	
Worst Case			18.44	
802.11n HT20	1	2 412	18.76	
	6	2 437	18.62	
	11	2 462	18.27	
	12	2 467	5.13	
	13	2 472	5.66	
Worst Case			18.76	

- Calculation of Output Power result
Average Power = Meas. Power + Duty Cycle CF

9.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

Power Spectral Density was performed utilizing the section8.4 under KDB558074 D01 15.247 Meas Guidance.

ANSI C63.10-2013, Section 11.10.3 & 11.10.5

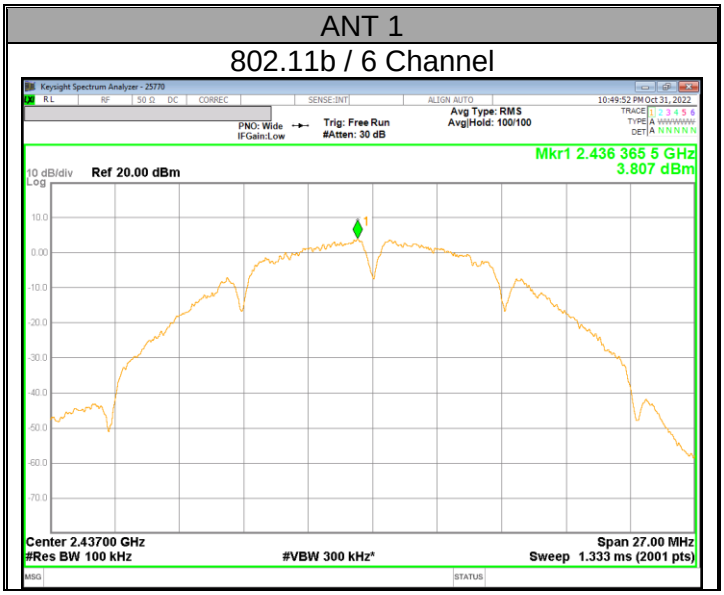
RESULTS

- Please refer to the next page

WORST CASE TEST PLOTS

ANT 1

802.11b / 6 Channel



9.4.1. 802.11b/g/n HT20 MODE TEST RESULTS

Mode	Channel	Frequency [MHz]	Meas PSD [dBm/100kHz]	DCCF	Total Corr'd PSD [dBm/100kHz]	PSD Limit [dBm/3kHz]
802.11b	1	2 412	2.353	-	2.353	8.00Note
	6	2 437	**3.807**	-	**3.807**	
	11	2 462	3.707	-	3.707	
	12	2 467	-8.863	-	-8.863	
	13	2 472	-8.690	-	-8.690	
802.11g	1	2 412	0.485	-	0.485	
	6	2 437	0.731	-	0.731	
	11	2 462	1.229	-	1.229	
	12	2 467	-11.722	-	-11.722	
	13	2 472	-11.753	-	-11.753	
802.11n HT20	1	2 412	1.135	-	1.135	
	6	2 437	0.870	-	0.870	
	11	2 462	0.345	-	0.345	
	12	2 467	-12.491	-	-12.491	
	13	2 472	-11.699	-	-11.699	

- Calculation of Output PSD result
- 1TX : Corr'd PSD = Meas PSD + Duty Cycle CF
Note1. RBW 100kHz measurement data is lower than 3kHz limit.

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

9.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

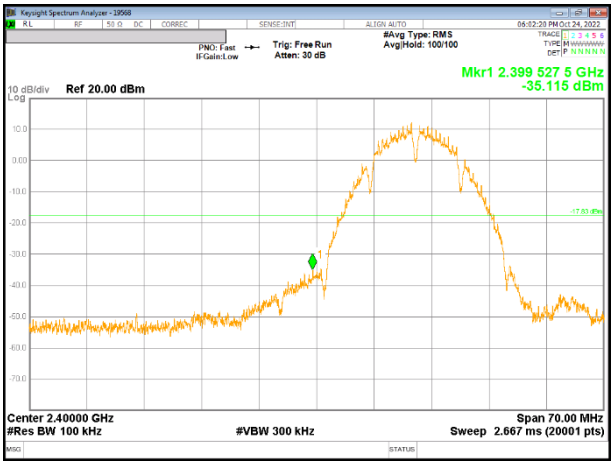
Output power was measured based on the use of average measurement, therefore the required attenuation is 30 dB.

TEST PROCEDURE

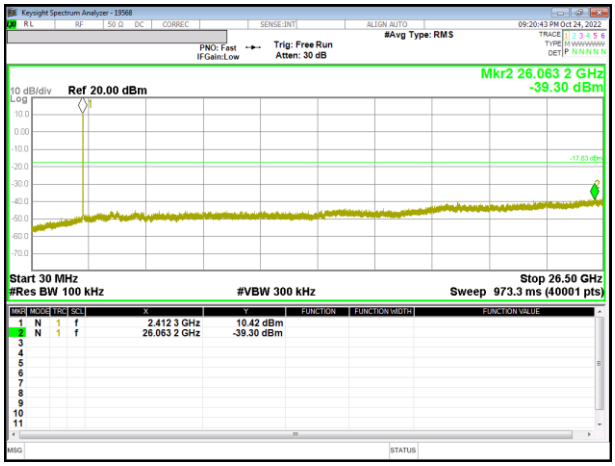
KDB 558074 D01 v05r02, Section 8.5
ANSI C63.10-2013, Section 11.11.3

RESULTS

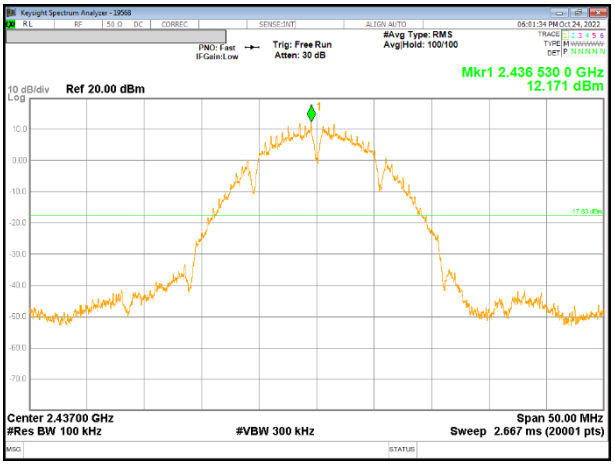
9.5.1. 802.11b MODE



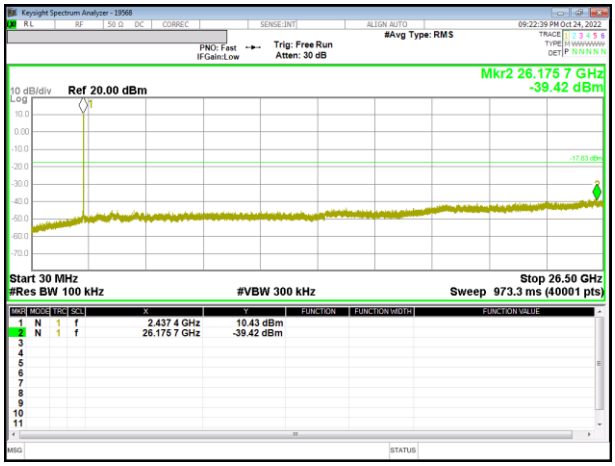
1 Channel Band-edge



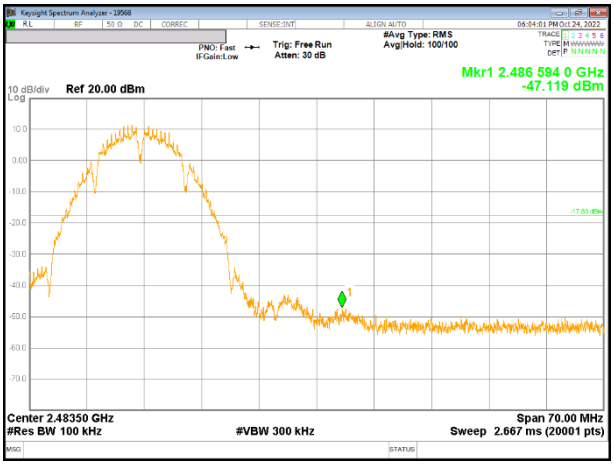
Out-Of-Band 1 Channel



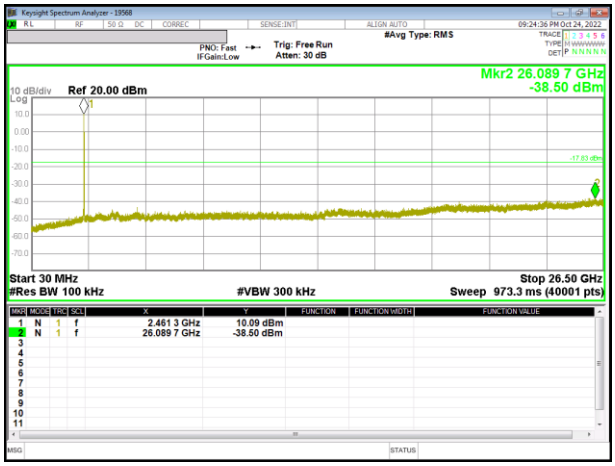
In-Band Reference Level



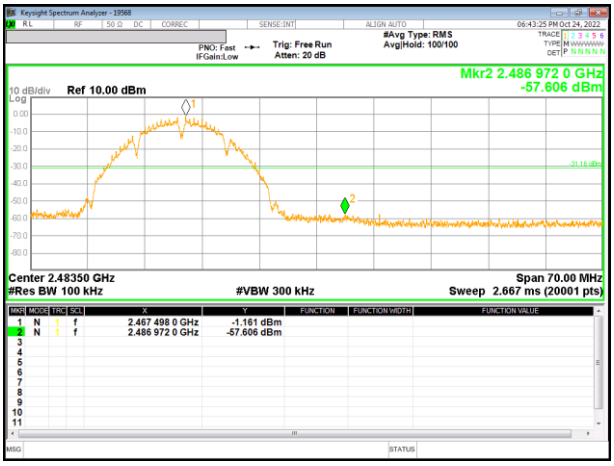
Out-Of-Band 6 Channel



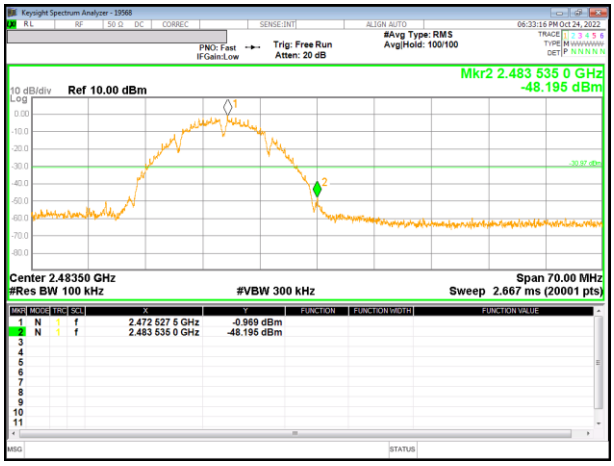
11 Channel Band-edge



Out-Of-Band 11 Channel

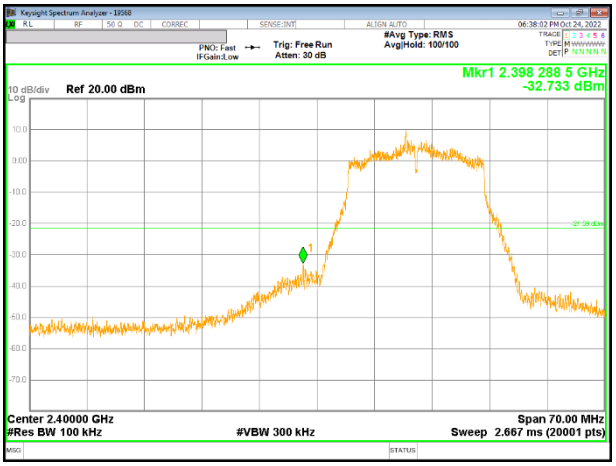


12 Channel Band-edge

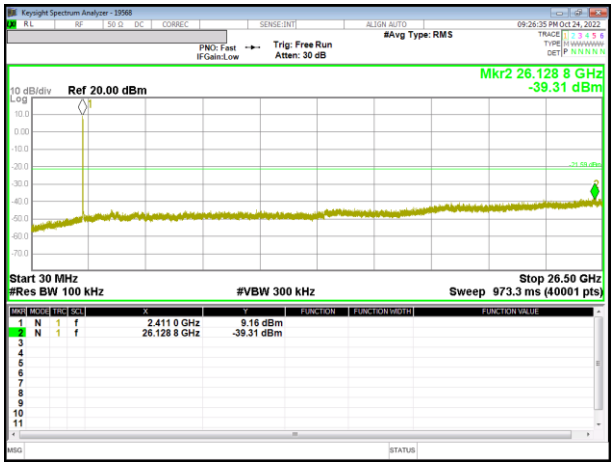


13 Channel Band-edge

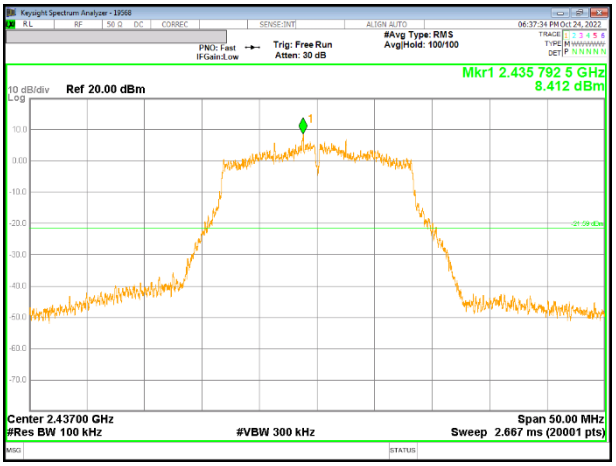
9.5.2. 802.11g MODE



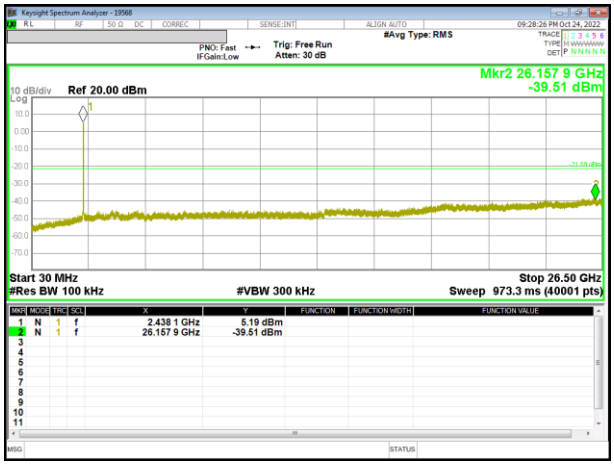
1 Channel Band-edge



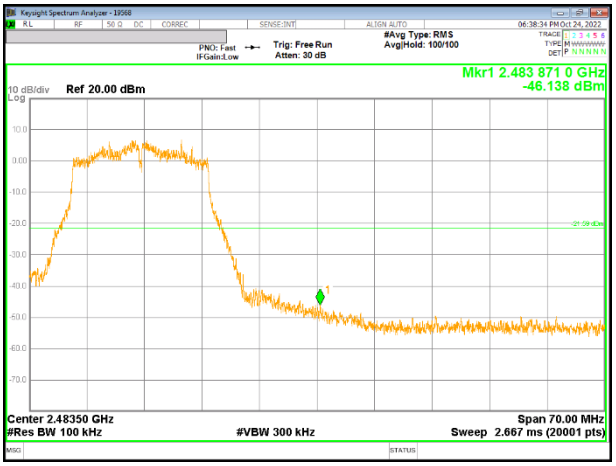
Out-Of-Band 1 Channel



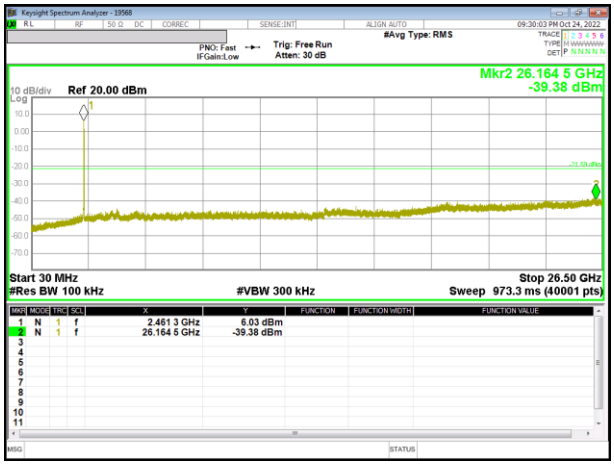
In-Band Reference Level



Out-Of-Band 6 Channel



11 Channel Band-edge

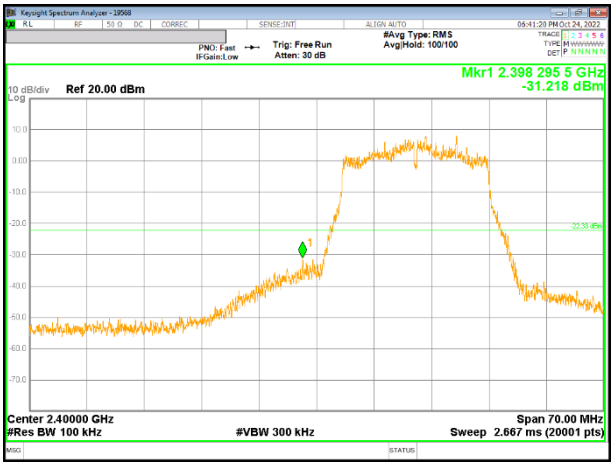


Out-Of-Band 11 Channel

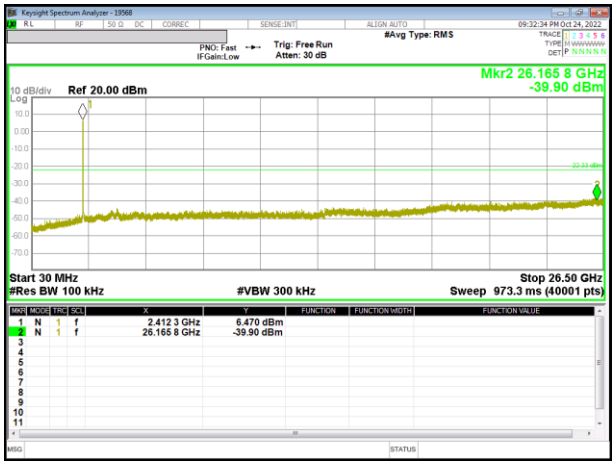
12 Channel Band-edge

13 Channel Band-edge

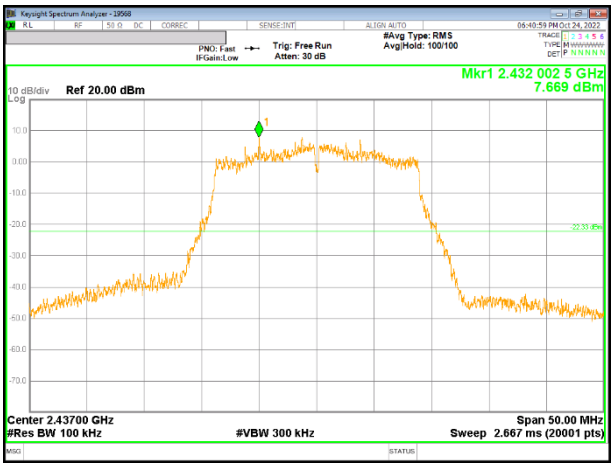
9.5.3. 802.11n HT20 MODE



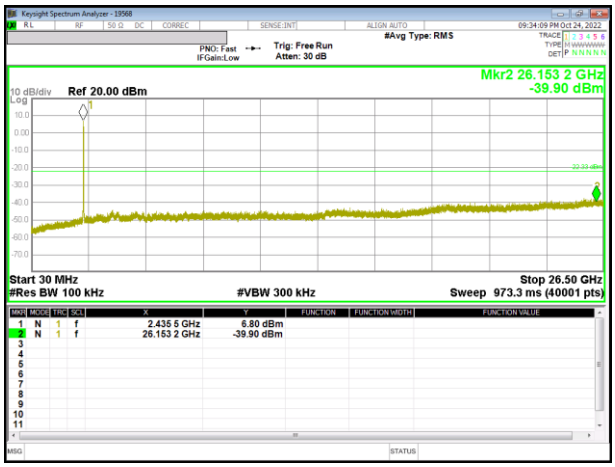
1 Channel Band-edge



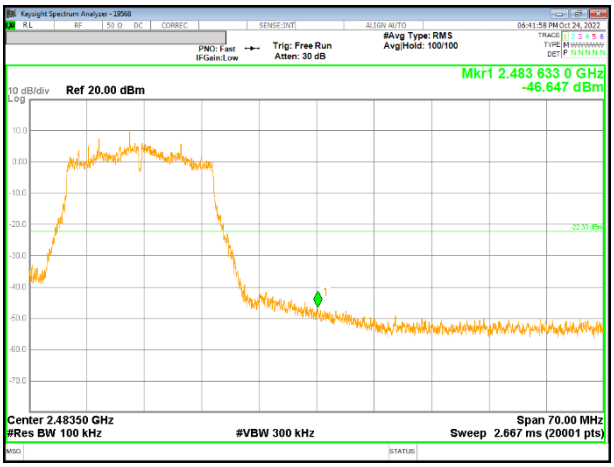
Out-Of-Band 1 Channel



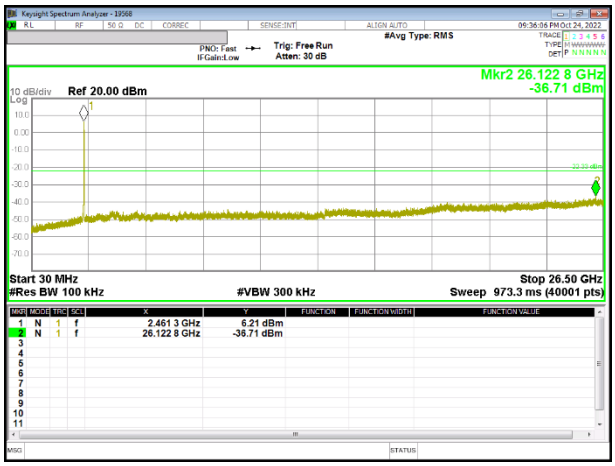
In-Band Reference Level



Out-Of-Band 6 Channel



11 Channel Band-edge



Out-Of-Band 11 Channel

12 Channel Band-edge

13 Channel Band-edge

10. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (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
30 – 88	100**	3
88 - 216	150**	3
216 – 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.

FCC Part 15.205 (a) : Only spurious emissions are permitted in any of the frequency bands listed below :

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~ 12.52025	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.57675 ~ 12.57725	156.52475 ~	1660 ~ 1710	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	13.36 ~ 13.41	156.52525	1718.8 ~ 1722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	16.42 ~ 16.423	156.7 ~ 156.9	2200 ~ 2300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.69475 ~ 16.69525	162.0125 ~	2310 ~ 2390	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	16.80425 ~ 16.80475	167.17	2483.5 ~ 2500	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	25.5 ~ 25.67	167.72 ~ 173.2	2655 ~ 2900		
8.291 ~ 8.294	37.5 ~ 38.25	240 ~ 285	3260 ~ 3267		
8.362 ~ 8.366	73 ~ 74.6	322 ~ 335.4	3332 ~ 3339		
8.37625 ~ 8.38675	74.8 ~ 75.2	399.90 ~ 410	3345.8 ~ 3358		
		608 ~ 614	3600 ~ 4400		
		960 ~ 1240			

▪ FCC Part 15.205(b) : The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1 GHz and 150 cm for above 1 GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor for average measurements.
(Restriced bandedge, Final detection of spurious harmonic emissions)

Duty cycle factor = 10log (1/x) For this sample:

802.11b SISO mode = 0 dB (duty cycle > 98%);
802.11g SISO mode = 0 dB (duty cycle > 98%);
802.11n(HT20) SISO mode = 0 dB (duty cycle > 98%);

Pre-scans to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 kHz for peak measurements.

The spectrum from 1 GHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.
(From 30MHz to 1GHz, test was performed with the EUT set to transmit at the channel with highest output power)

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

Note : Emission was pre-scanned from 9 kHz to 30 MHz; No emissions were detected which was at least 20dB below the specification limit (consider distance correction factor).
Per FCC part 15.31(o), test results were not reported.

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field based on KDB 414788.

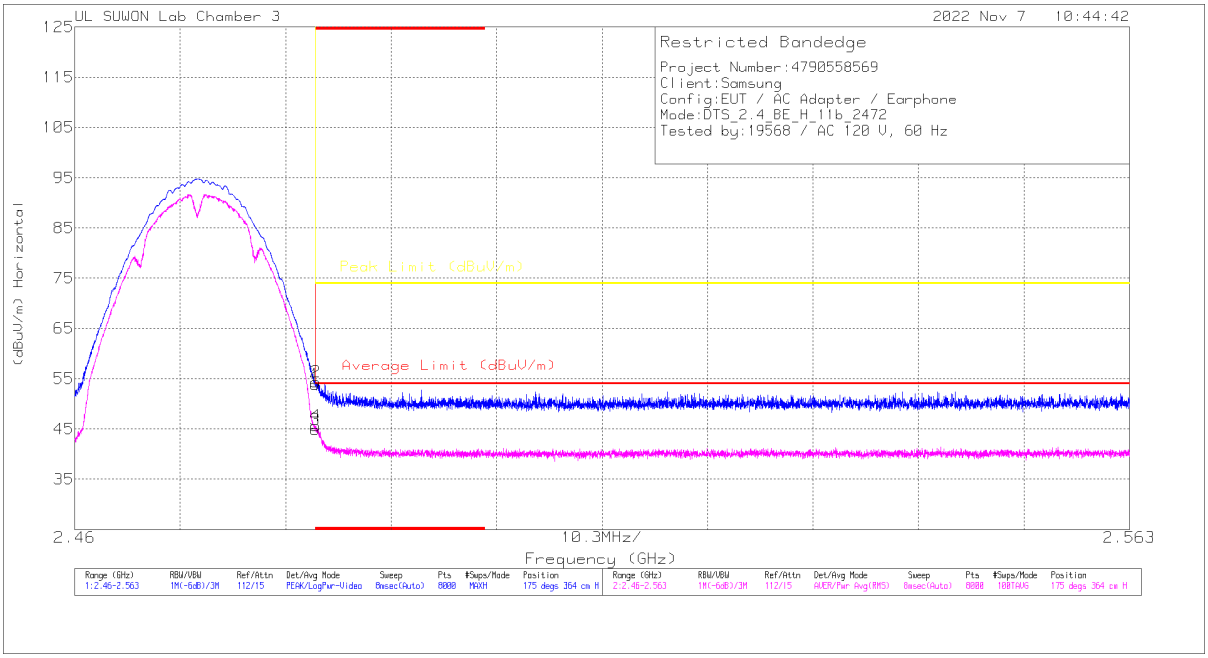
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

10.1. TRANSMITTER ABOVE 1 GHz

10.1.1. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND

BANDEDGE (ANT1 WORST CASE: 13 CHANNEL)

HORIZONTAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	45.68	Pk	32.9	-24.7	0	53.88	-	-	74	-20.12	175	364	H
2	* 2.48353	46.12	Pk	32.9	-24.7	0	54.32	-	-	74	-19.68	175	364	H
3	* 2.4835	36.69	RMS	32.9	-24.7	0	44.89	54	-9.11	-	-	175	364	H
4	* 2.48353	37.41	RMS	32.9	-24.7	0	45.61	54	-8.39	-	-	175	364	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

BANDEDGE TEST DATA

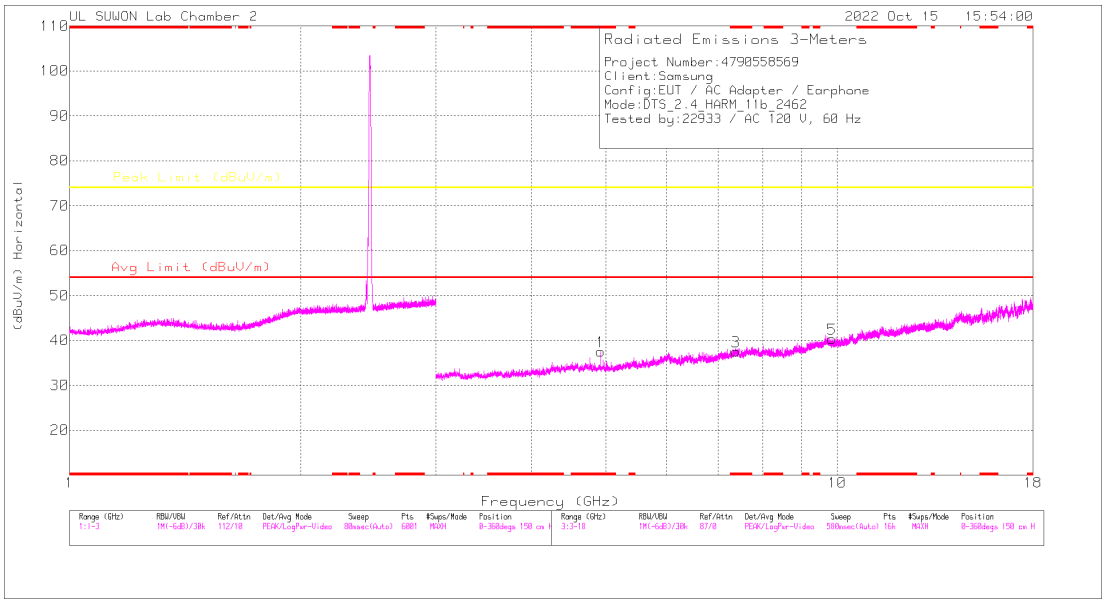
Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
2412	ANT1	* 2.39	43.45	Pk	32.80	-24.80	0.00	51.45	-	-	74.00	-22.55	166	140	H
		* 2.38729	45.63	Pk	32.70	-24.80	0.00	53.53	-	-	74.00	-20.47	166	140	H
		* 2.39	33.52	RMS	32.80	-24.80	0.00	41.52	54.00	-12.48	-	-	166	140	H
		* 2.38669	35.62	RMS	32.70	-24.90	0.00	43.42	54.00	-10.58	-	-	166	140	H
		* 2.39	43.26	Pk	32.80	-24.80	0.00	51.26	-	-	74.00	-22.74	199	354	V
		* 2.38586	45.35	Pk	32.70	-24.90	0.00	53.15	-	-	74.00	-20.85	199	354	V
		* 2.39	32.70	RMS	32.80	-24.80	0.00	40.70	54.00	-13.30	-	-	199	354	V
		* 2.38671	34.22	RMS	32.70	-24.90	0.00	42.02	54.00	-11.98	-	-	199	354	V
2462	ANT1	* 2.48351	41.24	Pk	31.90	-19.60	0.00	53.54	-	-	74.00	-20.46	103	239	H
		* 2.484	44.60	Pk	31.90	-19.60	0.00	56.90	-	-	74.00	**-17.10**	103	239	H
		* 2.48351	31.63	RMS	31.90	-19.60	0.00	43.93	54.00	-10.07	-	-	103	239	H
		* 2.48593	33.17	RMS	31.90	-19.60	0.00	45.47	54.00	-8.53	-	-	103	239	H
		* 2.48351	40.55	Pk	31.90	-19.60	0.00	52.85	-	-	74.00	-21.15	36	107	V
		2.563	43.50	Pk	32.00	-19.50	0.00	56.00	-	-	74.00	-18.00	36	107	V
		* 2.48351	31.55	RMS	31.90	-19.60	0.00	43.85	54.00	-10.15	-	-	36	107	V
		* 2.48615	32.53	RMS	31.90	-19.60	0.00	44.83	54.00	-9.17	-	-	36	107	V
2467	ANT1	* 2.4835	42.75	Pk	32.90	-24.70	0.00	50.95	-	-	74.00	-23.05	172	366	H
		* 2.48354	47.73	Pk	32.90	-24.70	0.00	55.93	-	-	74.00	-18.07	172	366	H
		* 2.4835	32.88	RMS	32.90	-24.70	0.00	41.08	54.00	-12.92	-	-	172	366	H
		* 2.4847	33.99	RMS	32.90	-24.70	0.00	42.19	54.00	-11.81	-	-	172	366	H
		* 2.4835	42.13	Pk	32.90	-24.70	0.00	50.33	-	-	74.00	-23.67	188	107	V
		* 2.49933	45.17	Pk	32.90	-24.80	0.00	53.27	-	-	74.00	-20.73	188	107	V
		* 2.4835	32.19	RMS	32.90	-24.70	0.00	40.39	54.00	-13.61	-	-	188	107	V
		* 2.48524	33.31	RMS	32.90	-24.70	0.00	41.51	54.00	-12.49	-	-	188	107	V
2472	ANT1	* 2.4835	45.68	Pk	32.90	-24.70	0.00	53.88	-	-	74.00	-20.12	175	364	H
		* 2.48353	46.12	Pk	32.90	-24.70	0.00	54.32	-	-	74.00	-19.68	175	364	H
		* 2.4835	36.69	RMS	32.90	-24.70	0.00	44.89	54.00	-9.11	-	-	175	364	H
		* 2.48353	37.41	RMS	32.90	-24.70	0.00	45.61	54.00	**-8.39**	-	-	175	364	H
		* 2.4835	45.29	Pk	32.90	-24.70	0.00	53.49	-	-	74.00	-20.51	190	103	V
		2.560	45.00	Pk	32.90	-24.70	0.00	53.20	-	-	74.00	-20.80	190	103	V
		* 2.4835	34.30	RMS	32.90	-24.70	0.00	42.50	54.00	-11.50	-	-	190	103	V
		* 2.48385	34.01	RMS	32.90	-24.70	0.00	42.21	54.00	-11.79	-	-	190	103	V

Note1. Pk - Peak detector, RMS - RMS detectior
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

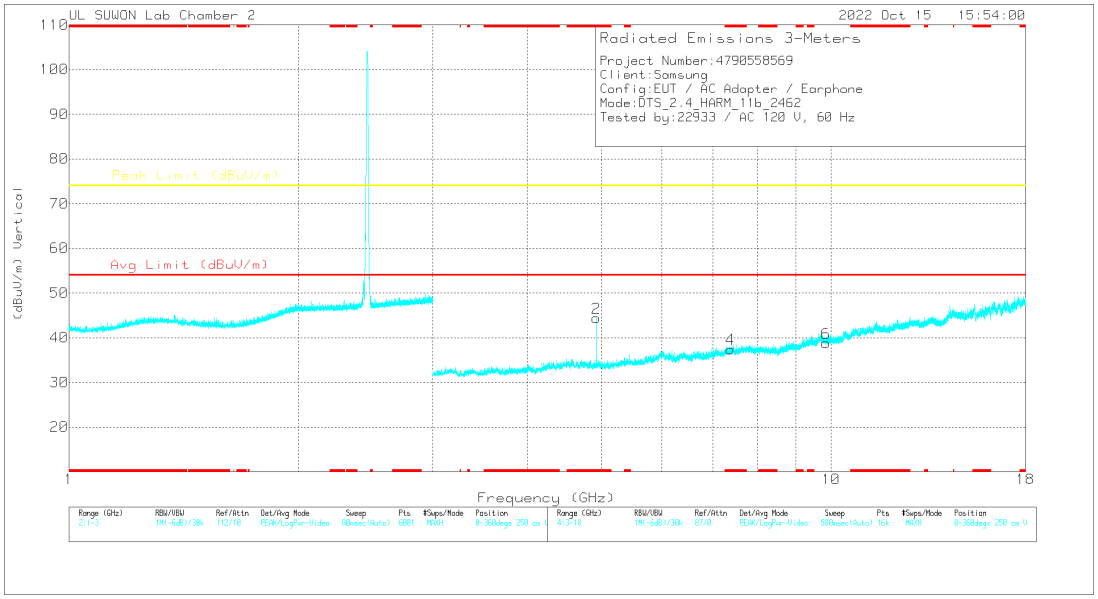
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

HARMONICS AND SPURIOUS EMISSIONS (ANT1 WORST CASE: 11 CHANNEL)

RESULTS



HORIZONTAL



VERTICAL

Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0016872 4	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.92392	38.8	PK2	34	-27.2	0	45.6	-	-	74	-28.4	109	101	H
* 4.92397	30.68	MAv1	34	-27.2	0	37.48	54	-16.52	-	-	109	101	H
* 4.92395	42.35	PK2	34	-27.2	0	49.15	-	-	74	-24.85	221	132	V
* 4.92402	37.96	MAv1	34	-27.2	0	44.76	54	-9.24	-	-	221	132	V
* 7.37651	34.4	PK2	35.7	-23.9	0	46.2	-	-	74	-27.8	0	100	H
* 7.37638	34.56	PK2	35.7	-23.9	0	46.36	-	-	74	-27.64	0	100	V
9.85404	32.73	PK2	37.2	-21.5	0	48.43	-	-	74	-25.57	0	100	H
9.84811	32.09	PK2	37.2	-21.5	0	47.79	-	-	74	-26.21	0	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

HARMONICS AND SPURIOUS EMISSIONS TEST DATA

Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
2412	ANT1	* 4.82393	39.14	PK2	34.00	-27.80	0.00	45.34	-	-	74.00	-28.66	143	118	H
		* 4.82398	30.52	MAv1	34.00	-27.80	0.00	36.72	54.00	-17.28	-	-	143	118	H
		* 4.82391	43.21	PK2	34.00	-27.80	0.00	49.41	-	-	74.00	**-24.59**	222	107	V
		* 4.82399	38.49	MAv1	34.00	-27.80	0.00	44.69	54.00	-9.31	-	-	222	107	V
		7.241	35.25	PK2	35.70	-25.20	0.00	45.75	-	-	74.00	-28.25	0	100	H
		7.243	35.48	PK2	35.70	-25.20	0.00	45.98	-	-	74.00	-28.02	0	100	V
		9.644	32.82	PK2	37.00	-21.00	0.00	48.82	-	-	74.00	-25.18	0	100	H
		9.650	33.21	PK2	37.00	-20.90	0.00	49.31	-	-	74.00	-24.69	0	100	V
2437	ANT1	* 4.87411	38.28	PK2	34.00	-27.70	0.00	44.58	-	-	74.00	-29.42	168	111	H
		* 4.87396	28.25	MAv1	34.00	-27.70	0.00	34.55	54.00	-19.45	-	-	168	111	H
		* 4.87402	40.59	PK2	34.00	-27.70	0.00	46.89	-	-	74.00	-27.11	216	169	V
		* 4.87395	34.11	MAv1	34.00	-27.70	0.00	40.41	54.00	-13.59	-	-	216	169	V
		* 7.31586	35.26	PK2	35.70	-24.60	0.00	46.36	-	-	74.00	-27.64	0	100	H
		* 7.31071	35.44	PK2	35.70	-24.60	0.00	46.54	-	-	74.00	-27.46	0	100	V
		9.758	33.19	PK2	37.10	-20.90	0.00	49.39	-	-	74.00	-24.61	0	100	H
		9.753	33.21	PK2	37.10	-20.90	0.00	49.41	-	-	74.00	**-24.59**	0	100	V
2462	ANT1	* 4.92392	38.80	PK2	34.00	-27.20	0.00	45.60	-	-	74.00	-28.40	109	101	H
		* 4.92397	30.68	MAv1	34.00	-27.20	0.00	37.48	54.00	-16.52	-	-	109	101	H
		* 4.92395	42.35	PK2	34.00	-27.20	0.00	49.15	-	-	74.00	-24.85	221	132	V
		* 4.92402	37.96	MAv1	34.00	-27.20	0.00	44.76	54.00	**-9.24**	-	-	221	132	V
		* 7.37651	34.40	PK2	35.70	-23.90	0.00	46.20	-	-	74.00	-27.80	0	100	H
		* 7.37638	34.56	PK2	35.70	-23.90	0.00	46.36	-	-	74.00	-27.64	0	100	V
		9.854	32.73	PK2	37.20	-21.50	0.00	48.43	-	-	74.00	-25.57	0	100	H
		9.848	32.09	PK2	37.20	-21.50	0.00	47.79	-	-	74.00	-26.21	0	100	V

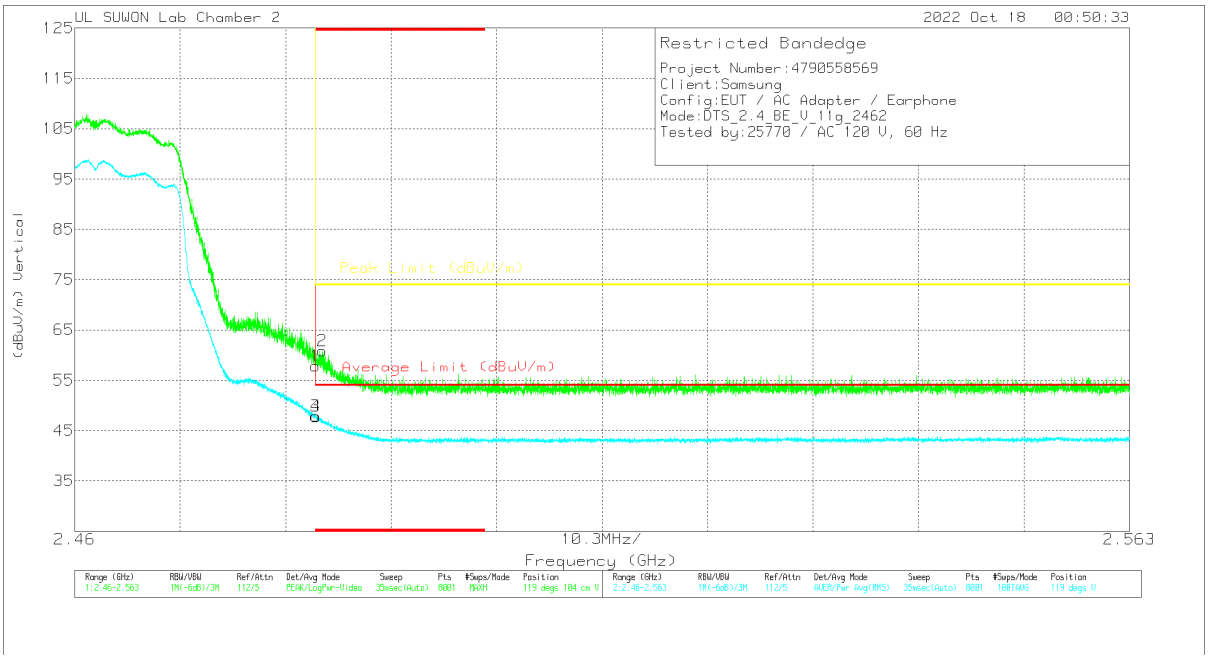
Note1. PK2 - KDB558074 Method: Maximum Peak / MAv1 - KDB558074 Option 1 Maximum RMS Average
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

10.1.2. TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND

BANDEDGE (ANT1 WORST CASE: 11 CHANNEL)

VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	45.56	Pk	31.9	-19.6	0	57.86	-	-	74	-16.14	119	104	V
2	* 2.48415	48.5	Pk	31.9	-19.6	0	60.8	-	-	74	-13.2	119	104	V
3	* 2.48351	35.55	RMS	31.9	-19.6	0	47.85	54	-6.15	-	-	119	104	V
4	* 2.48355	35.53	RMS	31.9	-19.6	0	47.83	54	-6.17	-	-	119	104	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

BANDEDGE TEST DATA

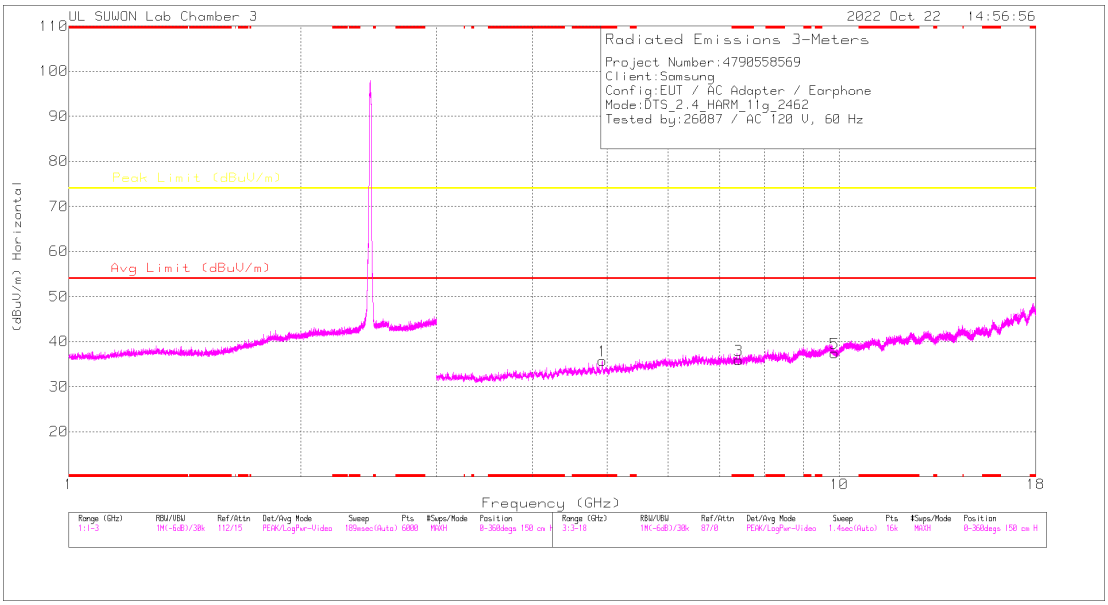
Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
2412	ANT1	* 2.39	45.63	Pk	31.70	-19.70	0.00	57.63	-	-	74.00	-16.37	116	355	H
		* 2.38942	50.00	Pk	31.70	-19.70	0.00	62.00	-	-	74.00	**-12.00**	116	355	H
		* 2.39	35.08	RMS	31.70	-19.70	0.00	47.08	54.00	-6.92	-	-	116	355	H
		* 2.38994	35.58	RMS	31.70	-19.70	0.00	47.58	54.00	-6.42	-	-	116	355	H
		* 2.39	40.51	Pk	31.70	-19.70	0.00	52.51	-	-	74.00	-21.49	114	355	V
		* 2.38498	44.00	Pk	31.70	-19.60	0.00	56.10	-	-	74.00	-17.90	114	355	V
		* 2.39	30.81	RMS	31.70	-19.70	0.00	42.81	54.00	-11.19	-	-	114	355	V
		* 2.38983	31.70	RMS	31.70	-19.70	0.00	43.70	54.00	-10.30	-	-	114	355	V
2462	ANT1	* 2.48351	48.52	Pk	31.90	-19.60	0.00	60.82	-	-	74.00	-13.18	113	269	H
		* 2.48427	47.59	Pk	31.90	-19.60	0.00	59.89	-	-	74.00	-14.11	113	269	H
		* 2.48351	34.54	RMS	31.90	-19.60	0.00	46.84	54.00	-7.16	-	-	113	269	H
		* 2.48352	34.63	RMS	31.90	-19.60	0.00	46.93	54.00	-7.07	-	-	113	269	H
		* 2.48351	45.56	Pk	31.90	-19.60	0.00	57.86	-	-	74.00	-16.14	119	104	V
		* 2.48415	48.50	Pk	31.90	-19.60	0.00	60.80	-	-	74.00	-13.20	119	104	V
		* 2.48351	35.55	RMS	31.90	-19.60	0.00	47.85	54.00	**-6.15**	-	-	119	104	V
		* 2.48355	35.53	RMS	31.90	-19.60	0.00	47.83	54.00	-6.17	-	-	119	104	V
2467	ANT1	* 2.48351	39.80	Pk	31.90	-19.60	0.00	52.10	-	-	74.00	-21.90	308	104	H
		2.541	43.98	Pk	32.00	-19.40	0.00	56.58	-	-	74.00	-17.42	308	104	H
		* 2.48351	31.07	RMS	31.90	-19.60	0.00	43.37	54.00	-10.63	-	-	308	104	H
		* 2.48798	31.61	RMS	31.90	-19.60	0.00	43.91	54.00	-10.09	-	-	308	104	H
		* 2.48351	40.07	Pk	31.90	-19.60	0.00	52.37	-	-	74.00	-21.63	98	118	V
		* 2.48388	44.95	Pk	31.90	-19.60	0.00	57.25	-	-	74.00	-16.75	98	118	V
		* 2.48351	31.09	RMS	31.90	-19.60	0.00	43.39	54.00	-10.61	-	-	98	118	V
		2.531	31.40	RMS	31.90	-19.40	0.00	43.90	54.00	-10.10	-	-	98	118	V
2472	ANT1	* 2.48351	44.61	Pk	31.90	-19.60	0.00	56.91	-	-	74.00	-17.09	127	298	H
		* 2.48354	45.99	Pk	31.90	-19.60	0.00	58.29	-	-	74.00	-15.71	127	298	H
		* 2.48351	33.78	RMS	31.90	-19.60	0.00	46.08	54.00	-7.92	-	-	127	298	H
		* 2.48355	33.74	RMS	31.90	-19.60	0.00	46.04	54.00	-7.96	-	-	127	298	H
		* 2.48351	46.23	Pk	31.90	-19.60	0.00	58.53	-	-	74.00	-15.47	89	104	V
		* 2.48356	48.03	Pk	31.90	-19.60	0.00	60.33	-	-	74.00	-13.67	89	104	V
		* 2.48351	35.07	RMS	31.90	-19.60	0.00	47.37	54.00	-6.63	-	-	89	104	V
		* 2.48356	34.85	RMS	31.90	-19.60	0.00	47.15	54.00	-6.85	-	-	89	104	V

Note1. Pk - Peak detector, RMS - RMS detectior
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

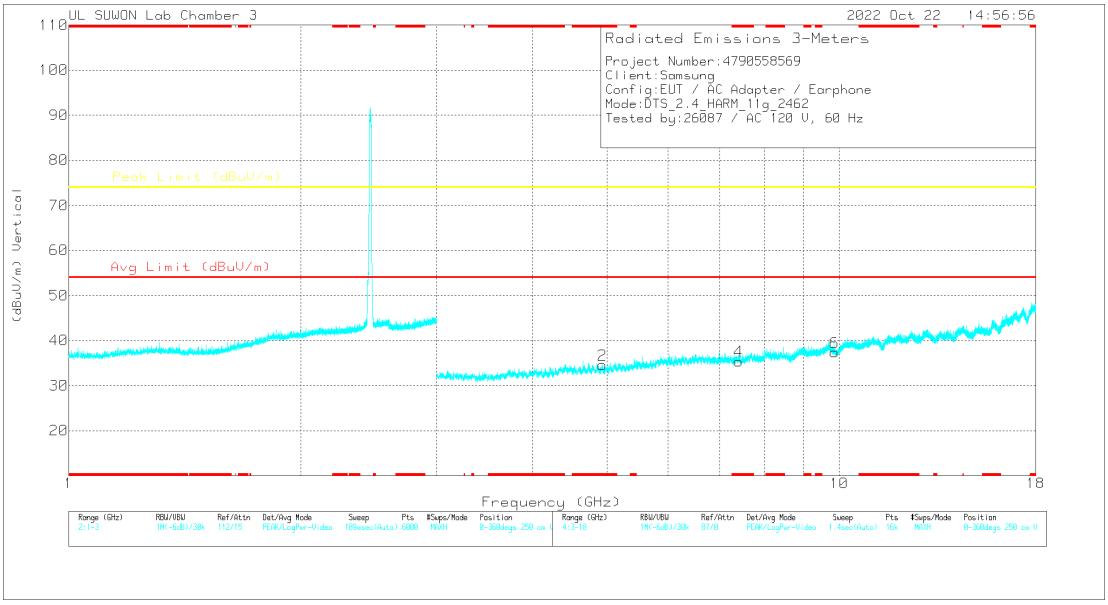
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

HARMONICS AND SPURIOUS EMISSIONS (ANT1 WORST CASE: 11 CHANNEL)

RESULTS



HORIZONTAL



VERTICAL

Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0021895 7	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.92361	42.12	PK2	34.7	-30.7	0	46.12	-	-	74	-27.88	1	110	H
* 4.92351	30.43	MAv1	34.7	-30.7	0	34.43	54	-19.57	-	-	1	110	H
* 4.92967	40.18	PK2	34.7	-30.7	0	44.18	-	-	74	-29.82	0	100	V
* 7.40878	34.73	PK2	36	-24.5	0	46.23	-	-	74	-27.77	0	100	H
* 7.42375	34.49	PK2	36	-24.7	0	45.79	-	-	74	-28.21	0	100	V
9.876	31.29	PK2	37.7	-21.5	0	47.49	-	-	74	-26.51	0	100	H
9.84823	32.21	PK2	37.7	-21.5	0	48.41	-	-	74	-25.59	0	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

HARMONICS AND SPURIOUS EMISSIONS TEST DATA

Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
2412	ANT1	* 4.81904	40.59	PK2	34.60	-30.00	0.00	45.19	-	-	74.00	-28.81	0	100	H
		* 4.81779	39.24	PK2	34.60	-30.00	0.00	43.84	-	-	74.00	-30.16	0	100	V
		7.154	35.33	PK2	36.10	-26.00	0.00	45.43	-	-	74.00	-28.57	0	100	H
		7.099	35.55	PK2	36.20	-26.10	0.00	45.65	-	-	74.00	-28.35	0	100	V
		9.635	32.71	PK2	37.40	-21.50	0.00	48.61	-	-	74.00	-25.39	0	100	H
		9.631	32.95	PK2	37.40	-21.60	0.00	48.75	-	-	74.00	**-25.25**	0	100	V
2437	ANT1	* 4.875	40.82	PK2	34.70	-30.60	0.00	44.92	-	-	74.00	-29.08	0	100	H
		* 4.8687	39.42	PK2	34.60	-30.50	0.00	43.52	-	-	74.00	-30.48	0	100	V
		* 7.30496	34.88	PK2	36.00	-25.30	0.00	45.58	-	-	74.00	-28.42	0	100	H
		* 7.32206	35.08	PK2	36.00	-25.10	0.00	45.98	-	-	74.00	-28.02	0	100	V
		9.758	32.37	PK2	37.50	-21.30	0.00	48.57	-	-	74.00	-25.43	0	100	H
		9.738	32.32	PK2	37.50	-21.40	0.00	48.42	-	-	74.00	-25.58	0	100	V
2462	ANT1	* 4.92361	42.12	PK2	34.70	-30.70	0.00	46.12	-	-	74.00	-27.88	1	110	H
		* 4.92351	30.43	MAv1	34.70	-30.70	0.00	34.43	54.00	**-19.57**	-	-	1	110	H
		* 4.92967	40.18	PK2	34.70	-30.70	0.00	44.18	-	-	74.00	-29.82	0	100	V
		* 7.40878	34.73	PK2	36.00	-24.50	0.00	46.23	-	-	74.00	-27.77	0	100	H
		* 7.42375	34.49	PK2	36.00	-24.70	0.00	45.79	-	-	74.00	-28.21	0	100	V
		9.876	31.29	PK2	37.70	-21.50	0.00	47.49	-	-	74.00	-26.51	0	100	H
		9.848	32.21	PK2	37.70	-21.50	0.00	48.41	-	-	74.00	-25.59	0	100	V

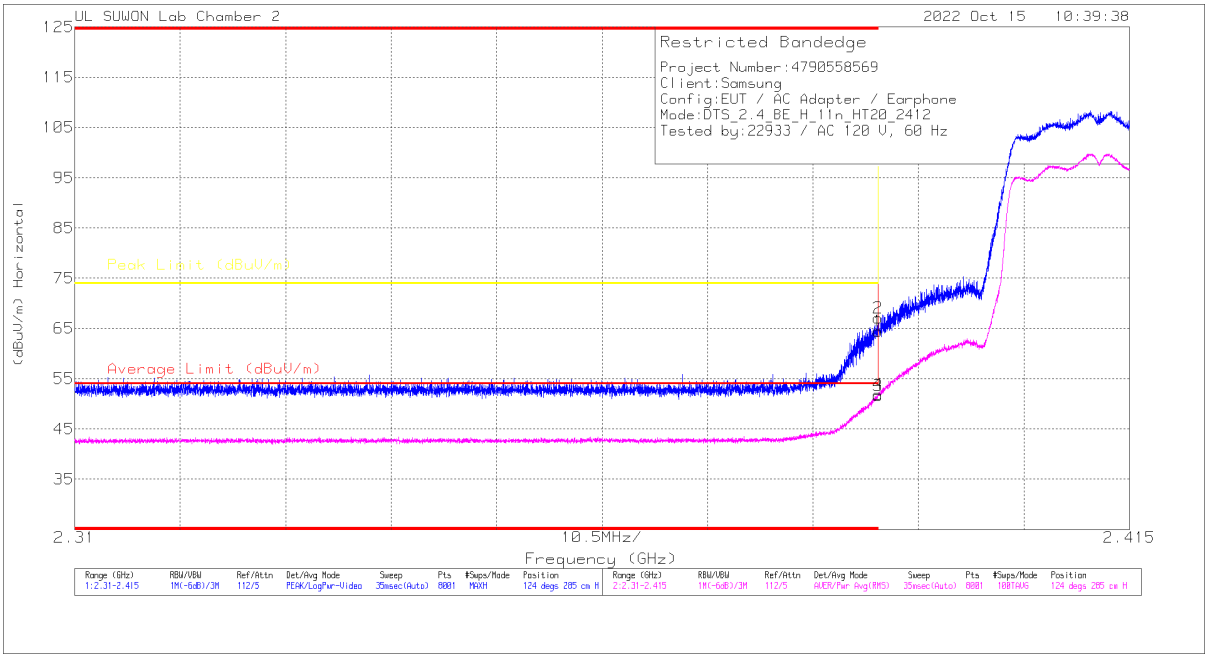
Note1. PK2 - KDB558074 Method: Maximum Peak / MAv1 - KDB558074 Option 1 Maximum RMS Average
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

10.1.3. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND

BANDEDGE (ANT1 WORST CASE: 1 CHANNEL)

HORIZONTAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	52.45	Pk	31.7	-19.7	0	64.45	-	-	74	-9.55	124	285	H
2	* 2.38996	55.07	Pk	31.7	-19.7	0	67.07	-	-	74	-6.93	124	285	H
3	* 2.39	39.61	RMS	31.7	-19.7	0	51.61	54	-2.39	-	-	124	285	H
4	* 2.38998	39.86	RMS	31.7	-19.7	0	51.86	54	-2.14	-	-	124	285	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

BANDEDGE TEST DATA

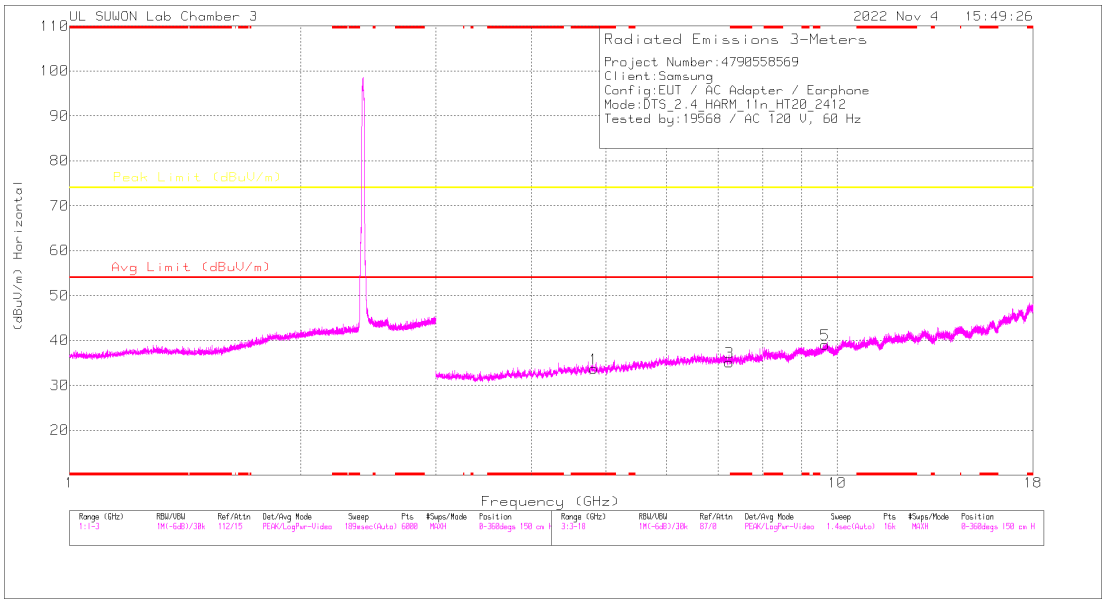
Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
2412	ANT1	* 2.39	52.45	Pk	31.70	-19.70	0.00	64.45	-	-	74.00	-9.55	124	285	H
		* 2.38996	55.07	Pk	31.70	-19.70	0.00	67.07	-	-	74.00	**-6.93**	124	285	H
		* 2.39	39.61	RMS	31.70	-19.70	0.00	51.61	54.00	-2.39	-	-	124	285	H
		* 2.38998	39.86	RMS	31.70	-19.70	0.00	51.86	54.00	**-2.14**	-	-	124	285	H
		* 2.39	51.87	Pk	31.70	-19.70	0.00	63.87	-	-	74.00	-10.13	55	102	V
		* 2.38997	53.42	Pk	31.70	-19.70	0.00	65.42	-	-	74.00	-8.58	55	102	V
		* 2.39	39.40	RMS	31.70	-19.70	0.00	51.40	54.00	-2.60	-	-	55	102	V
		* 2.38996	39.64	RMS	31.70	-19.70	0.00	51.64	54.00	-2.36	-	-	55	102	V
2462	ANT1	* 2.48351	47.16	Pk	31.90	-19.60	0.00	59.46	-	-	74.00	-14.54	120	341	H
		* 2.4837	48.50	Pk	31.90	-19.60	0.00	60.80	-	-	74.00	-13.20	120	341	H
		* 2.48351	36.08	RMS	31.90	-19.60	0.00	48.38	54.00	-5.62	-	-	120	341	H
		* 2.48356	36.12	RMS	31.90	-19.60	0.00	48.42	54.00	-5.58	-	-	120	341	H
		* 2.48351	45.89	Pk	31.90	-19.60	0.00	58.19	-	-	74.00	-15.81	77	108	V
		* 2.48368	49.29	Pk	31.90	-19.60	0.00	61.59	-	-	74.00	-12.41	77	108	V
		* 2.48351	35.39	RMS	31.90	-19.60	0.00	47.69	54.00	-6.31	-	-	77	108	V
		* 2.48379	36.02	RMS	31.90	-19.60	0.00	48.32	54.00	-5.68	-	-	77	108	V
2467	ANT1	* 2.48351	41.28	Pk	31.90	-19.60	0.00	53.58	-	-	74.00	-20.42	114	239	H
		2.511	43.68	Pk	31.90	-19.50	0.00	56.08	-	-	74.00	-17.92	114	239	H
		* 2.48351	31.01	RMS	31.90	-19.60	0.00	43.31	54.00	-10.69	-	-	114	239	H
		2.556	31.27	RMS	32.00	-19.30	0.00	43.97	54.00	-10.03	-	-	114	239	H
		* 2.48351	41.22	Pk	31.90	-19.60	0.00	53.52	-	-	74.00	-20.48	126	169	V
		* 2.48702	43.87	Pk	31.90	-19.60	0.00	56.17	-	-	74.00	-17.83	126	169	V
		* 2.48351	31.06	RMS	31.90	-19.60	0.00	43.36	54.00	-10.64	-	-	126	169	V
		2.562	31.46	RMS	32.00	-19.50	0.00	43.96	54.00	-10.04	-	-	126	169	V
2472	ANT1	* 2.48351	47.34	Pk	31.90	-19.60	0.00	59.64	-	-	74.00	-14.36	115	238	H
		* 2.48355	47.17	Pk	31.90	-19.60	0.00	59.47	-	-	74.00	-14.53	115	238	H
		* 2.48351	34.90	RMS	31.90	-19.60	0.00	47.20	54.00	-6.80	-	-	115	238	H
		* 2.48356	34.81	RMS	31.90	-19.60	0.00	47.11	54.00	-6.89	-	-	115	238	H
		* 2.48351	47.05	Pk	31.90	-19.60	0.00	59.35	-	-	74.00	-14.65	68	106	V
		* 2.4837	47.50	Pk	31.90	-19.60	0.00	59.80	-	-	74.00	-14.20	68	106	V
		* 2.48351	34.92	RMS	31.90	-19.60	0.00	47.22	54.00	-6.78	-	-	68	106	V
		* 2.48352	35.14	RMS	31.90	-19.60	0.00	47.44	54.00	-6.56	-	-	68	106	V

Note1. Pk - Peak detector, RMS - RMS detectior
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

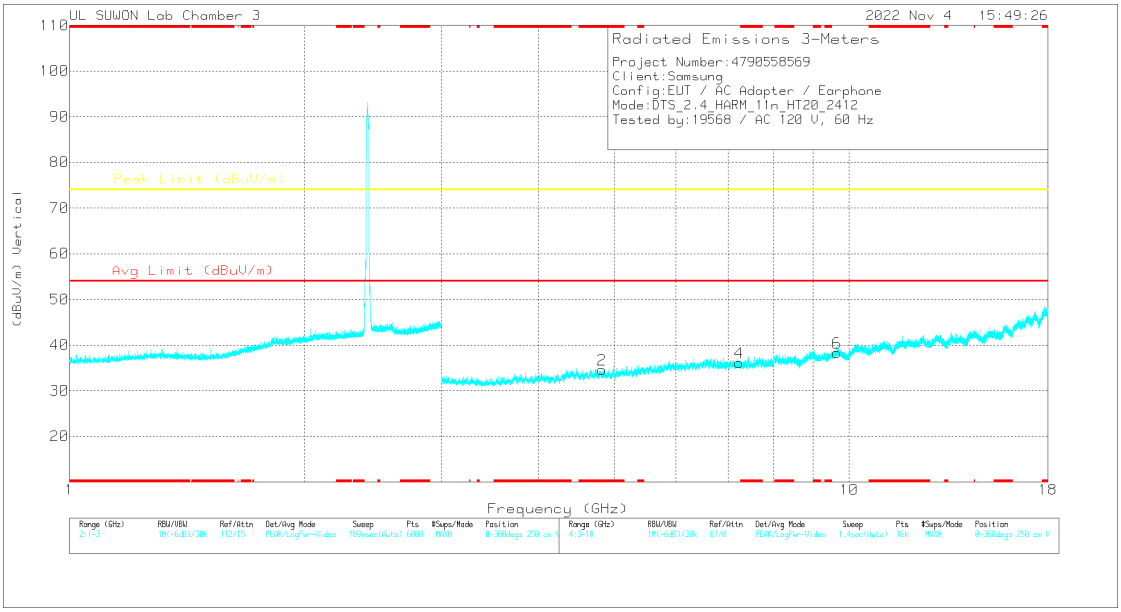
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

HARMONICS AND SPURIOUS EMISSIONS (ANT1 WORST CASE: 1 CHANNEL)

RESULTS



HORIZONTAL



VERTICAL

Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.83101	40.01	PK2	34.6	-30.1	0	44.51	-	-	74	-29.49	0	100	H
* 4.8315	38.95	PK2	34.6	-30.1	0	43.45	-	-	74	-30.55	0	100	V
7.23033	36.19	PK2	36	-25.6	0	46.59	-	-	74	-27.41	0	100	H
7.23424	35.69	PK2	36	-25.6	0	46.09	-	-	74	-27.91	0	100	V
9.65368	32.1	PK2	37.4	-21.5	0	48	-	-	74	-26	0	100	H
9.65507	32.77	PK2	37.4	-21.5	0	48.67	-	-	74	-25.33	0	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak

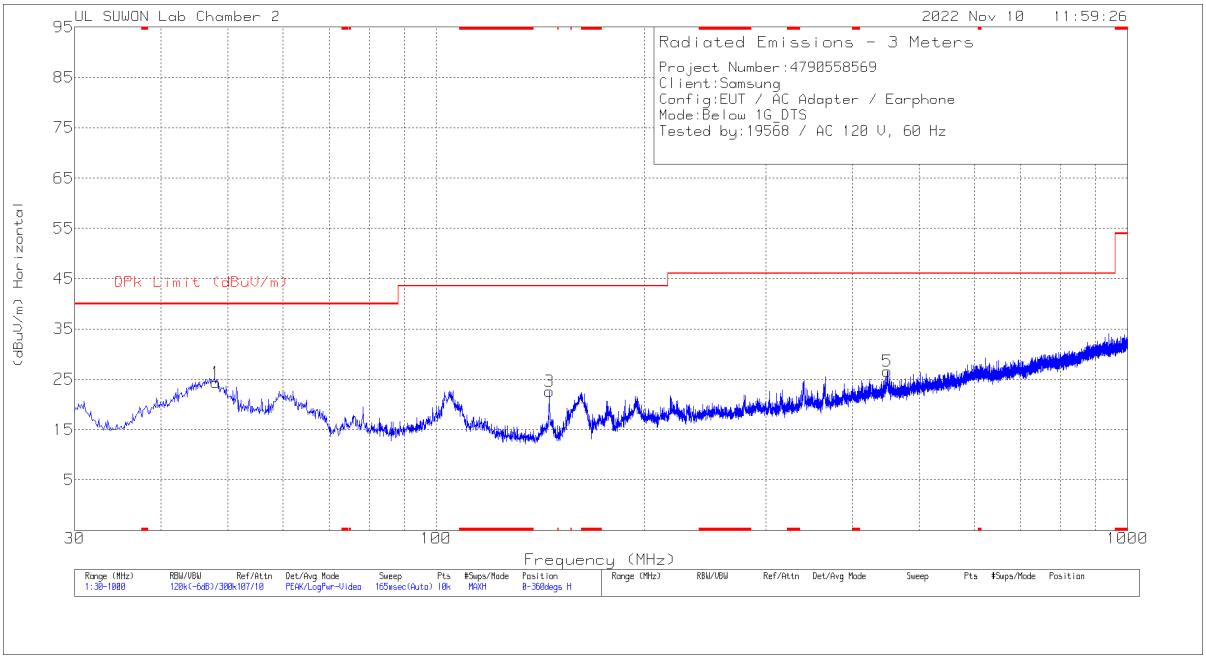
HARMONICS AND SPURIOUS EMISSIONS TEST DATA

Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
2412	ANT1	* 4.83101	40.01	PK2	34.60	-30.10	0.00	44.51	-	-	74.00	-29.49	0	100	H
		* 4.8315	38.95	PK2	34.60	-30.10	0.00	43.45	-	-	74.00	-30.55	0	100	V
		7.230	36.19	PK2	36.00	-25.60	0.00	46.59	-	-	74.00	-27.41	0	100	H
		7.234	35.69	PK2	36.00	-25.60	0.00	46.09	-	-	74.00	-27.91	0	100	V
		9.654	32.10	PK2	37.40	-21.50	0.00	48.00	-	-	74.00	-26.00	0	100	H
		9.655	32.77	PK2	37.40	-21.50	0.00	48.67	-	-	74.00	**-25.33**	0	100	V
2437	ANT1	* 4.87287	40.23	PK2	34.60	-30.60	0.00	44.23	-	-	74.00	-29.77	0	100	H
		* 4.87257	39.95	PK2	34.60	-30.60	0.00	43.95	-	-	74.00	-30.05	0	100	V
		* 7.30588	35.19	PK2	36.00	-25.30	0.00	45.89	-	-	74.00	-28.11	0	100	H
		* 7.31168	35.16	PK2	36.00	-25.30	0.00	45.86	-	-	74.00	-28.14	0	100	V
		9.742	31.67	PK2	37.50	-21.40	0.00	47.77	-	-	74.00	-26.23	0	100	H
		9.748	32.24	PK2	37.50	-21.40	0.00	48.34	-	-	74.00	-25.66	51	103	V
2457	ANT1	* 4.92834	41.70	PK2	34.70	-30.70	0.00	45.70	-	-	74.00	-28.30	0	100	H
		* 4.91729	40.61	PK2	34.70	-30.80	0.00	44.51	-	-	74.00	-29.49	0	100	V
		* 7.39654	35.00	PK2	36.00	-24.60	0.00	46.40	-	-	74.00	-27.60	0	100	H
		* 7.38772	34.71	PK2	36.00	-24.60	0.00	46.11	-	-	74.00	-27.89	0	100	V
		9.838	31.67	PK2	37.70	-21.50	0.00	47.87	-	-	74.00	-26.13	14	104	H
		9.848	31.45	PK2	37.70	-21.50	0.00	47.65	-	-	74.00	-26.35	4	108	V

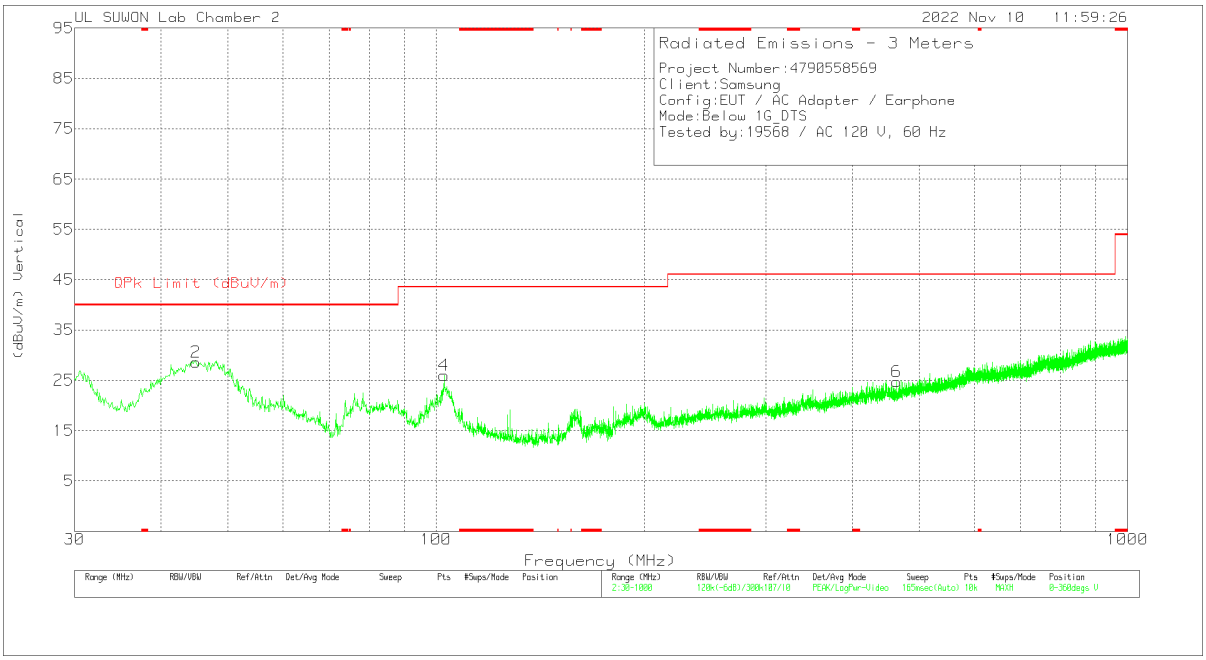
Note1. PK2 - KDB558074 Method: Maximum Peak / MAv1 - KDB558074 Option 1 Maximum RMS Average
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

10.2. WORST CASE BELOW 1 GHz



HORIZONTAL



VERTICAL

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below 1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	48.042	35.52	Pk	20.1	-31.2	24.42	40	-15.58	0-360	200	H
3	145.818	38.85	Pk	13.9	-30.1	22.65	43.52	-20.87	0-360	100	H
5	449.04	32.87	Pk	21.9	-28.2	26.57	46.02	-19.45	0-360	100	H
2	44.938	40.02	Pk	19.8	-31.2	28.62	40	-11.38	0-360	100	V
4	102.653	38.88	Pk	17.6	-30.5	25.98	43.52	-17.54	0-360	100	V
6	463.59	31.09	Pk	21.8	-28.1	24.79	46.02	-21.23	0-360	100	V

Pk - Peak detector

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

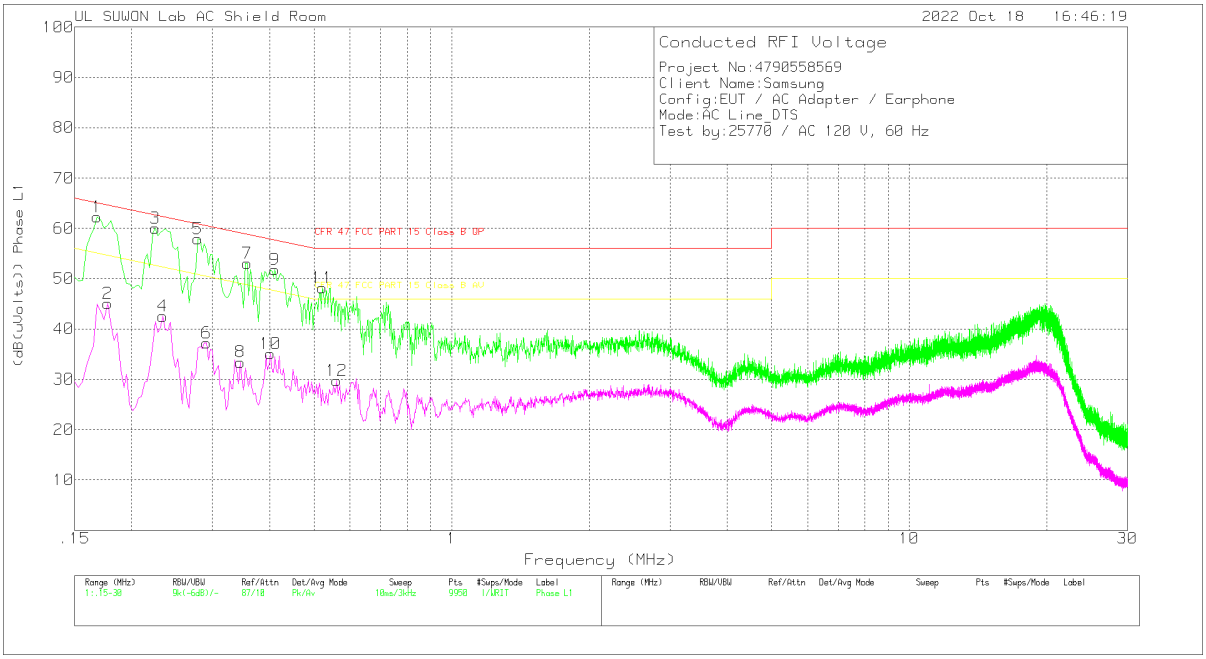
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

11.1. AC Power Line

LINE 1 RESULTS



Trace Markers

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_L1[dB]	CABLELOS S(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
1	.168	52.15	Pk	10	.1	62.25	65.06	-2.81	-	-
2	.177	34.95	Av	9.9	.2	45.05	-	-	54.63	-9.58
3	.225	50.18	Pk	9.7	.2	60.08	62.63	-2.55	-	-
4	.234	32.62	Av	9.7	.2	42.52	-	-	52.31	-9.79
5	.279	48.01	Pk	9.7	.2	57.91	60.85	-2.94	-	-
6	.291	27.37	Av	9.7	.2	37.27	-	-	50.5	-13.23
7	.357	43.04	Pk	9.8	.2	53.04	58.8	-5.76	-	-
8	.345	23.42	Av	9.8	.2	33.42	-	-	49.08	-15.66
9	.411	41.81	Pk	9.8	.2	51.81	57.63	-5.82	-	-
10	.402	25.06	Av	9.8	.2	35.06	-	-	47.81	-12.75
11	.522	38.1	Pk	9.9	.2	48.2	56	-7.8	-	-
12	.561	19.71	Av	9.8	.2	29.71	-	-	46	-16.29

Pk - Peak detector
Av - Average detection

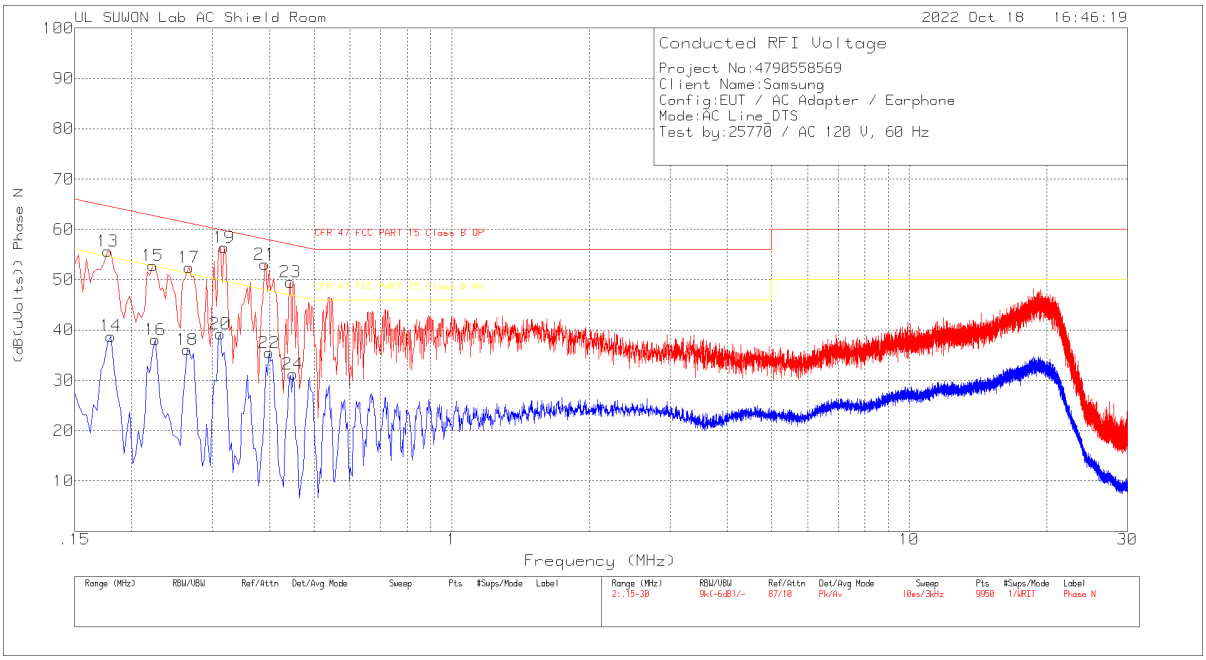
Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_L1[dB]	CABLELOS S(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
.16725	34.72	Qp	9.9	.1	44.72	65.1	-20.38	-	-
.22425	37.48	Qp	9.7	.2	47.38	62.66	-15.28	-	-
.27825	34.39	Qp	9.7	.2	44.29	60.87	-16.58	-	-
.35775	34.38	Qp	9.8	.2	44.38	58.78	-14.4	-	-
.41025	38.05	Qp	9.8	.2	48.05	57.64	-9.59	-	-
.52275	19.18	Qp	9.9	.2	29.28	56	-26.72	-	-

Qp - Quasi-Peak detector

LINE 2 RESULTS



Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_N[dB]	CABLELOSS(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
13	.177	45.54	Pk	9.9	.2	55.64	64.63	-8.99	-	-
14	.18	28.68	Av	9.9	.2	38.78	-	-	54.49	-15.71
15	.222	42.89	Pk	9.7	.2	52.79	62.74	-9.95	-	-
16	.225	28.18	Av	9.7	.2	38.08	-	-	52.63	-14.55
17	.267	42.66	Pk	9.6	.2	52.46	61.21	-8.75	-	-
18	.264	26.29	Av	9.6	.2	36.09	-	-	51.3	-15.21
19	.318	46.48	Pk	9.7	.2	56.38	59.76	-3.38	-	-
20	.312	29.33	Av	9.7	.2	39.23	-	-	49.92	-10.69
21	.39	43.07	Pk	9.8	.2	53.07	58.06	-4.99	-	-
22	.399	25.47	Av	9.8	.2	35.47	-	-	47.87	-12.4
23	.444	39.4	Pk	9.9	.2	49.5	56.99	-7.49	-	-
24	.45	21.1	Av	9.9	.2	31.2	-	-	46.88	-15.68

Pk - Peak detector
Av - Average detection

Range 2: Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_N[dB]	CABLELOSS(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
.17775	32.95	Qp	9.9	.2	43.05	64.59	-21.54	-	-
.22275	36.85	Qp	9.7	.2	46.75	62.72	-15.97	-	-
.26775	38.01	Qp	9.6	.2	47.81	61.19	-13.38	-	-
.31725	31.51	Qp	9.7	.2	41.41	59.78	-18.37	-	-
.38925	35.37	Qp	9.8	.2	45.37	58.08	-12.71	-	-
.44475	17.03	Qp	9.9	.2	27.13	56.97	-29.84	-	-

Qp - Quasi-Peak detector

END OF TEST REPORT

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433