



# **CERTIFICATION TEST REPORT**

**Report Number. :** 4790302419-E3V3

**Applicant :** SAMSUNG ELECTRONICS CO., LTD.  
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,  
GYEONGGI-DO, 16677, KOREA

**Model :** SM-A136B/DSN, SM-A136B/N

**FCC ID :** A3LSMA136B

**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:**  
2022-05-04

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	2022-04-01	Initial issue	Sungeun Lee
V2	2022-04-21	Updated to address TCB's question	Sungeun Lee
V3	2022-05-04	Add model name	Sungeun Lee

## TABLE OF CONTENTS

<b>1. ATTESTATION OF TEST RESULTS .....</b>	<b>5</b>
<b>2. TEST METHODOLOGY .....</b>	<b>6</b>
<b>3. FACILITIES AND ACCREDITATION .....</b>	<b>6</b>
<b>4. CALIBRATION AND UNCERTAINTY .....</b>	<b>7</b>
4.1. MEASURING INSTRUMENT CALIBRATION .....	7
4.2. SAMPLE CALCULATION .....	7
4.3. MEASUREMENT UNCERTAINTY.....	7
4.4. DECISION RULE.....	7
<b>5. EQUIPMENT UNDER TEST.....</b>	<b>8</b>
5.1. EUT DESCRIPTION.....	8
5.2. MAXIMUM OUTPUT POWER.....	8
5.3. DESCRIPTION OF AVAILABLE ANTENNAS.....	8
5.4. TESTED CHANNELS LIST.....	9
5.5. WORST-CASE CONFIGURATION AND MODE.....	9
5.6. DESCRIPTION OF TEST SETUP.....	10
<b>6. MEASUREMENT METHOD.....</b>	<b>12</b>
<b>7. TEST AND MEASUREMENT EQUIPMENT .....</b>	<b>13</b>
<b>8. SUMMARY TABLE .....</b>	<b>14</b>
<b>9. ANTENNA PORT TEST RESULTS.....</b>	<b>15</b>
9.1. ON TIME AND DUTY CYCLE.....	15
9.2. 6 dB BANDWIDTH.....	16
9.2.1. 802.11b MODE IN THE 2.4 GHz BAND.....	17
9.2.2. 802.11g MODE IN THE 2.4 GHz BAND.....	17
9.2.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND .....	17
9.3. OUTPUT POWER.....	18
<b>9.3.1. TEST RESULTS.....</b>	<b>19</b>
9.4. POWER SPECTRAL DENSITY.....	20
<b>9.4.1. 802.11b/g/n HT20 MODE TEST RESULTS.....</b>	<b>21</b>
9.5. CONDUCTED SPURIOUS EMISSIONS.....	22
9.5.1. 802.11b MODE .....	23
9.5.2. 802.11g MODE .....	25
9.5.3. 802.11n HT20 MODE .....	27

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<b>10. RADIATED TEST RESULTS.....</b>	<b>29</b>
10.1. TRANSMITTER ABOVE 1 GHz.....	31
10.1.1. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND .....	31
10.1.2. TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND .....	35
10.1.3. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND.....	39
10.2. WORST CASE BELOW 1 GHz (USB C to C cable) .....	43
10.3. WORST CASE BELOW 1 GHz (USB A to C cable).....	44
<b>11. AC POWER LINE CONDUCTED EMISSIONS .....</b>	<b>45</b>
11.1. AC Power Line (USB C to C Cable).....	46
11.2. AC Power Line (USB A to C Cable).....	48

# 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-A136B/DSN, SM-A136B/N

**SERIAL NUMBER:** R3CT2062ZZH, R3CT2062HAY (CONDUCTED);  
R3CT20636MK (RADIATED);

**DATE TESTED:** 2022-02-16 ~ 2022-03-31;

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 informational 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:



Sungeun Lee  
Suwon Lab Engineer  
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	
<input checked="" type="checkbox"/>	Chamber 1(3m semi-anechoic chamber)
<input checked="" type="checkbox"/>	Chamber 2(3m semi-anechoic chamber)
<input checked="" type="checkbox"/>	Chamber 3(3m semi-anechoic chamber)
<input type="checkbox"/>	Chamber 4(3m Full-anechoic chamber)
<input type="checkbox"/>	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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 28.9 \text{ dBuV/m} &= 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} \end{aligned}$$

### 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 115:2007.

## 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.

This report covers the Samsung models SM-A136B/DSN and SM-A136B/N. These models are identical in hardware except SM-A136B/N has single SIM tray. With some pre-scan, model SM-A136B/DSN was set for final test.

#### WiFi operating mode

Frequency range	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	17.71	59.02
	802.11g SISO	17.58	57.28
	802.11n(HT20) SISO	17.48	55.98

### 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	-4.15



### 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
10	2 457		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: X

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

Ch.	Freq.	SISO Target[dBm]		
		802.11b	802.11g	802.11n HT20
1	2412	17	17	17
6	2437	17	17	17
10	2457		17	17
11	2462	17	16	16
12	2467	17	13	14
13	2472	16	11	11

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

## 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
Charger	SAMSUNG	EP-TA200	R37KC6F39T1SE3	N/A
Data Cable	SAMSUNG	EP-DR140AWE	GH39-01999A	N/A
Earphone	SAMSUNG	GH59-15055A	EHS64AVFWE	N/A

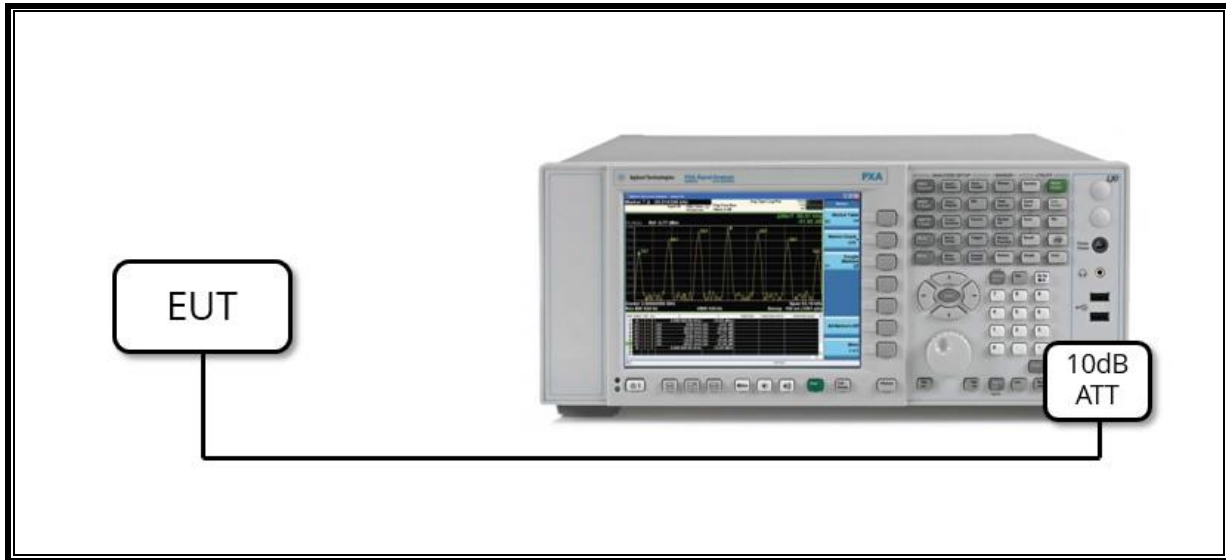
### I/O CABLE

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

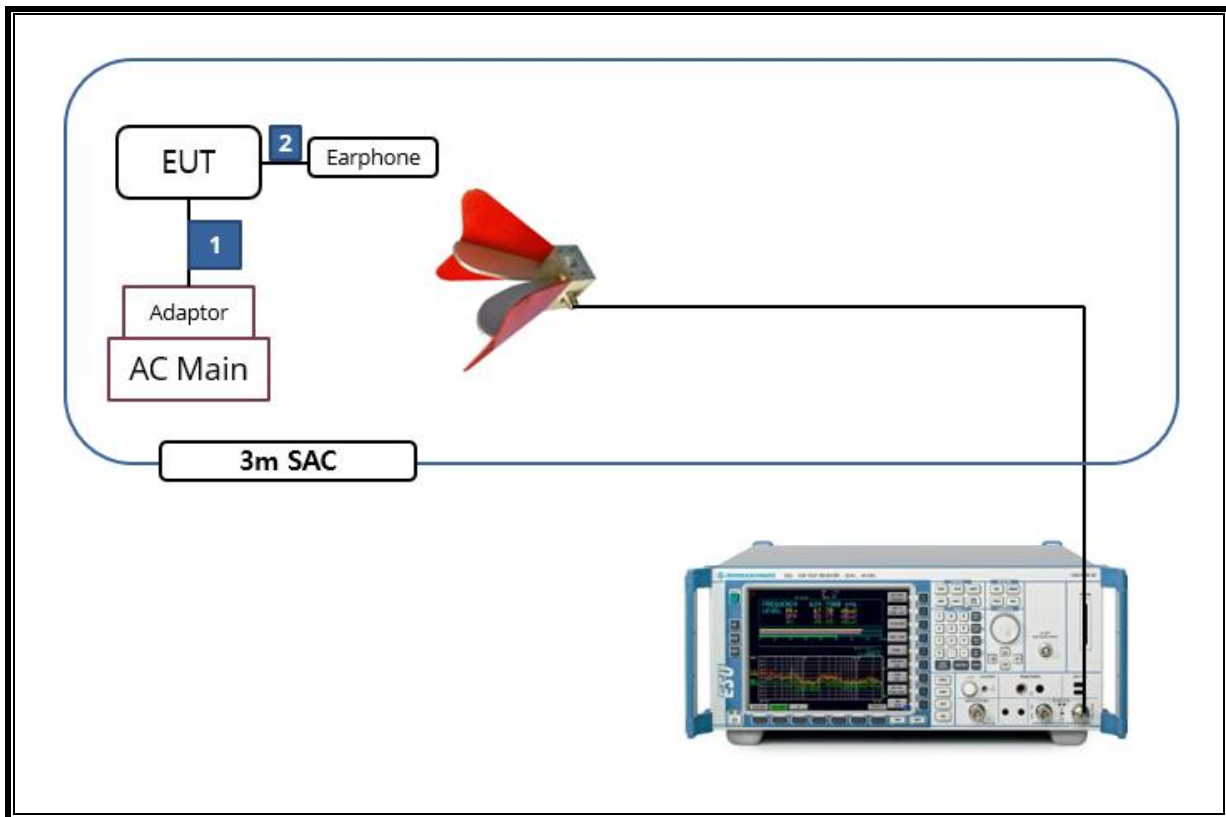
### TEST SETUP

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

**SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)**



**SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)**



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## 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

## 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	2022/08/19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	2022/08/13
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	2022/08/13
Antenna, Horn, 18 GHz	ETS	3115	00167211	2022/07/27
Antenna, Horn, 18 GHz	ETS	3115	00161451	2022/08/15
Antenna, Horn, 18 GHz	ETS	3117	00168724	2022/07/27
Antenna, Horn, 18 GHz	ETS	3117	00168717	2022/08/15
Antenna, Horn, 40 GHz	ETS	3116C	00166155	2022/08/04
Preamplifier	ETS	3116C-PA	00168841	2022/08/04
Preamplifier, 1000 MHz	Sonoma	310N	341282	2022/08/02
Preamplifier, 1000 MHz	Sonoma	310N	351741	2022/08/02
Preamplifier, 1000 MHz	Sonoma	310N	370599	2022/08/02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	2022/08/02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	2022/08/02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029168	2022/08/02
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	2022/08/04
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	2022/08/04
Average Power Sensor	Agilent / HP	U2000	MY54270007	2022/08/04
Average Power Sensor	Agilent / HP	U2000	MY54260010	2022/08/04
Attenuator	PASTERNAK	PE7087-10	A001	2022/08/03
Attenuator	PASTERNAK	PE7087-10	A008	2022/08/03
Attenuator	PASTERNAK	PE7004-10	2	2022/08/02
Attenuator	PASTERNAK	PE7087-10	A009	2022/08/03
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2022/08/02
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2022/08/02
EMI Test Receive, 3 GHz	R&S	ESR3	101832	2022/08/02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	2022/08/02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	2022/08/02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	019	2022/08/02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	2022/08/02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	2022/08/02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	2022/08/02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	2022/08/02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	2022/08/02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	020	2022/08/02
LISN	R&S	ENV-216	101837	2022/08/05
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	8.384	8.423	0.995	99.537	-	0.12
802.11g SISO	2.756	2.801	0.984	98.393	-	0.36
802.11n(HT20) SISO	2.560	2.605	0.983	98.273	-	0.39

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.



## 9.2. 6 dB BANDWIDTH

### LIMITS

FCC §15.247 (a) (2)

The minimum 6 dB bandwidth shall be at least 500 kHz.

### TEST PROCEDURE

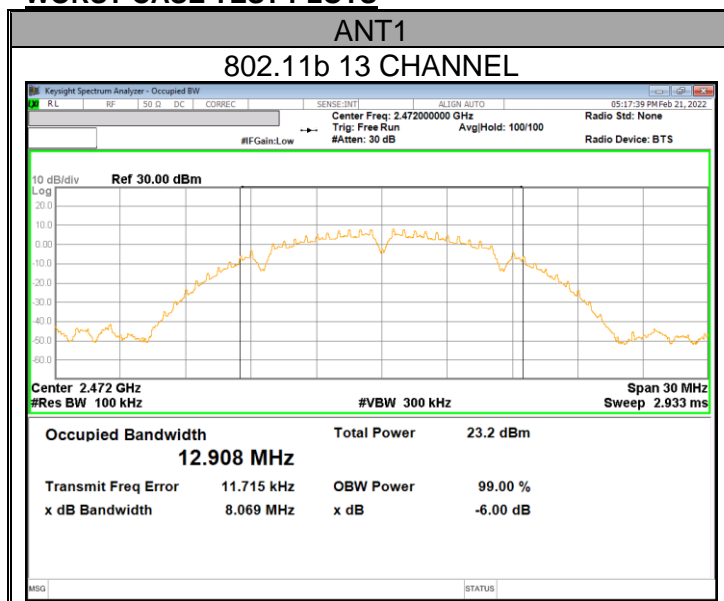
Reference to KDB 558074 D01 15.247 Meas Guidance: The transmitter output is connected to a spectrum analyzer with the RBW set to 100 kHz, the VBW  $\geq 3 \times$  RBW, peak detector and max hold.

ANSI C63.10-2013, Section 11.8.1

### RESULTS

- Please refer to the next page

### WORST CASE TEST PLOTS





**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	8.077	0.5
6	2 437	8.073	
11	2 462	8.078	
12	2 467	8.086	
13	2 472	<b>8.069</b>	
Worst		<b>8.069</b>	

**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	15.150	0.5
6	2 437	15.150	
10	2 457	15.100	
11	2 462	15.130	
12	2 467	15.150	
13	2 472	15.460	
Worst		<b>15.100</b>	

**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	15.150	0.5
6	2 437	15.130	
10	2 457	15.070	
11	2 462	15.120	
12	2 467	15.150	
13	2 472	15.490	
Worst		<b>15.070</b>	

### 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	17.31	30.00
	6	2 437	17.71	
	11	2 462	17.52	
	12	2 467	17.37	
	13	2 472	16.32	
Worst Case			17.71	
802.11g	1	2 412	17.28	
	6	2 437	17.58	
	10	2 457	17.44	
	11	2 462	16.35	
	12	2 467	12.63	
	13	2 472	10.56	
Worst Case			17.58	
802.11n HT20	1	2 412	17.12	
	6	2 437	17.25	
	10	2 457	17.48	
	11	2 462	15.48	
	12	2 467	13.42	
	13	2 472	10.47	
Worst Case			17.48	

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

## 9.4. POWER SPECTRAL DENSITY

### LIMITS

FCC §15.247 (e)

RSS-247 (5.2) (b)

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

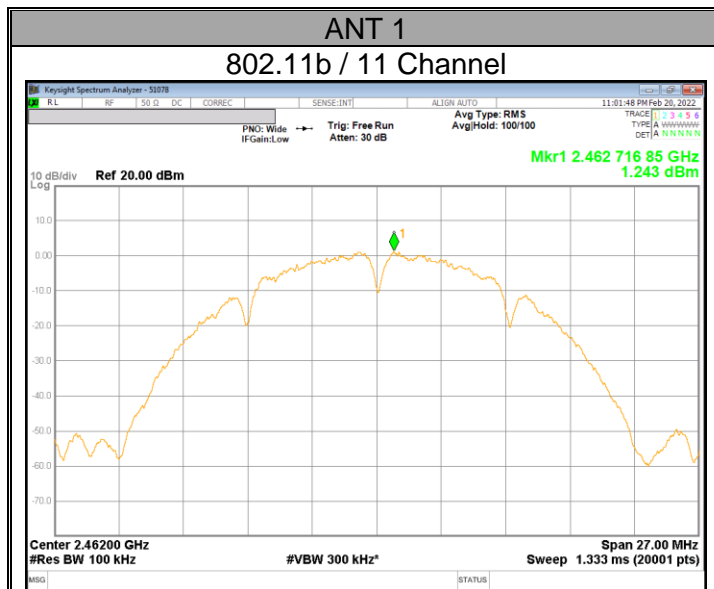
Power Spectral Density was performed utilizing the section 8.4 under KDB558074 D01 15.247 Meas Guidance.

ANSI C63.10-2013, Section 11.10.3 & 11.10.5

### RESULTS

- Please refer to the next page

### WORST CASE TEST PLOTS



**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	0.851	-	0.851	8.00 <sup>Note</sup>
	6	2 437	1.029	-	1.029	
	11	2 462	1.243	-	<b>1.243</b>	
	12	2 467	0.837	-	0.837	
	13	2 472	-0.260	-	-0.260	
802.11g	1	2 412	-1.800	-	-1.800	
	6	2 437	-1.100	-	-1.100	
	10	2 457	-1.535	-	-1.535	
	11	2 462	-2.740	-	-2.740	
	12	2 467	-6.499	-	-6.499	
	13	2 472	-8.406	-	-8.406	
802.11n HT20	1	2 412	-2.084	-	-2.084	
	6	2 437	-1.547	-	-1.547	
	10	2 457	-1.818	-	-1.818	
	11	2 462	-3.825	-	-3.825	
	12	2 467	-5.936	-	-5.936	
	13	2 472	-8.831	-	-8.831	

**- Calculation of Output PSD result**

- 1TX : Corr'd PSD = Meas PSD + Duty Cycle CF

Note1. RBW 100kHz measurement data is lower than 3kHz limit.

## 9.5. CONDUCTED SPURIOUS EMISSIONS

### LIMITS

FCC §15.247 (d)

RSS-247 5.5

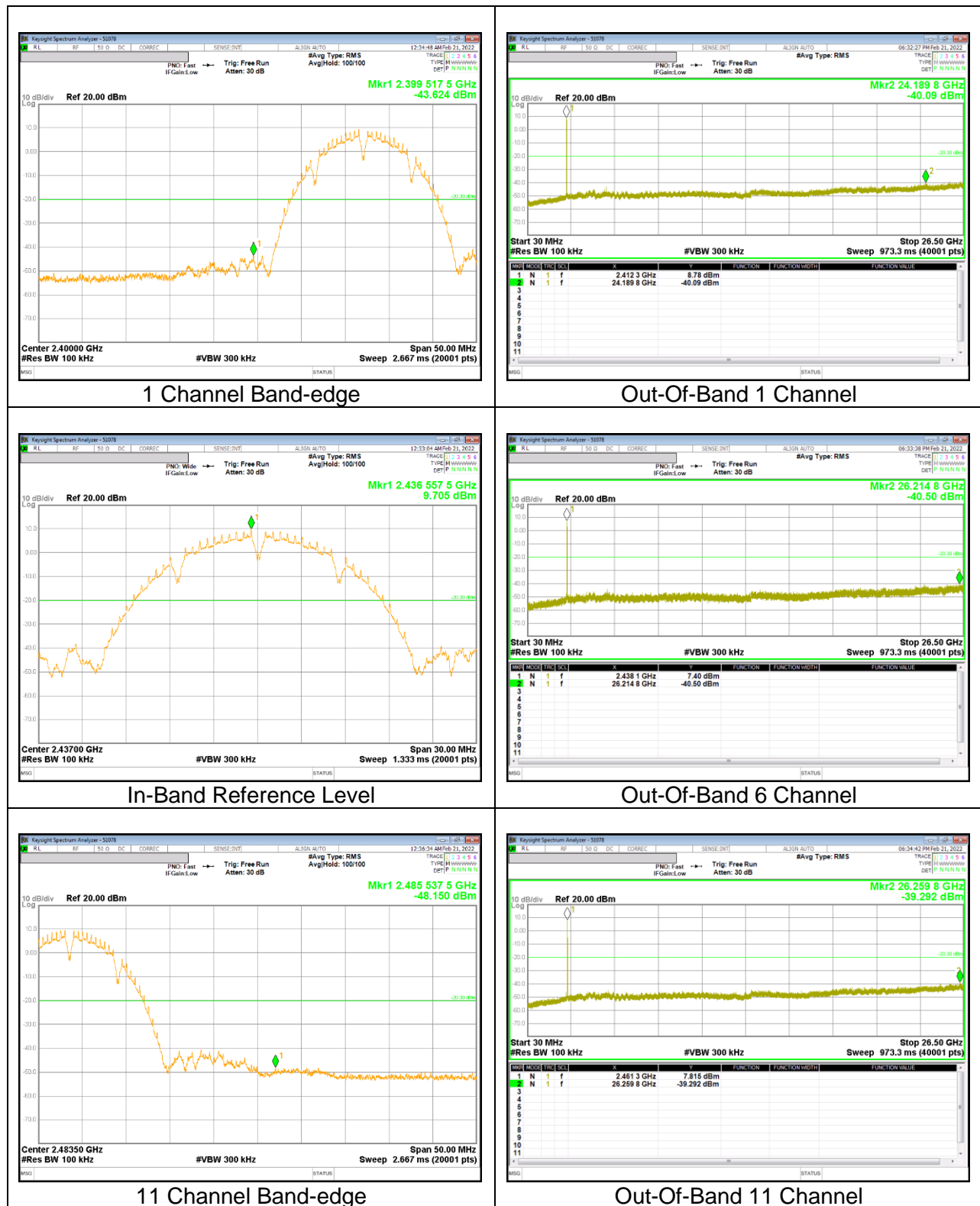
Output power was measured based on the use of average measurement, therefore the required attenuation is 30 dB.

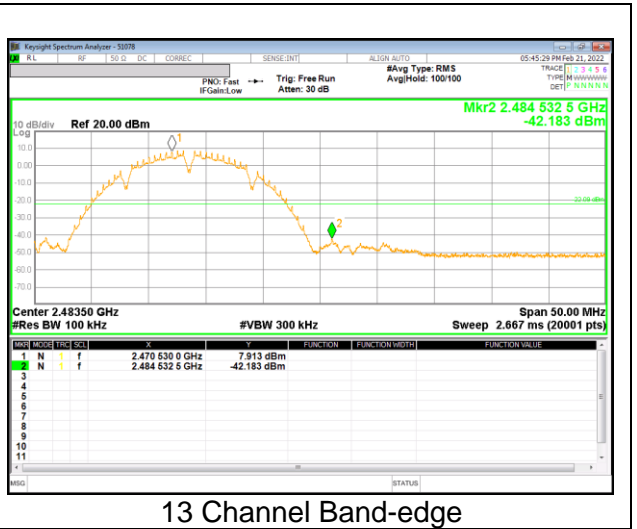
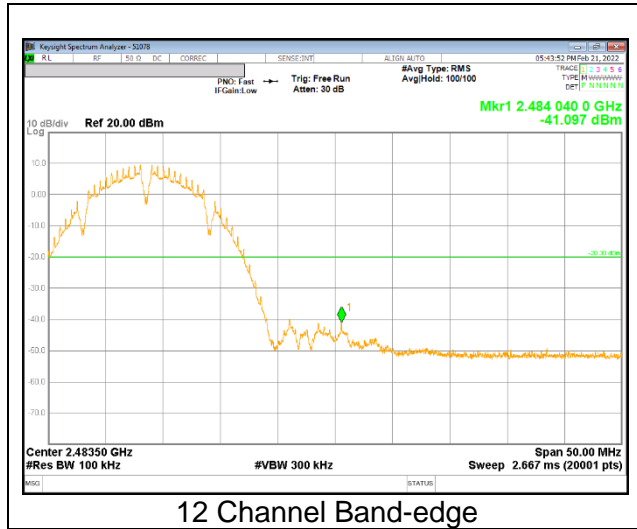
### TEST PROCEDURE

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

### RESULTS

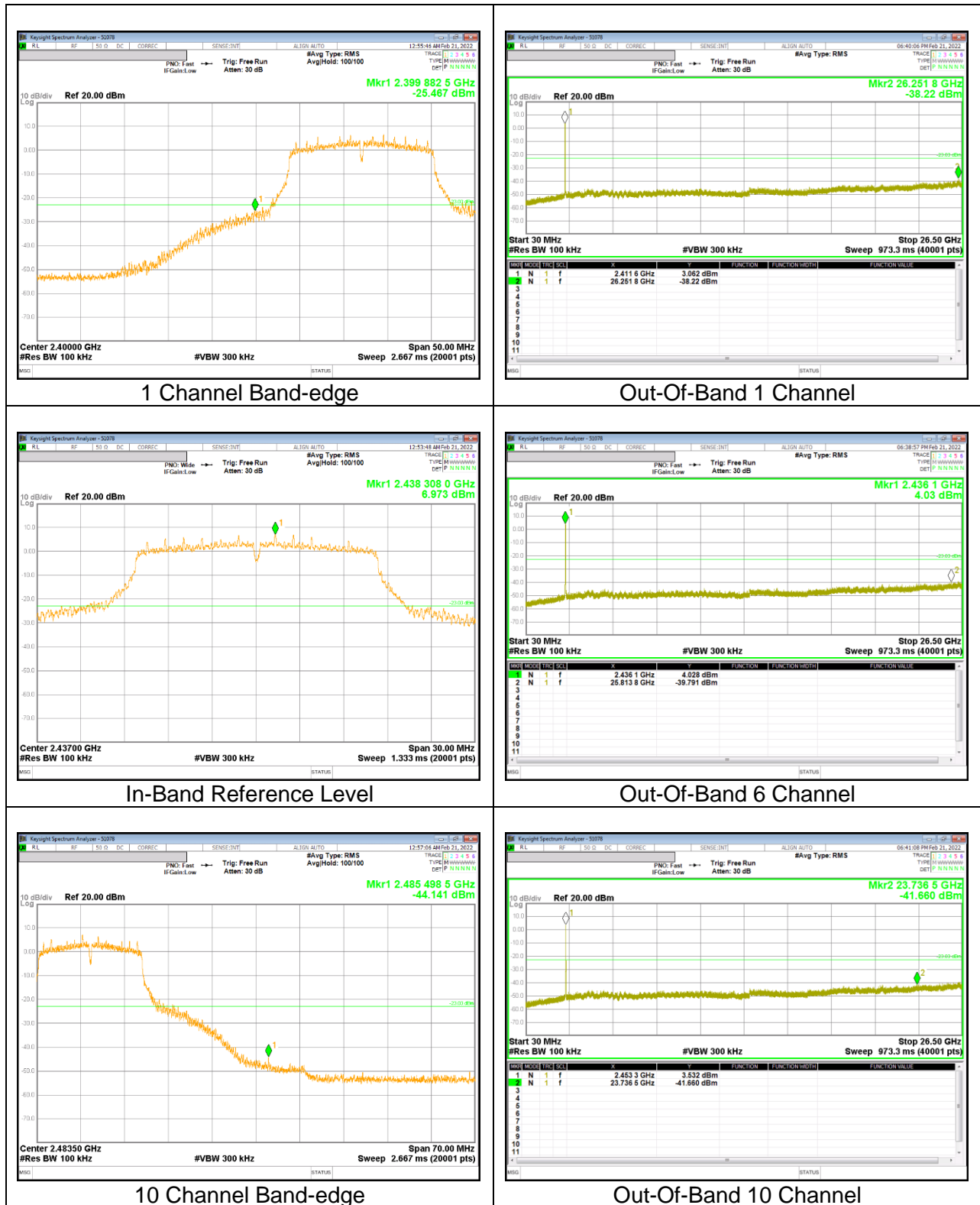
### 9.5.1. 802.11b MODE

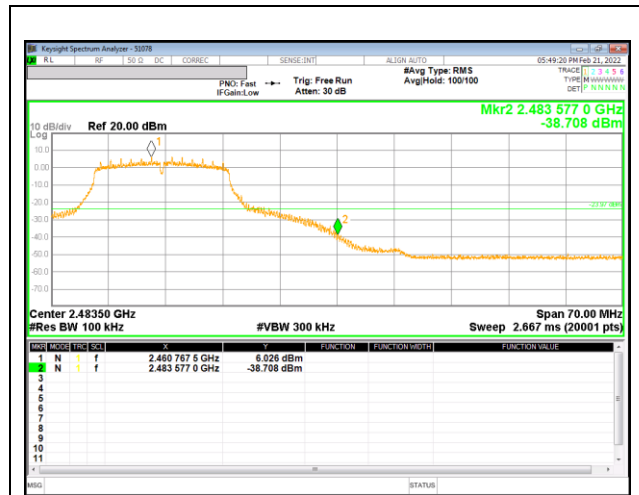




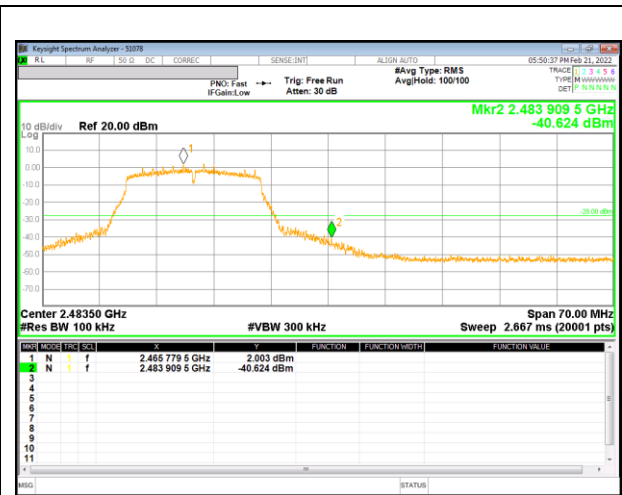


### 9.5.2. 802.11g MODE

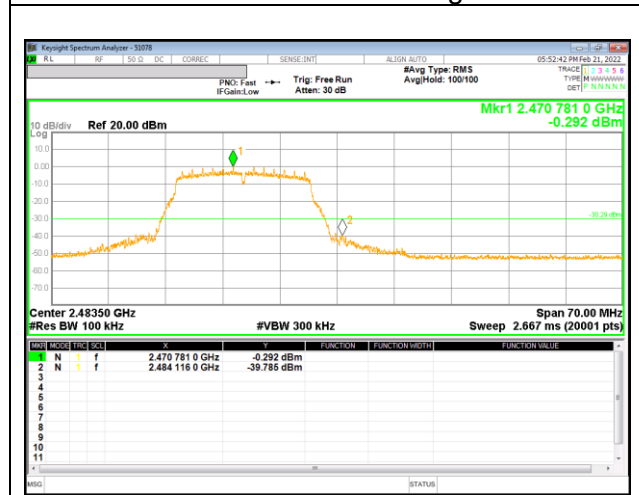




11 Channel Band-edge

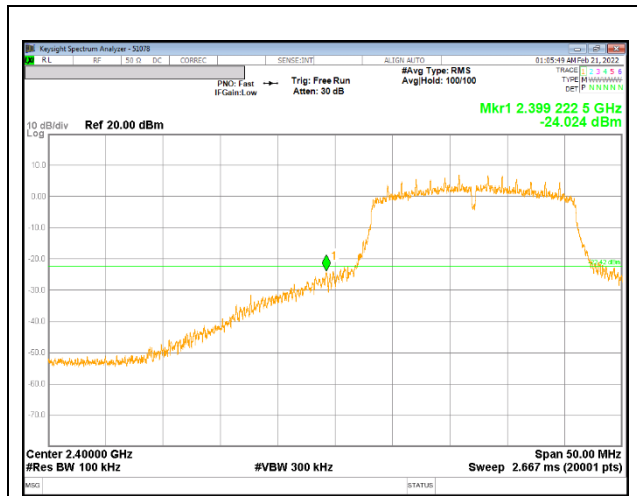


12 Channel Band-edge

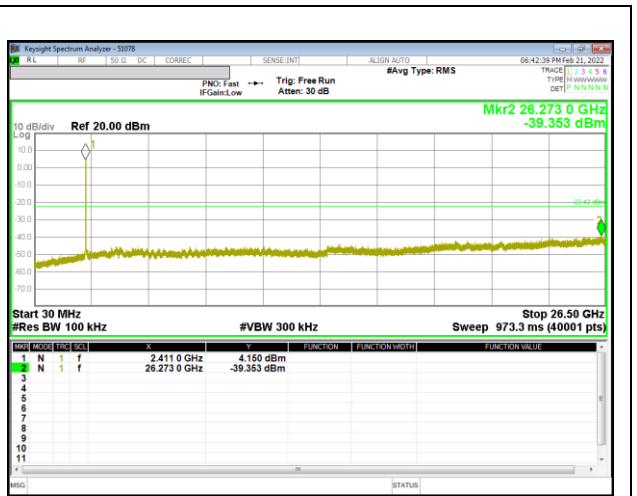


13 Channel Band-edge

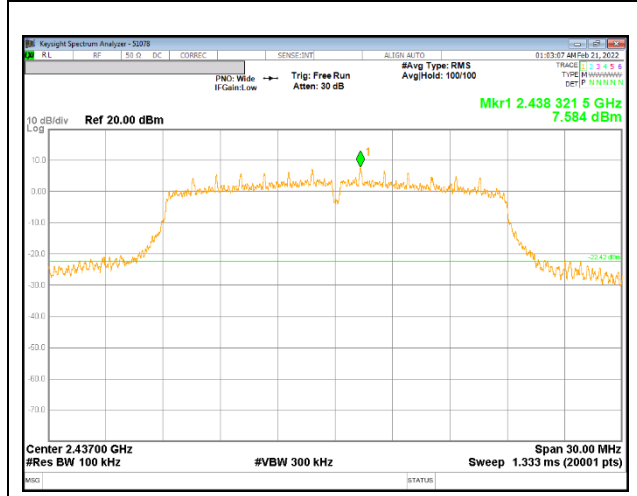
9.5.3. 802.11n HT20 MODE



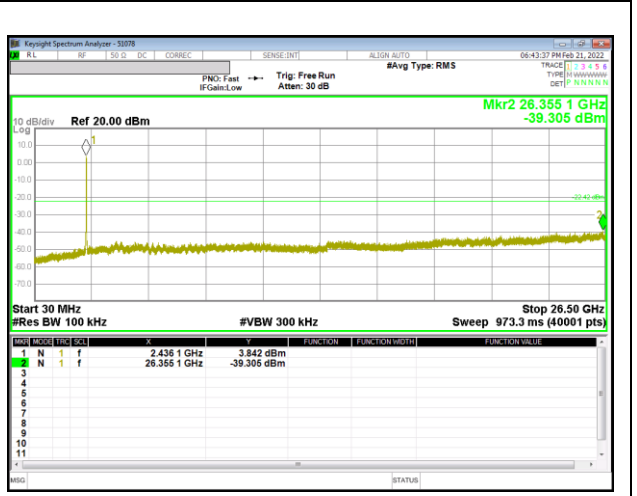
1 Channel Band-edge



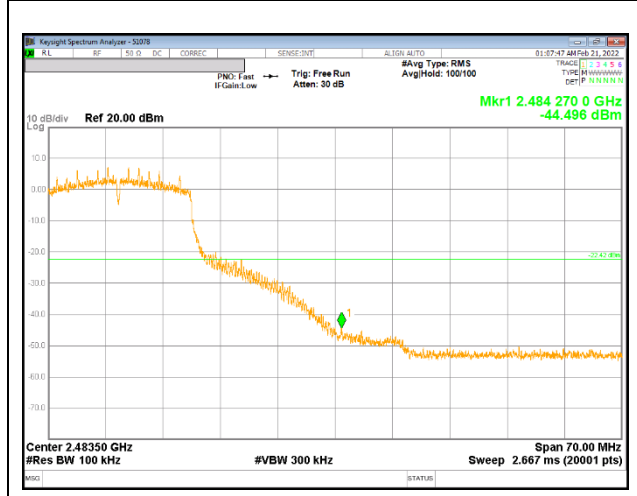
Out-Of-Band 1 Channel



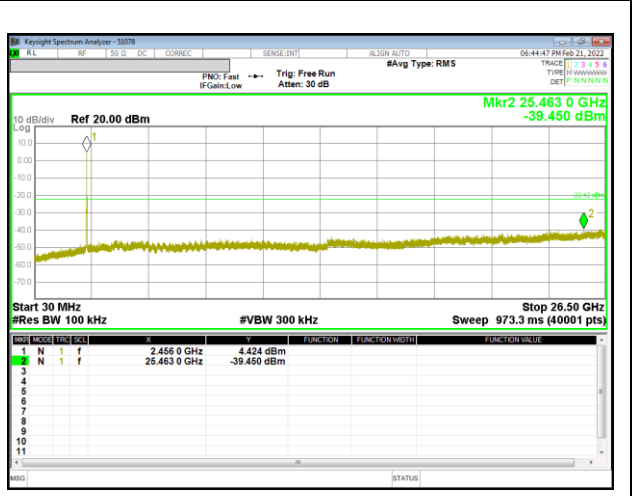
In-Band Reference Level



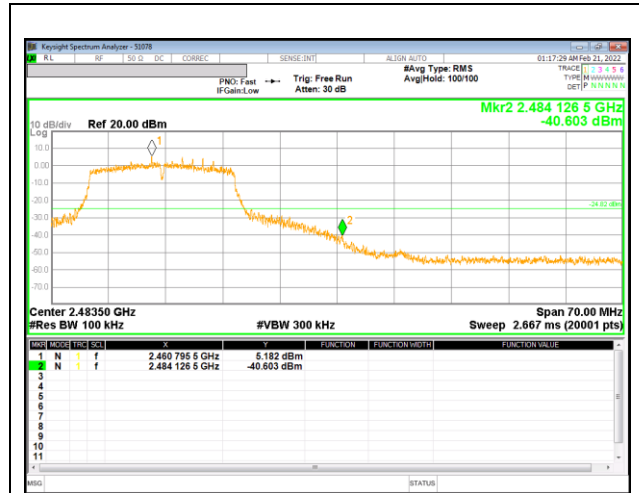
Out-Of-Band 6 Channel



10 Channel Band-edge



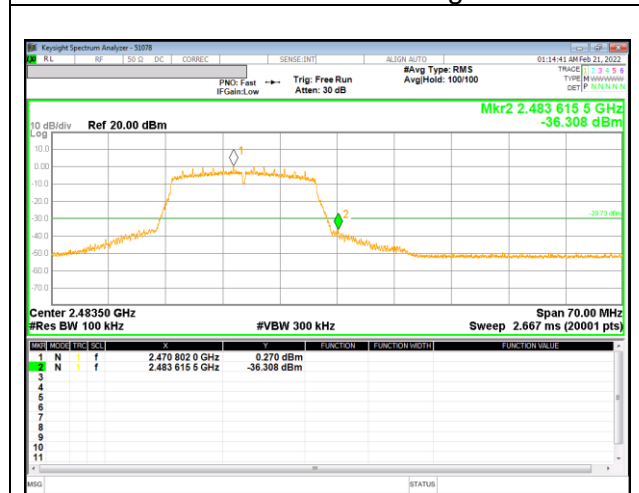
Out-Of-Band 10 Channel



11 Channel Band-edge



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. (Restricted bandedge, Final detection of spurious harmonic emissions)

Duty cycle factor =  $10\log(1/x)$  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.

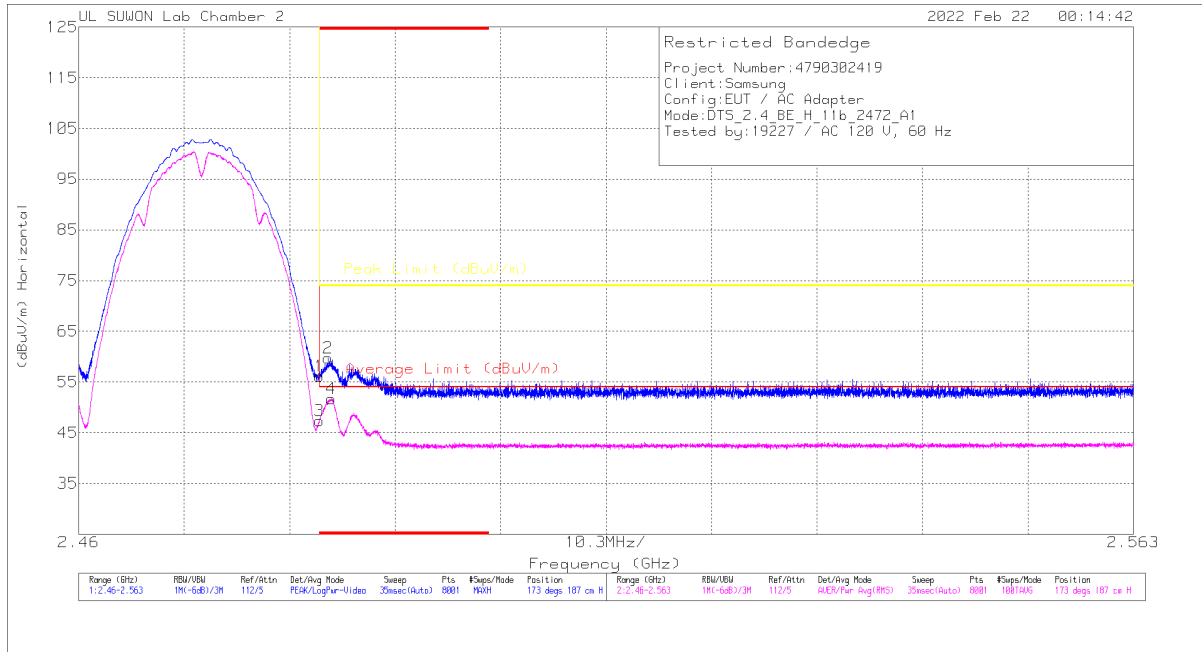
Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site.  
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field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

## 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_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	44.59	PK	32	-20.4	0	56.19	-	-	74	-17.81	173	187	H
2	* 2.48435	48.14	PK	32	-20.4	0	59.74	-	-	74	-14.26	173	187	H
3	* 2.48351	35.72	RMS	32	-20.4	0	47.32	54	-6.68	-	-	173	187	H
4	* 2.48467	40.16	RMS	32	-20.5	0	51.68	54	-2.32	-	-	173	187	H

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

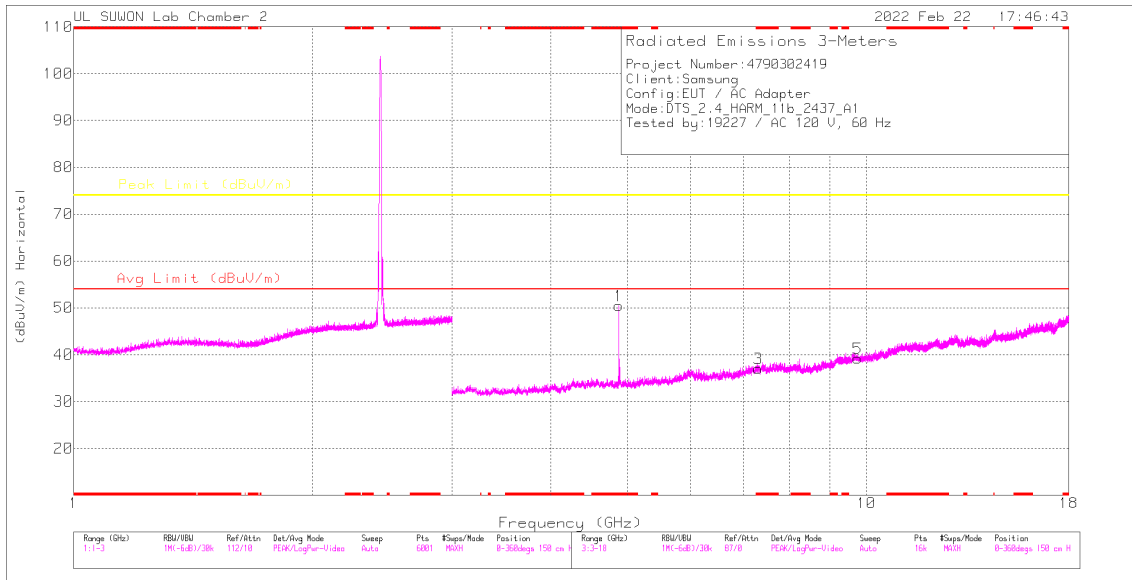
**BANEDGE TEST DATA**

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	42.02	Pk	31.90	-20.60	0.00	53.32	-	-	74.00	-20.68	167	225	H	
		* 2.38767	44.39	Pk	31.90	-20.60	0.00	55.69	-	-	74.00	-18.31	167	225	H	
		* 2.39	31.00	RMS	31.90	-20.60	0.00	42.30	54.00	-11.70	-	-	-	167	225	H
		* 2.38606	32.11	RMS	31.90	-20.60	0.00	43.41	54.00	-10.59	-	-	-	167	225	H
		* 2.39	40.58	Pk	31.90	-20.60	0.00	51.88	-	-	74.00	-22.12	134	113	V	
		* 2.38866	43.57	Pk	31.90	-20.60	0.00	54.87	-	-	74.00	-19.13	134	113	V	
		* 2.39	30.74	RMS	31.90	-20.60	0.00	42.04	54.00	-11.96	-	-	-	134	113	V
		* 2.3882	31.53	RMS	31.90	-20.60	0.00	42.83	54.00	-11.17	-	-	-	134	113	V
2462	ANT1	* 2.48351	42.05	Pk	32.00	-20.40	0.00	53.65	-	-	74.00	-20.35	172	189	H	
		* 2.48563	44.54	Pk	32.00	-20.50	0.00	56.04	-	-	74.00	-17.96	172	189	H	
		* 2.48351	32.82	RMS	32.00	-20.40	0.00	44.42	54.00	-9.58	-	-	-	172	189	H
		* 2.48755	33.14	RMS	32.10	-20.40	0.00	44.84	54.00	-9.16	-	-	-	172	189	H
		* 2.48351	41.56	Pk	32.00	-20.40	0.00	53.16	-	-	74.00	-20.84	223	380	V	
		* 2.523	43.84	Pk	32.10	-20.30	0.00	55.64	-	-	74.00	-18.36	223	380	V	
		* 2.48351	31.66	RMS	32.00	-20.40	0.00	43.26	54.00	-10.74	-	-	-	223	380	V
		* 2.4871	32.33	RMS	32.00	-20.40	0.00	43.93	54.00	-10.07	-	-	-	223	380	V
2467	ANT1	* 2.48351	47.04	Pk	32.00	-20.40	0.00	58.64	-	-	74.00	-15.36	172	189	H	
		* 2.48392	46.77	Pk	32.00	-20.40	0.00	58.37	-	-	74.00	-15.63	172	189	H	
		* 2.48351	36.45	RMS	32.00	-20.40	0.00	48.05	54.00	-5.95	-	-	-	172	189	H
		* 2.48409	38.28	RMS	32.00	-20.40	0.00	49.88	54.00	-4.12	-	-	-	172	189	H
		* 2.48351	43.87	Pk	32.00	-20.40	0.00	55.47	-	-	74.00	-18.53	223	382	V	
		* 2.48404	46.03	Pk	32.00	-20.40	0.00	57.63	-	-	74.00	-16.37	223	382	V	
		* 2.48351	34.36	RMS	32.00	-20.40	0.00	45.96	54.00	-8.04	-	-	-	223	382	V
		* 2.48397	36.20	RMS	32.00	-20.40	0.00	47.80	54.00	-6.20	-	-	-	223	382	V
2472	ANT1	* 2.48351	44.59	Pk	32.00	-20.40	0.00	56.19	-	-	74.00	-17.81	173	187	H	
		* 2.48435	48.14	Pk	32.00	-20.40	0.00	59.74	-	-	74.00	-14.26	173	187	H	
		* 2.48351	35.72	RMS	32.00	-20.40	0.00	47.32	54.00	-6.68	-	-	-	173	187	H
		* 2.48467	40.18	RMS	32.00	-20.50	0.00	51.68	54.00	-2.32	-	-	-	173	187	H
		* 2.48351	43.38	Pk	32.00	-20.40	0.00	54.98	-	-	74.00	-19.02	222	380	V	
		* 2.48423	45.89	Pk	32.00	-20.40	0.00	57.49	-	-	74.00	-16.51	222	380	V	
		* 2.48351	33.66	RMS	32.00	-20.40	0.00	45.26	54.00	-8.74	-	-	-	222	380	V
		* 2.48454	37.46	RMS	32.00	-20.50	0.00	48.96	54.00	-5.04	-	-	-	222	380	V

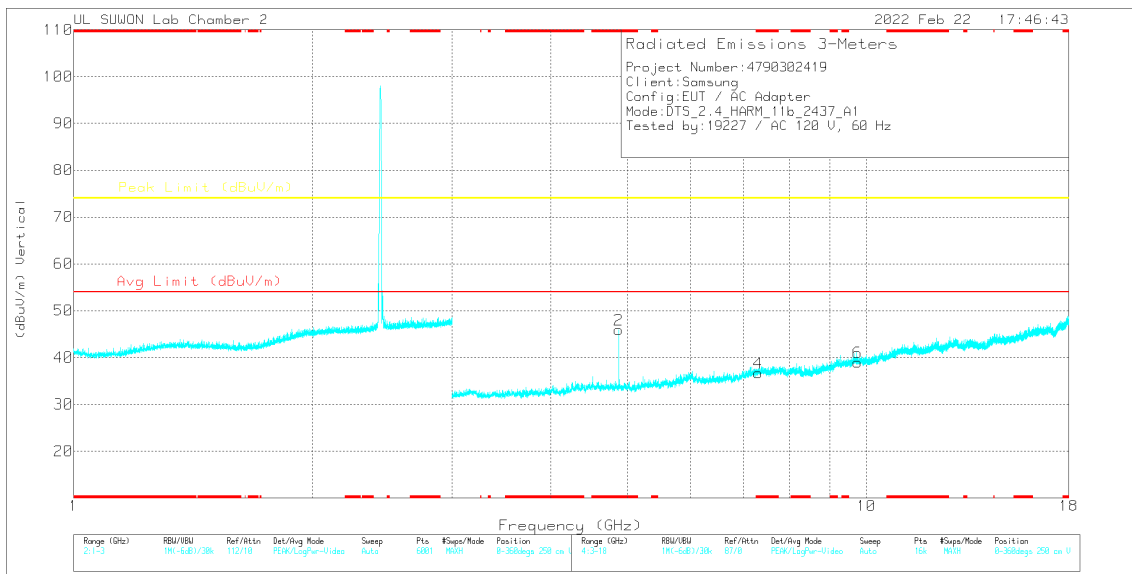
Note1. Pk - Peak detector, RMS - RMS detector  
 Note2. \* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band



## HARMONICS AND SPURIOUS EMISSIONS (ANT1 WORST CASE: 6 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
* 4.87398	47.04	PK2	34.1	-27.9	0	53.24	-	-	74	-20.76	318	108	H
* 4.87399	44.65	MAv1	34.1	-27.9	0	50.85	54	-3.15	-	-	318	108	H
* 4.87415	42.16	PK2	34.1	-27.9	0	48.36	-	-	74	-25.64	30	100	V
* 4.874	37.72	MAv1	34.1	-27.9	0	43.92	54	-10.08	-	-	30	100	V
* 7.32052	36.51	PK2	36.1	-24.8	0	47.81	-	-	74	-26.19	0	100	H
* 7.31393	35.88	PK2	36.1	-25	0	46.98	-	-	74	-27.02	0	100	V
9.75659	32.6	PK2	37.2	-21.4	0	48.4	-	-	74	-25.6	0	100	H
9.75397	32.12	PK2	37.2	-21.4	0	47.92	-	-	74	-26.08	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	* 4.82398	45.85	PK2	34.10	-28.10	0.00	51.85	-	-	74.00	-22.15	320	106	H	
		4.82398	42.78	MAV1	34.10	-28.10	0.00	49.78	54.00	-5.22	-	-	-	320	106	H
		* 4.82408	40.90	PK2	34.10	-28.10	0.00	46.90	-	-	74.00	-27.10	62	101	V	
		* 4.82396	34.86	MAV1	34.10	-28.10	0.00	40.86	54.00	-13.14	-	-	-	62	101	V
		7.244	35.21	PK2	36.20	-25.50	0.00	45.91	-	-	74.00	-28.09	0	100	H	
		7.240	35.31	PK2	36.20	-25.50	0.00	46.01	-	-	74.00	-27.99	0	100	V	
		9.639	32.80	PK2	37.00	-21.50	0.00	48.30	-	-	74.00	-25.70	0	100	H	
		9.646	32.62	PK2	37.00	-21.50	0.00	48.12	-	-	74.00	-25.88	0	100	V	
		* 4.87398	47.04	PK2	34.10	-27.90	0.00	53.24	-	-	74.00	-20.76	318	108	H	
2437	ANT1	* 4.87399	44.65	MAV1	34.10	-27.90	0.00	50.85	54.00	-3.15	-	-	318	108	H	
		4.87415	42.16	PK2	34.10	-27.90	0.00	48.36	-	-	74.00	-25.64	30	100	V	
		* 4.874	37.72	MAV1	34.10	-27.90	0.00	43.92	54.00	-10.08	-	-	30	100	V	
		* 7.32052	36.51	PK2	36.10	-24.80	0.00	47.81	-	-	74.00	-26.19	0	100	H	
		* 7.31393	35.88	PK2	36.10	-25.00	0.00	46.98	-	-	74.00	-27.02	0	100	V	
		9.757	32.60	PK2	37.20	-21.40	0.00	48.40	-	-	74.00	-25.60	0	100	H	
		9.754	32.12	PK2	37.20	-21.40	0.00	47.92	-	-	74.00	-26.08	0	100	V	
		* 4.92409	43.60	PK2	34.10	-27.40	0.00	50.30	-	-	74.00	-23.70	316	104	H	
		2462	ANT1	4.92397	39.76	MAV1	34.10	-27.40	0.00	46.46	54.00	-7.54	-	-	316	104
* 4.92412	40.69			PK2	34.10	-27.40	0.00	47.39	-	-	74.00	-26.61	42	104	V	
* 4.92399	34.14			MAV1	34.10	-27.40	0.00	40.84	54.00	-13.16	-	-	42	104	V	
* 7.39207	35.34			PK2	36.10	-24.20	0.00	47.24	-	-	74.00	-26.76	0	100	H	
* 7.38756	35.56			PK2	36.10	-24.20	0.00	47.46	-	-	74.00	-26.54	0	100	V	
9.840	32.67			PK2	37.30	-21.70	0.00	48.27	-	-	74.00	-25.73	0	100	H	
9.847	32.62			PK2	37.30	-21.70	0.00	48.22	-	-	74.00	-25.78	0	100	V	

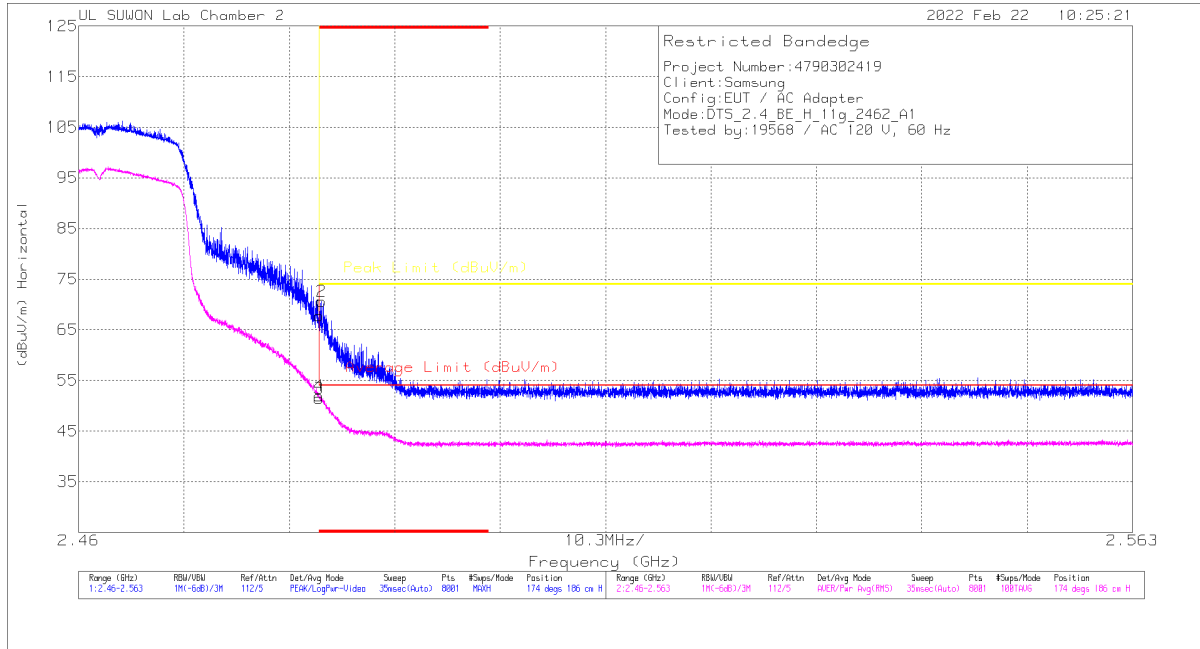
Note1. PK2 - KDB558074 Method: Maximum Peak / MAV1 - KDB558074 Option 1 Maximum RMS Average

Note2. \* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

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

#### BANDEDGE (ANT1 WORST CASE: 11 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	* 2.48351	56.19	PK	32	-20.4	0	67.79	-	-	74	-6.21	174	186	H
2	* 2.48374	59.03	PK	32	-20.4	0	70.63	-	-	74	-3.37	174	186	H
3	* 2.48351	39.86	RMS	32	-20.4	0	51.46	54	-2.54	-	-	174	186	H
4	* 2.48352	40.39	RMS	32	-20.4	0	51.99	54	-2.01	-	-	174	186	H

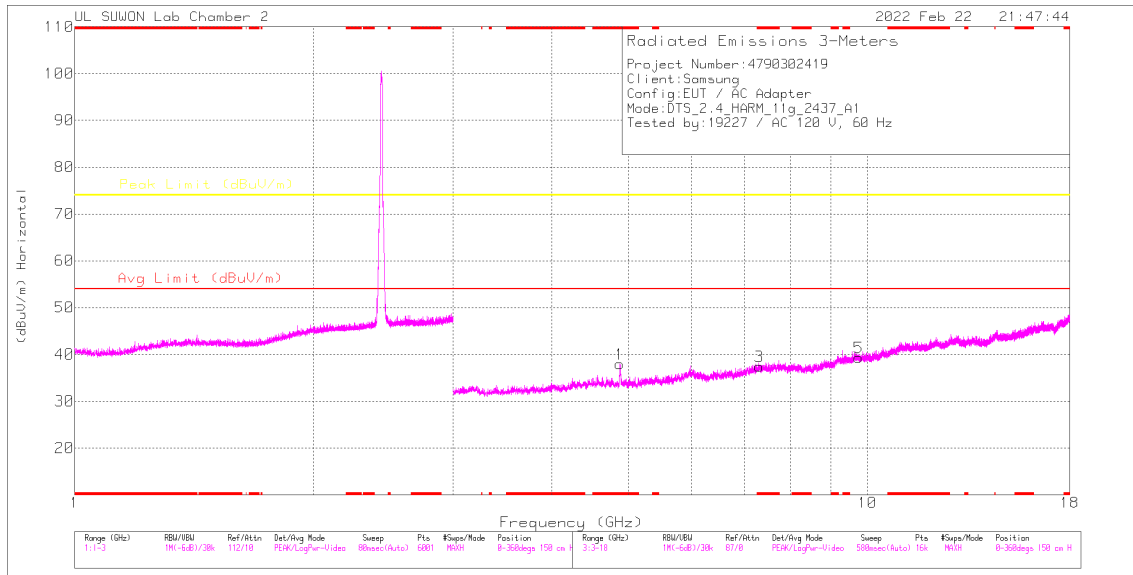
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PK - Peak detector  
 RMS - RMS detection

**BANDEDGE TEST DATA**

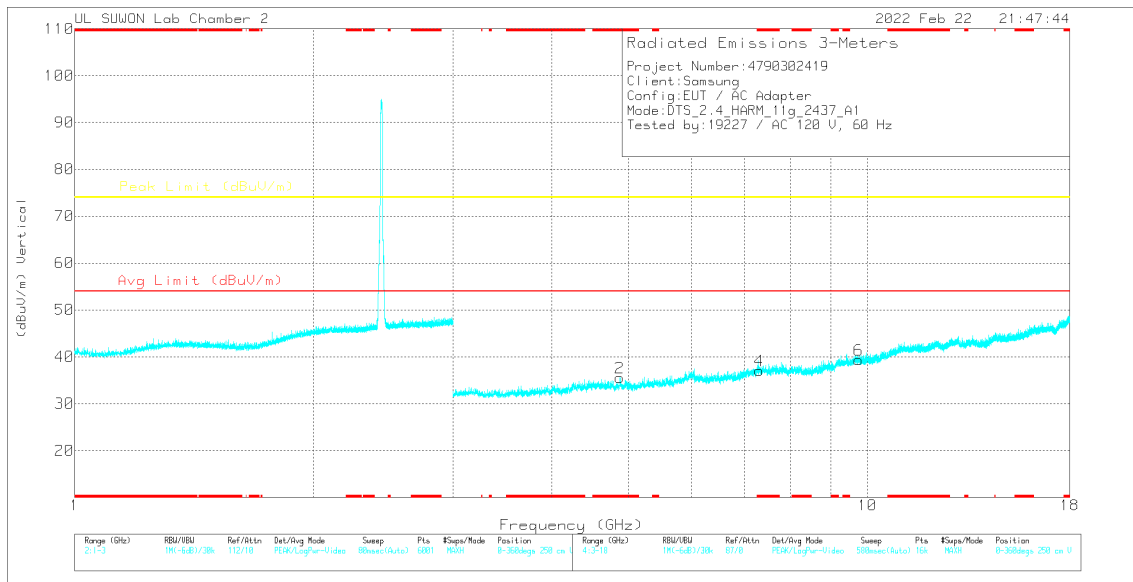
Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity	
2412	ANT1	* 2.39	49.38	Pk	31.90	-20.60	0.00	60.68	-	-	74.00	-13.32	157	356	H	
		* 2.38985	52.45	Pk	31.90	-20.60	0.00	63.75	-	-	74.00	-10.25	157	356	H	
		* 2.39	35.94	RMS	31.90	-20.60	0.00	47.24	54.00	-6.76	-	-	-	157	356	H
		* 2.38983	36.20	RMS	31.90	-20.60	0.00	47.50	54.00	-6.50	-	-	-	157	356	H
		* 2.39	43.54	Pk	31.90	-20.60	0.00	54.84	-	-	74.00	-19.16	123	111	V	
		* 2.38997	49.44	Pk	31.90	-20.60	0.00	60.74	-	-	74.00	-13.26	123	111	V	
		* 2.39	32.81	RMS	31.90	-20.60	0.00	44.11	54.00	-9.89	-	-	-	123	111	V
		* 2.38991	33.07	RMS	31.90	-20.60	0.00	44.37	54.00	-9.63	-	-	-	123	111	V
2457	ANT1	* 2.48351	45.76	Pk	32.00	-20.40	0.00	57.36	-	-	74.00	-16.64	173	144	H	
		* 2.48365	50.60	Pk	32.00	-20.40	0.00	62.20	-	-	74.00	-11.80	173	144	H	
		* 2.48351	34.78	RMS	32.00	-20.40	0.00	46.38	54.00	-7.62	-	-	-	173	144	H
		* 2.48363	35.09	RMS	32.00	-20.40	0.00	46.69	54.00	-7.31	-	-	-	173	144	H
		* 2.48351	41.44	Pk	32.00	-20.40	0.00	53.04	-	-	74.00	-20.96	125	106	V	
		* 2.48387	44.23	Pk	32.00	-20.40	0.00	55.83	-	-	74.00	-18.17	125	106	V	
		* 2.48351	31.97	RMS	32.00	-20.40	0.00	43.57	54.00	-10.43	-	-	-	125	106	V
		* 2.48359	32.44	RMS	32.00	-20.40	0.00	44.04	54.00	-9.96	-	-	-	125	106	V
2462	ANT1	* 2.48351	56.19	Pk	32.00	-20.40	0.00	67.79	-	-	74.00	-6.21	174	186	H	
		* 2.48374	59.03	Pk	32.00	-20.40	0.00	70.63	-	-	74.00	-3.37	174	186	H	
		* 2.48351	39.86	RMS	32.00	-20.40	0.00	51.46	54.00	-2.54	-	-	-	174	186	H
		* 2.48352	40.39	RMS	32.00	-20.40	0.00	51.99	54.00	-2.01	-	-	-	174	186	H
		* 2.48351	47.97	Pk	32.00	-20.40	0.00	59.57	-	-	74.00	-14.43	125	100	V	
		* 2.48374	50.14	Pk	32.00	-20.40	0.00	61.74	-	-	74.00	-12.26	125	100	V	
		* 2.48351	35.26	RMS	32.00	-20.40	0.00	46.86	54.00	-7.14	-	-	-	125	100	V
		* 2.48356	35.53	RMS	32.00	-20.40	0.00	47.13	54.00	-6.87	-	-	-	125	100	V
2467	ANT1	* 2.48351	50.01	Pk	32.00	-20.40	0.00	61.61	-	-	74.00	-12.39	173	118	H	
		* 2.48384	55.85	Pk	32.00	-20.40	0.00	67.45	-	-	74.00	-6.55	173	118	H	
		* 2.48351	38.02	RMS	32.00	-20.40	0.00	49.62	54.00	-4.38	-	-	-	173	118	H
		* 2.48359	38.49	RMS	32.00	-20.40	0.00	50.09	54.00	-3.91	-	-	-	173	118	H
		* 2.48351	45.84	Pk	32.00	-20.40	0.00	57.44	-	-	74.00	-16.56	125	106	V	
		* 2.48373	49.34	Pk	32.00	-20.40	0.00	60.94	-	-	74.00	-13.06	125	106	V	
		* 2.48351	33.58	RMS	32.00	-20.40	0.00	45.18	54.00	-8.82	-	-	-	125	106	V
		* 2.48355	34.00	RMS	32.00	-20.40	0.00	45.60	54.00	-8.40	-	-	-	125	106	V
2472	ANT1	* 2.48351	49.94	Pk	32.00	-20.40	0.00	61.54	-	-	74.00	-12.46	169	122	H	
		* 2.48382	56.45	Pk	32.00	-20.40	0.00	68.05	-	-	74.00	-5.95	169	122	H	
		* 2.48351	38.09	RMS	32.00	-20.40	0.00	49.69	54.00	-4.31	-	-	-	169	122	H
		* 2.48408	39.06	RMS	32.00	-20.40	0.00	50.66	54.00	-3.34	-	-	-	169	122	H
		* 2.48351	44.42	Pk	32.00	-20.40	0.00	56.02	-	-	74.00	-17.98	125	104	V	
		* 2.48402	48.26	Pk	32.00	-20.40	0.00	59.86	-	-	74.00	-14.14	125	104	V	
		* 2.48351	33.37	RMS	32.00	-20.40	0.00	44.97	54.00	-9.03	-	-	-	125	104	V
		* 2.48417	33.63	RMS	32.00	-20.40	0.00	45.23	54.00	-8.77	-	-	-	125	104	V

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

## HARMONICS AND SPURIOUS EMISSIONS (ANT1 WORST CASE: 6 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
* 4.87618	42.16	PK2	34.1	-27.9	0	48.36	-	-	74	-25.64	319	103	H
* 4.87666	30.19	MAV1	34.1	-27.9	0	36.39	54	-17.61	-	-	319	103	H
* 4.8763	39.03	PK2	34.1	-27.9	0	45.23	-	-	74	-28.77	39	113	V
* 4.87736	26.18	MAV1	34.1	-27.9	0	32.38	54	-21.62	-	-	39	113	V
* 7.31448	35.73	PK2	36.1	-24.9	0	46.93	-	-	74	-27.07	0	100	H
* 7.30785	35.65	PK2	36.2	-25	0	46.85	-	-	74	-27.15	0	100	V
9.75834	32.43	PK2	37.2	-21.5	0	48.13	-	-	74	-25.87	0	100	H
9.75627	33.12	PK2	37.2	-21.4	0	48.92	-	-	74	-25.08	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	* 4.82123	34.22	PK2	34.10	-28.00	0.00	40.32	-	-	74.00	-33.68	324	100	H	
		* 4.82293	28.38	MAv1	34.10	-28.10	0.00	34.38	54.00	-19.62	-	-	-	324	100	H
		* 4.82571	37.27	PK2	34.10	-28.10	0.00	43.27	-	-	-	74.00	-30.73	36	107	V
		* 4.82535	25.38	MAv1	34.10	-28.10	0.00	31.38	54.00	-22.62	-	-	-	36	107	V
		7.236	29.01	PK2	36.20	-25.50	0.00	39.71	-	-	74.00	-34.29	0	100	H	
		7.236	27.40	PK2	36.20	-25.50	0.00	38.10	-	-	74.00	-35.90	0	100	V	
		9.649	26.06	PK2	37.00	-21.50	0.00	41.56	-	-	74.00	-32.44	0	100	H	
		9.650	23.04	PK2	37.00	-21.50	0.00	38.54	-	-	74.00	-35.46	0	100	V	
		* 4.87618	42.16	PK2	34.10	-27.90	0.00	48.36	-	-	74.00	-25.64	319	103	H	
2437	ANT1	* 4.87666	30.19	MAv1	34.10	-27.90	0.00	36.39	54.00	-17.61	-	-	319	103	H	
		* 4.8763	39.03	PK2	34.10	-27.90	0.00	45.23	-	-	74.00	-28.77	39	113	V	
		* 4.87736	26.18	MAv1	34.10	-27.90	0.00	32.38	54.00	-21.62	-	-	39	113	V	
		* 7.31448	35.73	PK2	36.10	-24.90	0.00	46.93	-	-	74.00	-27.07	0	100	H	
		* 7.30785	35.65	PK2	36.20	-25.00	0.00	46.85	-	-	74.00	-27.15	0	100	V	
		9.758	32.43	PK2	37.20	-21.50	0.00	48.13	-	-	74.00	-25.87	0	100	H	
		9.756	33.12	PK2	37.20	-21.40	0.00	48.92	-	-	74.00	-25.08	0	100	V	
		* 4.90741	39.20	PK2	34.10	-27.50	0.00	45.80	-	-	74.00	-28.20	316	103	H	
		* 4.91053	27.16	MAv1	34.10	-27.50	0.00	33.76	54.00	-20.24	-	-	316	103	H	
2457	ANT1	* 4.89189	37.46	PK2	34.10	-27.70	0.00	43.86	-	-	74.00	-30.14	44	100	V	
		* 4.90921	25.15	MAv1	34.10	-27.50	0.00	31.75	54.00	-22.25	-	-	44	100	V	
		* 7.37651	35.44	PK2	36.10	-24.30	0.00	47.24	-	-	74.00	-26.76	0	100	H	
		* 7.37663	34.70	PK2	36.10	-24.30	0.00	46.50	-	-	74.00	-27.50	0	100	V	
		9.826	32.57	PK2	37.20	-21.80	0.00	47.97	-	-	74.00	-26.03	0	100	H	
		9.827	32.83	PK2	37.20	-21.80	0.00	48.23	-	-	74.00	-25.77	0	100	V	

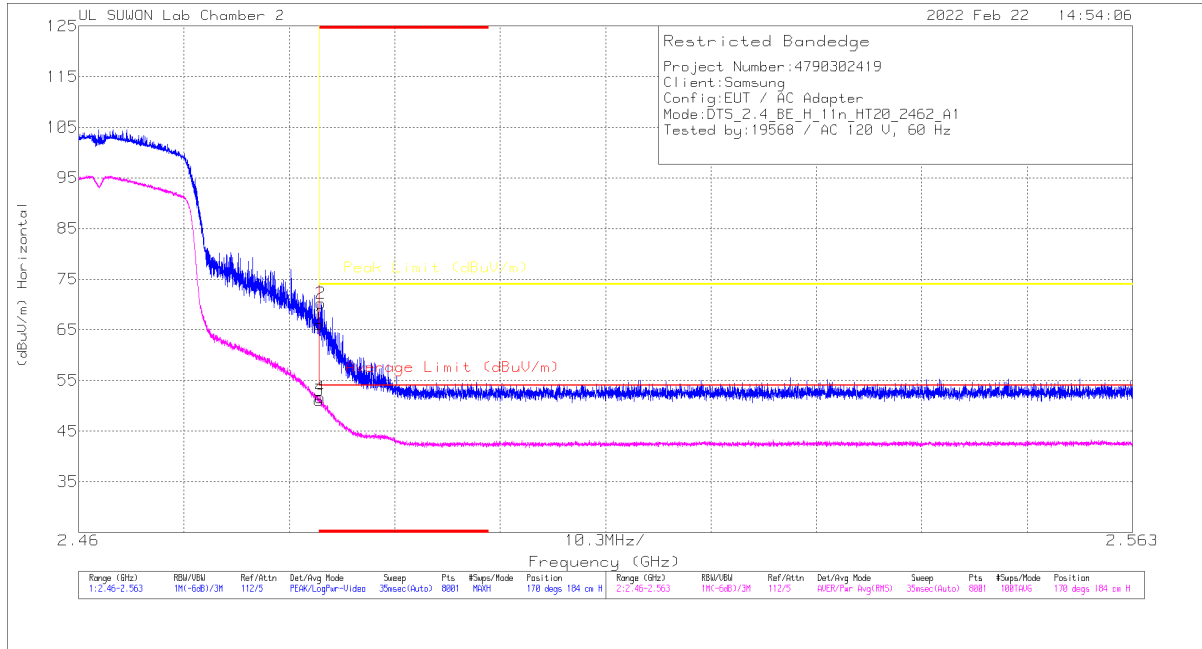
Note1. PK2 - KDB558074 Method: Maximum Peak / MAv1 - KDB558074 Option 1 Maximum RMS Average

Note2. \* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

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

#### BANDEDGE (ANT1 WORST CASE: 11 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	* 2.48351	54.48	PK	32	-20.4	0	66.08	-	-	74	-7.92	170	184	H
2	* 2.48369	58.63	PK	32	-20.4	0	70.23	-	-	74	-3.77	170	184	H
3	* 2.48351	39.47	RMS	32	-20.4	0	51.07	54	-2.93	-	-	170	184	H
4	* 2.48364	40.03	RMS	32	-20.4	0	51.63	54	-2.37	-	-	170	184	H

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

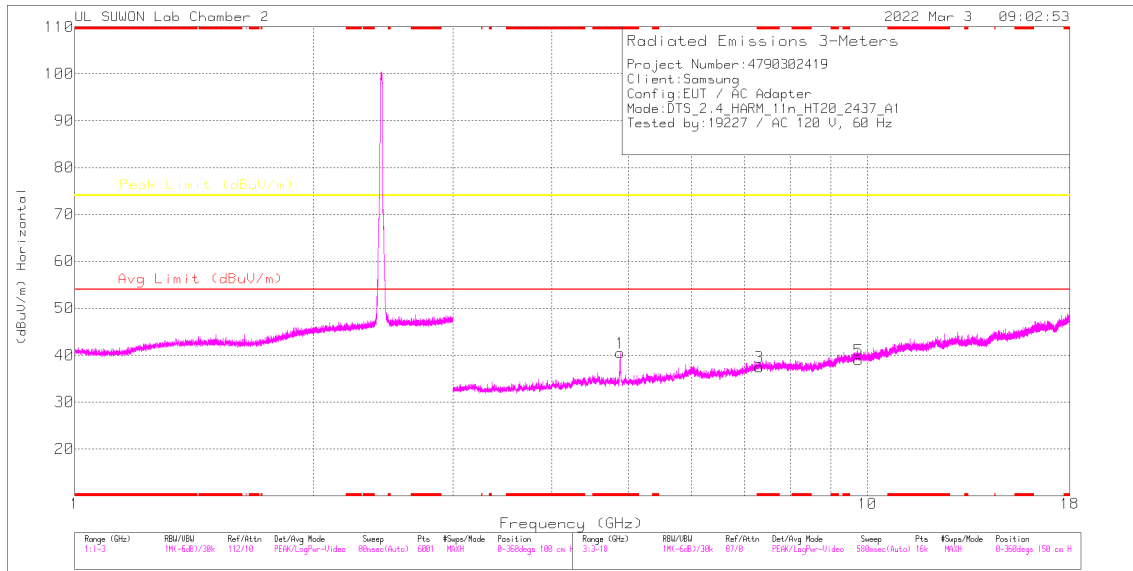
**BANEDGE TEST DATA**

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	52.11	Pk	31.90	-20.60	0.00	63.41	-	-	74.00	-10.59	170	169	H	
		* 2.38855	55.24	Pk	31.90	-20.60	0.00	66.54	-	-	74.00	-7.46	170	169	H	
		* 2.39	37.72	RMS	31.90	-20.60	0.00	49.02	54.00	-4.98	-	-	-	170	169	H
		* 2.38984	37.63	RMS	31.90	-20.60	0.00	48.93	54.00	-5.07	-	-	-	170	169	H
		* 2.39	47.47	Pk	31.90	-20.60	0.00	58.77	-	-	74.00	-15.23	125	109	V	
		* 2.38879	51.48	Pk	31.90	-20.60	0.00	62.78	-	-	74.00	-11.22	125	109	V	
		* 2.39	34.42	RMS	31.90	-20.60	0.00	45.72	54.00	-8.28	-	-	-	125	109	V
		* 2.38996	34.48	RMS	31.90	-20.60	0.00	45.78	54.00	-8.22	-	-	-	125	109	V
		* 2.48351	48.12	Pk	32.00	-20.40	0.00	59.72	-	-	74.00	-14.28	171	186	H	
* 2.48404	50.92	Pk	32.00	-20.40	0.00	62.52	-	-	74.00	-11.48	171	186	H			
* 2.48351	35.01	RMS	32.00	-20.40	0.00	46.61	54.00	-7.39	-	-	-	171	186	H		
* 2.48387	35.01	RMS	32.00	-20.40	0.00	46.61	54.00	-7.39	-	-	-	171	186	H		
* 2.48351	42.34	Pk	32.00	-20.40	0.00	53.94	-	-	74.00	-20.06	125	104	V			
* 2.48369	45.12	Pk	32.00	-20.40	0.00	56.72	-	-	74.00	-17.28	125	104	V			
* 2.48351	32.05	RMS	32.00	-20.40	0.00	43.65	54.00	-10.35	-	-	-	125	104	V		
* 2.48355	32.62	RMS	32.00	-20.40	0.00	44.22	54.00	-9.78	-	-	-	125	104	V		
* 2.48351	54.48	Pk	32.00	-20.40	0.00	66.08	-	-	74.00	-7.92	170	184	H			
* 2.48369	58.63	Pk	32.00	-20.40	0.00	70.23	-	-	74.00	-3.77	170	184	H			
* 2.48351	39.47	RMS	32.00	-20.40	0.00	51.07	54.00	-2.93	-	-	-	170	184	H		
* 2.48364	40.03	RMS	32.00	-20.40	0.00	51.63	54.00	-2.37	-	-	-	170	184	H		
* 2.48351	47.44	Pk	32.00	-20.40	0.00	59.04	-	-	74.00	-14.96	144	107	V			
* 2.48354	52.04	Pk	32.00	-20.40	0.00	63.64	-	-	74.00	-10.36	144	107	V			
* 2.48351	35.15	RMS	32.00	-20.40	0.00	46.75	54.00	-7.25	-	-	-	144	107	V		
* 2.48357	35.79	RMS	32.00	-20.40	0.00	47.39	54.00	-6.61	-	-	-	144	107	V		
* 2.48351	51.04	Pk	32.00	-20.40	0.00	62.64	-	-	74.00	-11.36	170	118	H			
* 2.4837	57.50	Pk	32.00	-20.40	0.00	69.10	-	-	74.00	-4.90	170	118	H			
* 2.48351	38.95	RMS	32.00	-20.40	0.00	50.55	54.00	-3.45	-	-	-	170	118	H		
* 2.48352	39.15	RMS	32.00	-20.40	0.00	50.75	54.00	-3.25	-	-	-	170	118	H		
* 2.48351	44.40	Pk	32.00	-20.40	0.00	56.00	-	-	74.00	-18.00	127	100	V			
* 2.48364	49.09	Pk	32.00	-20.40	0.00	60.69	-	-	74.00	-13.31	127	100	V			
* 2.48351	33.65	RMS	32.00	-20.40	0.00	45.25	54.00	-8.75	-	-	-	127	100	V		
* 2.48387	34.16	RMS	32.00	-20.40	0.00	45.76	54.00	-8.24	-	-	-	127	100	V		
* 2.48351	57.23	Pk	32.00	-20.40	0.00	68.83	-	-	74.00	-5.17	171	118	H			
* 2.48355	56.86	Pk	32.00	-20.40	0.00	68.46	-	-	74.00	-5.54	171	118	H			
* 2.48351	39.74	RMS	32.00	-20.40	0.00	51.34	54.00	-2.66	-	-	-	171	118	H		
* 2.48359	39.31	RMS	32.00	-20.40	0.00	50.91	54.00	-3.09	-	-	-	171	118	H		
* 2.48351	45.48	Pk	32.00	-20.40	0.00	57.08	-	-	74.00	-16.92	139	102	V			
* 2.48373	49.93	Pk	32.00	-20.40	0.00	61.53	-	-	74.00	-12.47	139	102	V			
* 2.48351	33.34	RMS	32.00	-20.40	0.00	44.94	54.00	-9.06	-	-	-	139	102	V		
* 2.4837	33.82	RMS	32.00	-20.40	0.00	45.42	54.00	-8.58	-	-	-	139	102	V		

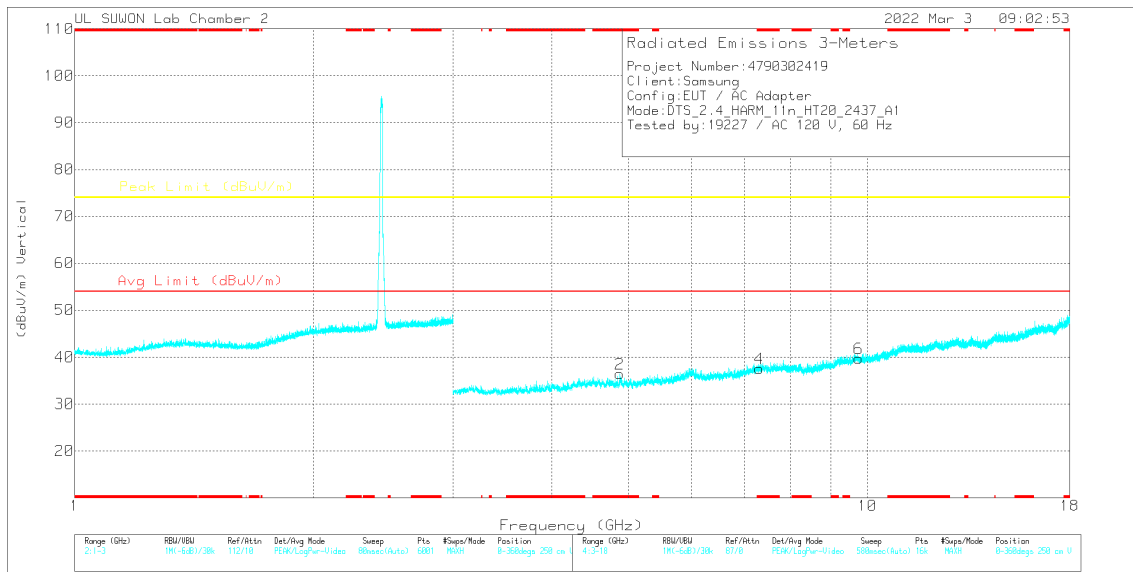
Note1. Pk - Peak detector, RMS - RMS detector  
 Note2. \* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band



## HARMONICS AND SPURIOUS EMISSIONS (ANT1 WORST CASE: 6 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
* 4.87551	42.61	PK2	34.1	-27.9	0	48.81	-	-	74	-25.19	318	101	H
* 4.87565	30.82	MAV1	34.1	-27.9	0	37.02	54	-16.98	-	-	318	101	H
* 4.87848	38.76	PK2	34.1	-27.8	0	45.06	-	-	74	-28.94	33	131	V
* 4.87732	26.38	MAV1	34.1	-27.9	0	32.58	54	-21.42	-	-	33	131	V
* 7.31328	35.87	PK2	36.1	-25	0	46.97	-	-	74	-27.03	0	100	H
* 7.313	35.46	PK2	36.1	-25	0	46.56	-	-	74	-27.44	0	100	V
9.75151	32.69	PK2	37.2	-21.4	0	48.49	-	-	74	-25.51	0	100	H
9.74692	32.88	PK2	37.2	-21.4	0	48.68	-	-	74	-25.32	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

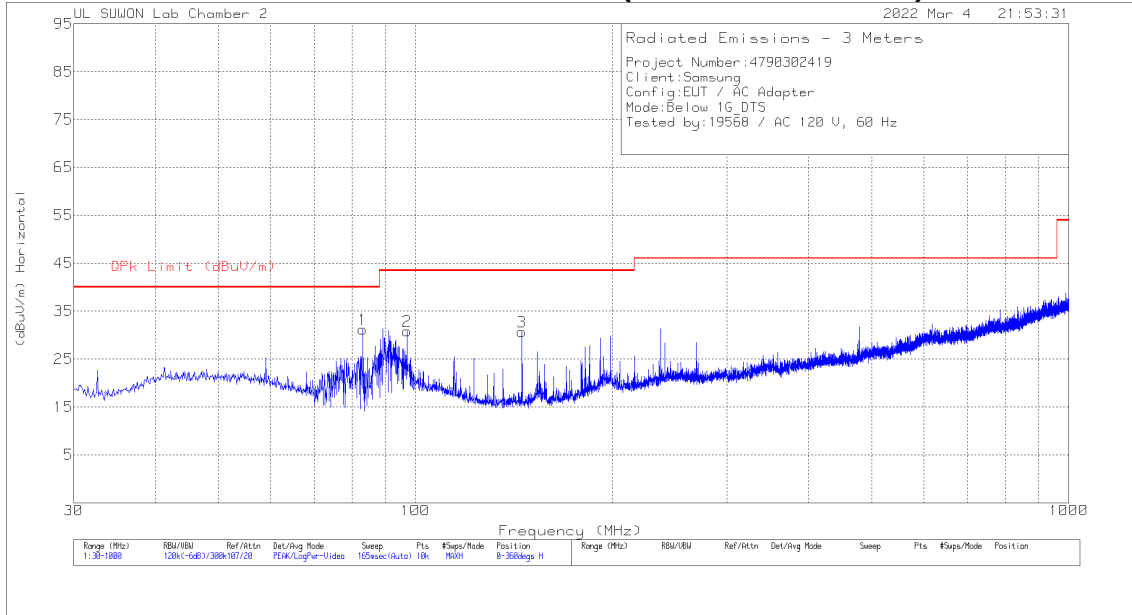
**HARMONICS AND SPURIOUS EMISSIONS TEST DATA**

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	* 4.81679	41.42	PK2	34.10	-28.10	0.00	47.42	-	-	74.00	-26.58	321	100	H
		* 4.82223	28.64	MAv1	34.10	-28.10	0.00	34.64	54.00	-19.36	-	-	321	100	H
		* 4.82479	37.59	PK2	34.10	-28.10	0.00	43.59	-	-	74.00	-30.41	41	100	V
		* 4.82263	25.56	MAv1	34.10	-28.10	0.00	31.56	54.00	-22.44	-	-	41	100	V
		7.238	35.85	PK2	36.20	-25.50	0.00	46.55	-	-	74.00	-27.45	0	100	H
		7.239	35.46	PK2	36.20	-25.50	0.00	46.16	-	-	74.00	-27.84	0	100	V
		9.651	32.48	PK2	37.00	-21.40	0.00	48.08	-	-	74.00	-25.92	0	100	H
		9.649	32.60	PK2	37.00	-21.50	0.00	48.10	-	-	74.00	-25.90	0	100	V
		* 4.87551	42.61	PK2	34.10	-27.90	0.00	48.81	-	-	74.00	-25.19	318	101	H
2437	ANT1	* 4.87565	30.82	MAv1	34.10	-27.90	0.00	37.02	54.00	-16.98	-	-	318	101	H
		* 4.87848	38.76	PK2	34.10	-27.80	0.00	45.06	-	-	74.00	-28.94	33	131	V
		* 4.87732	26.38	MAv1	34.10	-27.90	0.00	32.58	54.00	-21.42	-	-	33	131	V
		* 7.31326	35.87	PK2	36.10	-25.00	0.00	46.97	-	-	74.00	-27.03	0	100	H
		* 7.313	35.46	PK2	36.10	-25.00	0.00	46.56	-	-	74.00	-27.44	0	100	V
		9.752	32.69	PK2	37.20	-21.40	0.00	48.49	-	-	74.00	-25.51	0	100	H
		9.747	32.88	PK2	37.20	-21.40	0.00	48.68	-	-	74.00	-25.32	0	100	V
		* 4.91244	39.82	PK2	34.10	-27.50	0.00	46.42	-	-	74.00	-27.58	316	115	H
		* 4.90798	27.66	MAv1	34.10	-27.50	0.00	34.26	54.00	-19.74	-	-	316	115	H
2457	ANT1	* 4.91348	37.85	PK2	34.10	-27.50	0.00	44.45	-	-	74.00	-29.55	37	118	V
		* 4.90864	25.38	MAv1	34.10	-27.50	0.00	31.98	54.00	-22.02	-	-	37	118	V
		* 7.35846	34.86	PK2	36.10	-24.40	0.00	46.56	-	-	74.00	-27.44	0	100	H
		* 7.36463	35.50	PK2	36.10	-24.40	0.00	47.20	-	-	74.00	-26.80	0	100	V
		9.829	32.71	PK2	37.30	-21.80	0.00	48.21	-	-	74.00	-25.79	0	100	H
		9.836	32.69	PK2	37.30	-21.70	0.00	48.29	-	-	74.00	-25.71	0	100	V

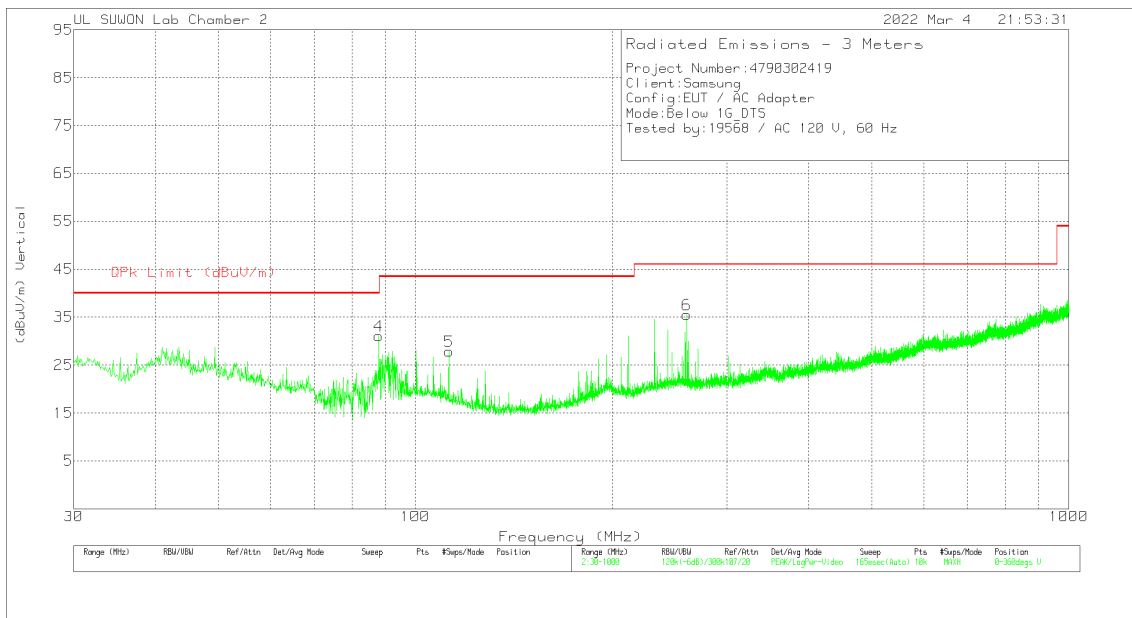
Note1. PK2 - KDB558074 Method: Maximum Peak / MAv1 - KDB558074 Option 1 Maximum RMS Average

Note2. \* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

### 10.2. WORST CASE BELOW 1 GHz (USB C to C cable)



**HORIZONTAL**



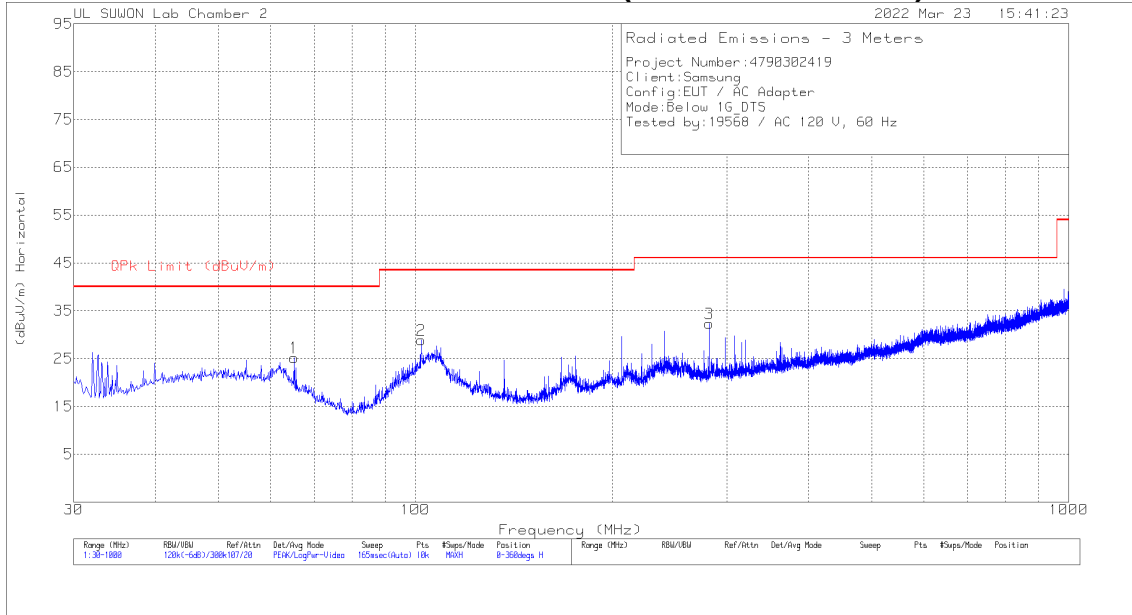
**VERTICAL**

**Trace Markers**

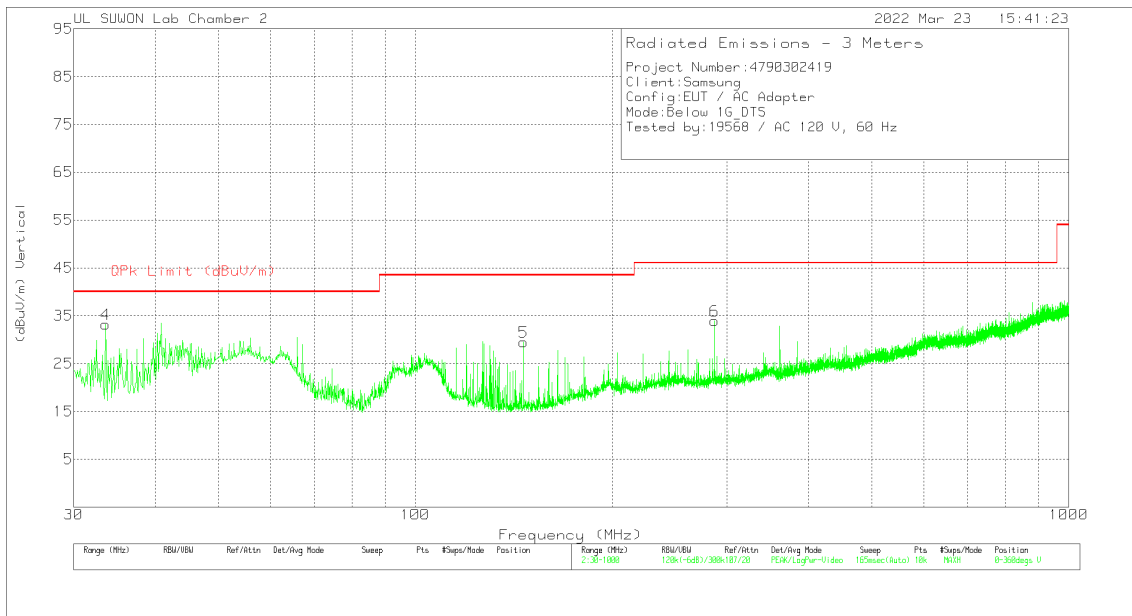
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below 1G[dB]	Corrected Reading (dBuV/m)	QPK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	83.156	49.65	Pk	13.1	-31.5	31.25	40	-8.75	0-360	100	H
2	97.124	44.77	Pk	17.4	-31.3	30.87	43.52	-12.65	0-360	300	H
3	145.624	47.66	Pk	14.1	-31	30.76	43.52	-12.76	0-360	100	H
4	87.909	47.83	Pk	14.8	-31.5	31.13	40	-8.87	0-360	100	V
5	112.547	42.52	Pk	16.6	-31.2	27.92	43.52	-15.6	0-360	300	V
6	260.472	47.19	Pk	18.8	-30.5	35.49	46.02	-10.53	0-360	100	V

Pk - Peak detector

### 10.3. WORST CASE BELOW 1 GHz (USB A to C cable)



**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	65.211	39.61	Pk	17.1	-31.5	25.21	40	-14.79	0-360	200	H
2	102.071	42.41	Pk	17.8	-31.3	28.91	43.52	-14.61	0-360	200	H
3	281.812	43.87	Pk	18.9	-30.4	32.37	46.02	-13.65	0-360	100	H
4	33.589	49.17	Pk	15.9	-31.9	33.17	40	-6.83	0-360	100	V
5	146.4	46.46	Pk	14.1	-31.1	29.46	43.52	-14.06	0-360	100	V
6	286.856	45.08	Pk	19.1	-30.3	33.88	46.02	-12.14	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

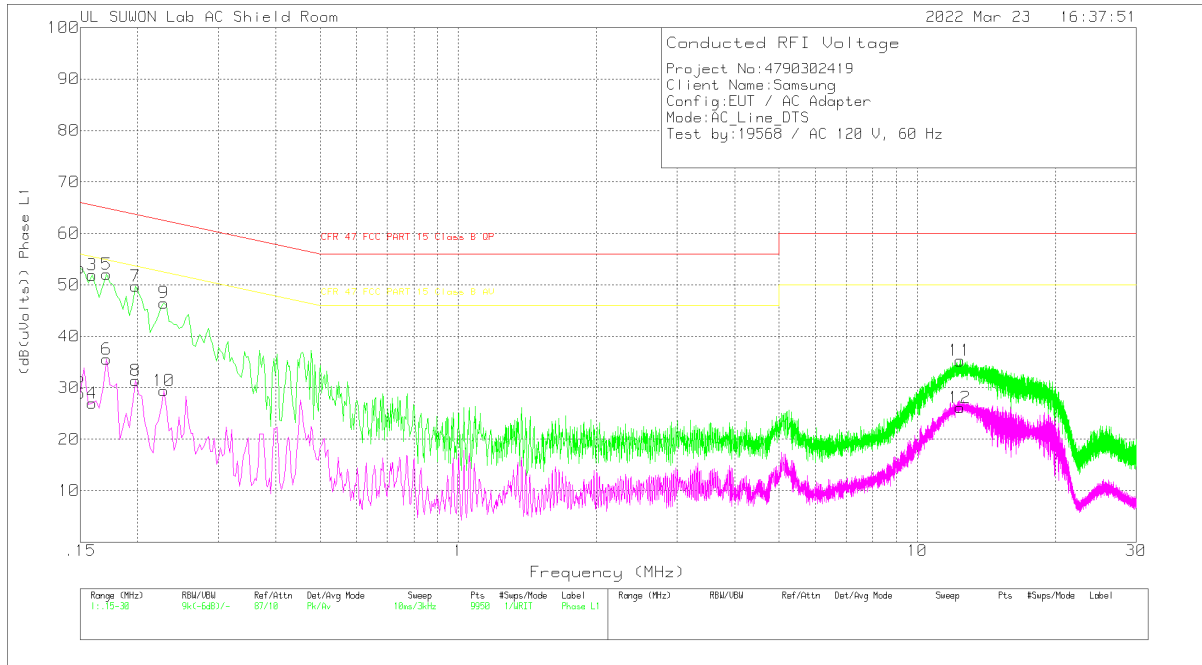
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

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 (USB C to C Cable) LINE 1 RESULTS



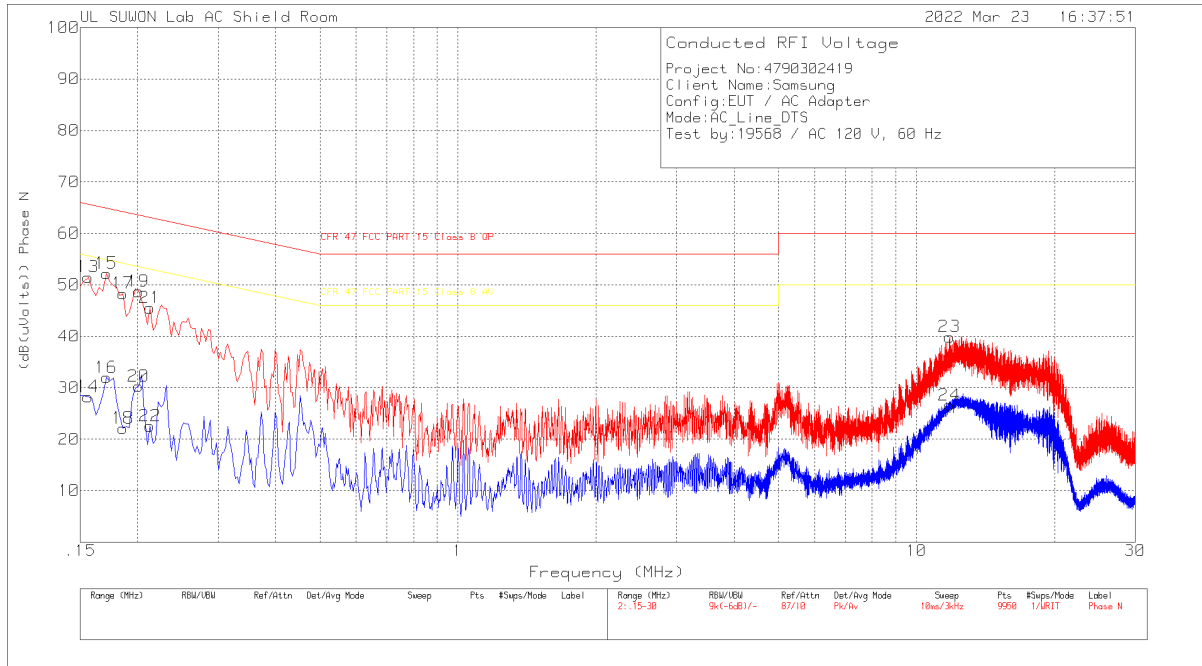
Trace Markers

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h 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	.15	43.47	Pk	9.7	.1	53.27	66	-12.73	-	-
2	.15	19.12	Av	9.7	.1	28.92	-	-	56	-27.08
3	.159	41.99	Pk	9.8	.1	51.89	65.52	-13.63	-	-
4	.159	17.09	Av	9.8	.1	26.99	-	-	55.52	-28.53
5	.171	41.85	Pk	10	.2	52.05	64.91	-12.86	-	-
6	.171	25.35	Av	10	.2	35.55	-	-	54.91	-19.36
7	.198	39.72	Pk	9.8	.2	49.72	63.69	-13.97	-	-
8	.198	21.38	Av	9.8	.2	31.38	-	-	53.69	-22.31
9	.228	36.6	Pk	9.7	.2	46.5	62.52	-16.02	-	-
10	.228	19.53	Av	9.7	.2	29.43	-	-	52.52	-23.09
11	12.381	25.07	Pk	9.9	.3	35.27	60	-24.73	-	-
12	12.381	15.94	Av	9.9	.3	26.14	-	-	50	-23.86

Pk - Peak detector  
 Av - Average detection

### LINE 2 RESULTS



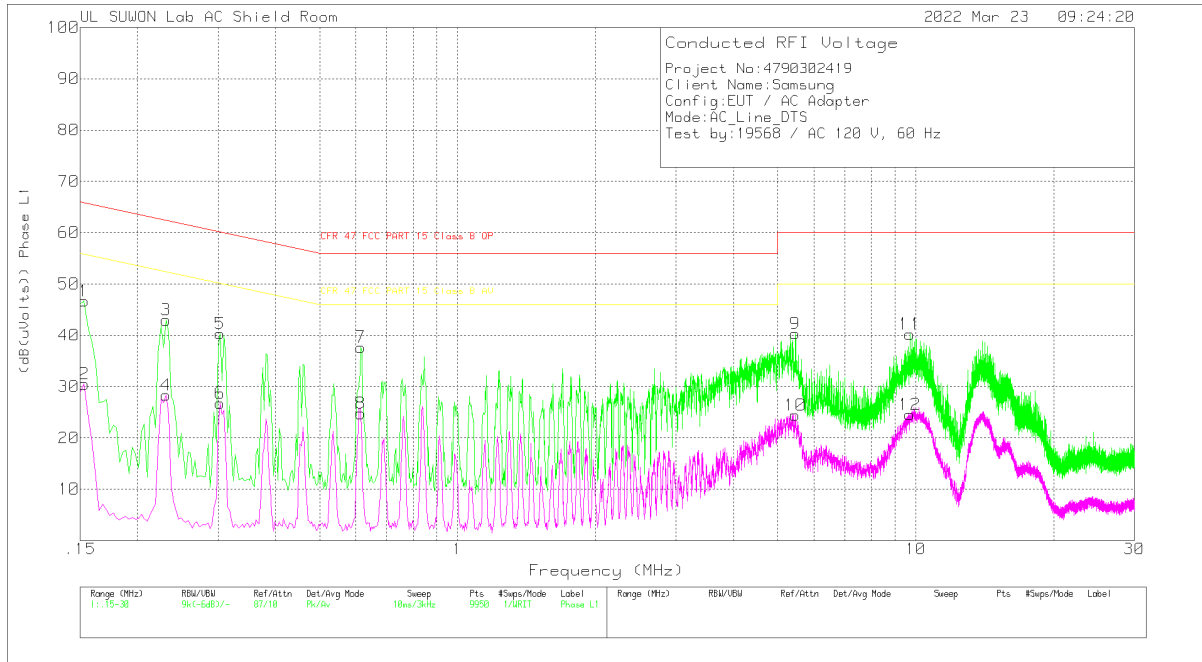
#### Trace Markers

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	.156	41.6	Pk	9.8	.1	51.5	65.67	-14.17	-	-
14	.156	18.35	Av	9.8	.1	28.25	-	-	55.67	-27.42
15	.171	42.02	Pk	10	.2	52.22	64.91	-12.69	-	-
16	.171	21.78	Av	10	.2	31.98	-	-	54.91	-22.93
17	.186	38.23	Pk	9.9	.2	48.33	64.21	-15.88	-	-
18	.186	12.02	Av	9.9	.2	22.12	-	-	54.21	-32.09
19	.201	38.71	Pk	9.8	.2	48.71	63.57	-14.86	-	-
20	.201	20.29	Av	9.8	.2	30.29	-	-	53.57	-23.28
21	.213	35.54	Pk	9.8	.2	45.54	63.09	-17.55	-	-
22	.213	12.56	Av	9.8	.2	22.56	-	-	53.09	-30.53
23	11.802	29.69	Pk	9.9	.3	39.89	60	-20.11	-	-
24	11.802	16.4	Av	9.9	.3	26.6	-	-	50	-23.4

Pk - Peak detector  
 Av - Average detection

## 11.2. AC Power Line (USB A to C Cable) LINE 1 RESULTS



### Trace Markers

Range 1: Phase L1 .15 - 30MHz

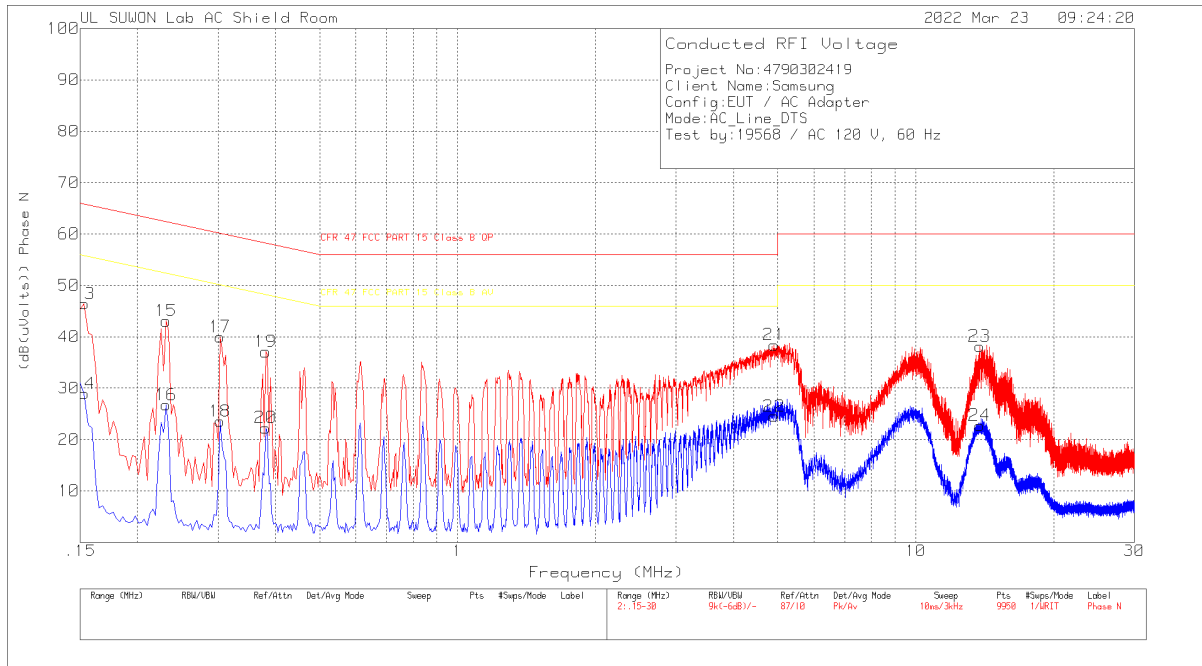
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_L1[dB]	CABLELOS S(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
1	.153	36.75	Pk	9.8	.1	46.65	65.84	-19.19	-	-
2	.153	20.6	Av	9.8	.1	30.5	-	-	55.84	-25.34
3	.231	33.08	Pk	9.7	.2	42.98	62.41	-19.43	-	-
4	.231	18.41	Av	9.7	.2	28.31	-	-	52.41	-24.1
5	.303	30.42	Pk	9.7	.2	40.32	60.16	-19.84	-	-
6	.303	16.87	Av	9.7	.2	26.77	-	-	50.16	-23.39
7	.615	27.64	Pk	9.8	.2	37.64	56	-18.36	-	-
8	.615	14.76	Av	9.8	.2	24.76	-	-	46	-21.24
9	5.46	30.3	Pk	9.7	.3	40.3	60	-19.7	-	-
10	5.46	14.43	Av	9.7	.3	24.43	-	-	50	-25.57
11	9.708	30.01	Pk	9.8	.4	40.21	60	-19.79	-	-
12	9.708	14.35	Av	9.8	.4	24.55	-	-	50	-25.45

Pk - Peak detector

Av - Average detection



### LINE 2 RESULTS



#### Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_N[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)
13	.153	36.51	Pk	9.8	.1	46.41	65.84	-19.43	-	-
14	.153	19.04	Av	9.8	.1	28.94	-	-	55.84	-26.9
15	.231	33.19	Pk	9.7	.2	43.09	62.41	-19.32	-	-
16	.231	16.82	Av	9.7	.2	26.72	-	-	52.41	-25.69
17	.303	30.06	Pk	9.7	.2	39.96	60.16	-20.2	-	-
18	.303	13.67	Av	9.7	.2	23.57	-	-	50.16	-26.59
19	.381	27.1	Pk	9.8	.2	37.1	58.26	-21.16	-	-
20	.381	12.28	Av	9.8	.2	22.28	-	-	48.26	-25.98
21	4.908	28.43	Pk	9.7	.3	38.43	56	-17.57	-	-
22	4.908	14.54	Av	9.7	.3	24.54	-	-	46	-21.46
23	13.785	27.76	Pk	10	.4	38.16	60	-21.84	-	-
24	13.785	12.34	Av	10	.4	22.74	-	-	50	-27.26

Pk - Peak detector

Av - Average detection

## END OF TEST REPORT