



FCC CFR47 PART 15 SUBPART C

Bluetooth Low Energy

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Phone + BT/BLE, DTS b/g/n, ANT+ and NFC

MODEL NUMBER : SM-G611S, SM-G611K, SM-G611L

FCC ID: A3LSMG611KOR

REPORT NUMBER: 4788269334-E2V2

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Prepared for
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Revision History

Rev.	Issue Date	Revisions	Revised By
V1	01/04/18	Initial issue	Junwhan Lee
V2	01/05/18	Revised to address TCB's question	Junwhan Lee

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

EUT DESCRIPTION: GSM/WCDMA/LTE Phone + BT/BLE, DTS b/g/n, ANT+ and NFC

MODEL NUMBER: SM-G611S, SM-G611K, SM-G611L

SERIAL NUMBER: R39JB04JBD, R39JB04JBP (RADIATED);
R39JB04JMRA (CONDUCTED)

DATE TESTED: DEC 11, 2017 - DEC 28, 2017

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass

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:



SungGil Park
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:



Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with following methods.

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 558074 D01 DTS Meas Guidance v04.
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
☒	Chamber 2

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <http://www.iasonline.org/PDF/TL/TL-637.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:

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

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	2.32 dB
Radiated Disturbance, Below 1GHz	3.86 dB
Radiated Disturbance, Above 1 GHz	5.97 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

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

SM-G611S and SM-G611K/SM-G611L are same hardware and only difference is S/W user interface for different network operator. SM-G611S was used for the tests.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range [MHz]	Mode	Power Mode	Output Power [dBm]	Output Power [mW]
2402 - 2480	BLE	Peak	7.602	5.76
		Average	7.143	5.18

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an internal antenna, with a maximum gain of 0.91 dBi.

5.4. 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.

The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA50KWK	DW2J609DS/A -E	N/A
Data Cable	SAMSUNG	ECB-DU68WE	N/A	N/A
Earphone	SAMSUNG	EHS64AVFWE	N/A	N/A

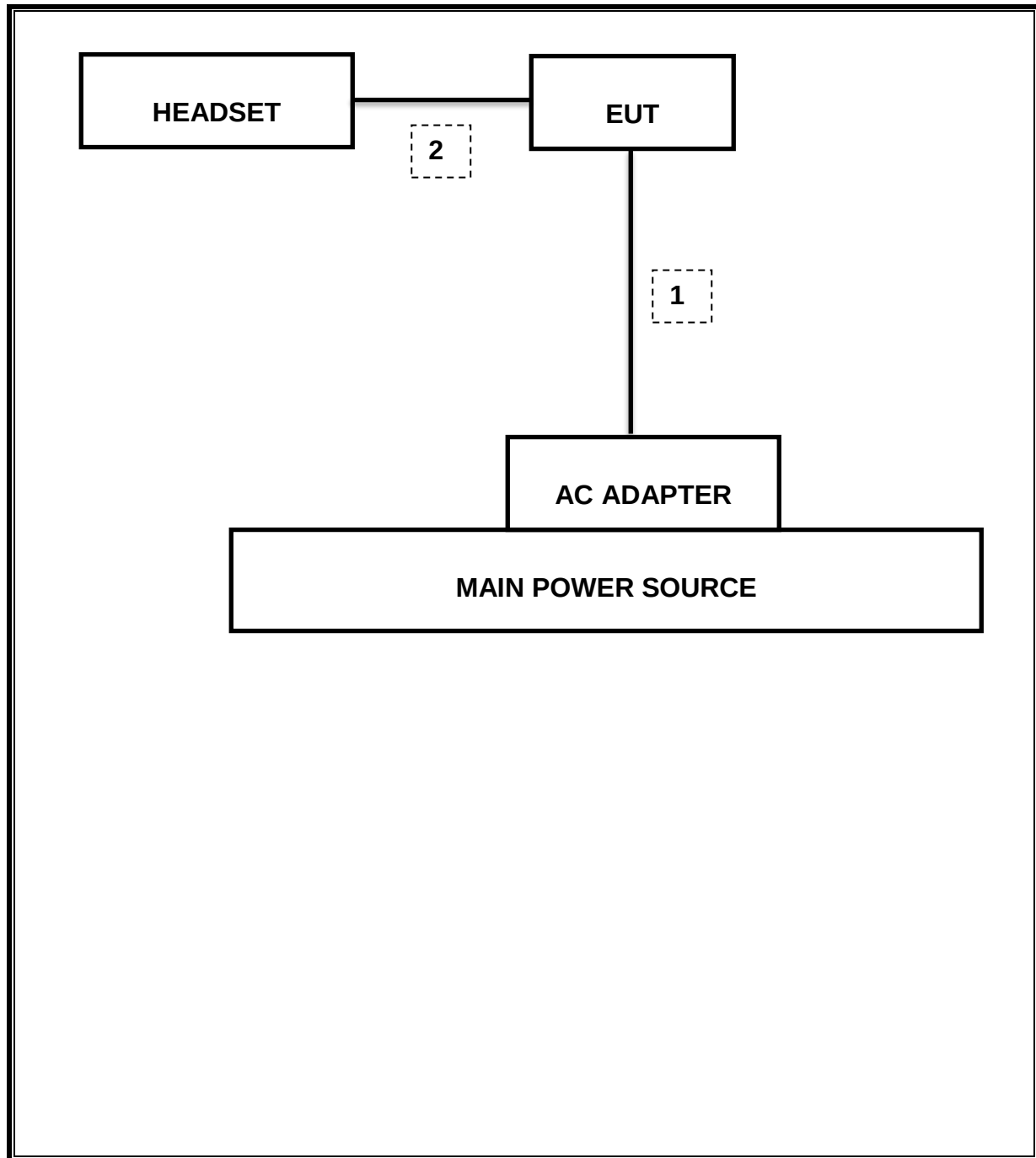
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	Mini-USB	Shielded	1.2m	N/A
2	Audio	2	Mini-Jack	Unshielded	1.2m	N/A

TEST SETUP

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

SETUP DIAGRAM FOR TESTS



6. 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	08-31-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	04-14-19
Antenna, Horn, 18 GHz	ETS	3115	00167211	10-14-18
Antenna, Horn, 18 GHz	ETS	3115	00161451	03-10-19
Antenna, Horn, 18 GHz	ETS	3117	00168724	05-31-19
Antenna, Horn, 18 GHz	ETS	3117	00168717	05-31-19
Antenna, Horn, 40 GHz	ETS	3116C	00166155	12-04-19
Preamplifier	ETS	3116C-PA	00168841	11-13-19
Antenna, Horn, 40 GHz	ETS	3116C	00168645	12-04-19
Attenuator / Switch driver	HP	11713A	3748A04272	N/A
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-09-18
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-07-18
Preamplifier	ETS	3115-PA	00167475	08-09-18
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-08-18
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-08-18
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-08-18
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-08-18
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-08-18
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-08-18
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-07-18
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-08-18
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-08-18
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-08-18
ATTENUATOR	PASTERNAK	PE7087-10	A009	08-08-18
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-08-18
High Pass Filter 6GHz	Micro-Tronics	HPM17542	009	08-08-18
High Pass Filter 6GHz	Micro-Tronics	HPM17542	016	08-08-18
LISN	R&S	ENV-216	101837	08-09-18
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	08-07-18
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	10-26-19
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

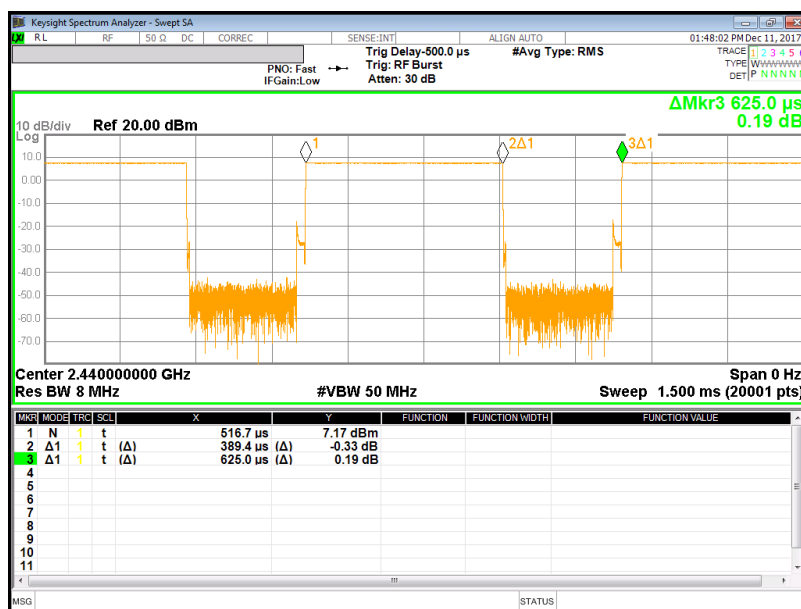
7. REFERENCE MEASUREMENT RESULTS

7.1. ON TIME AND DUTY CYCLE RESULTS

LIMITS

None: for reporting purposes only.

Mode	ON Time B [msec]	Period [msec]	Duty Cycle x [linear]	Duty Cycle [%]	Duty Cycle Correction Factor [dB]	1/T Minimum VBW [kHz]
2400MHz Bands						
BLE	0.389	0.625	0.623	62.3%	2.05	2.568



7.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

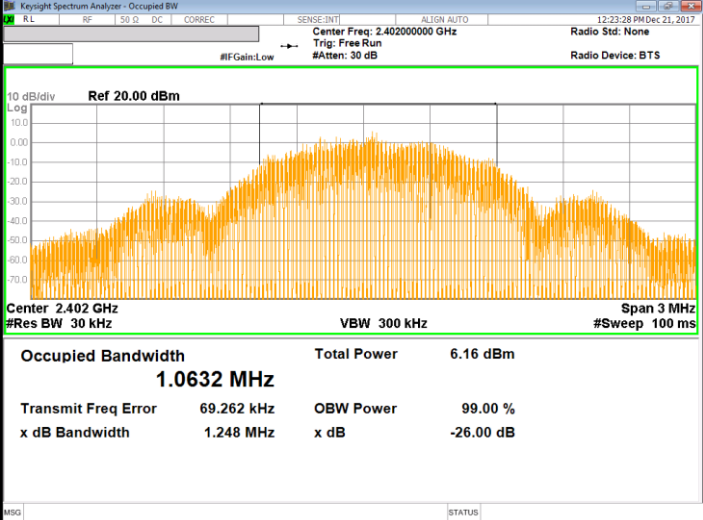
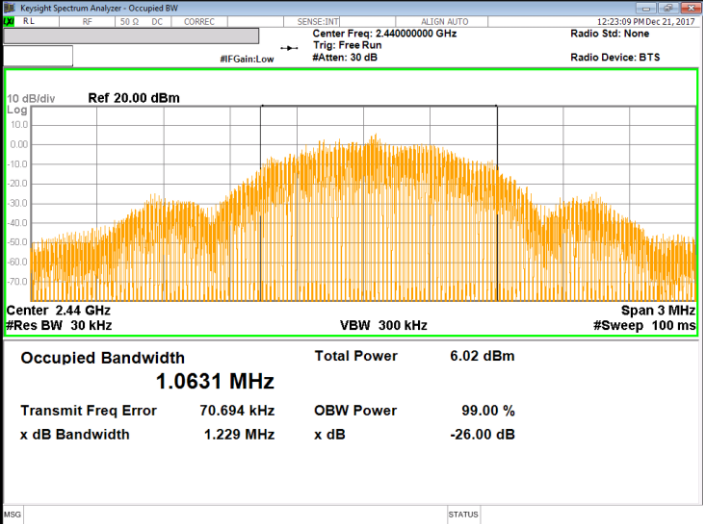
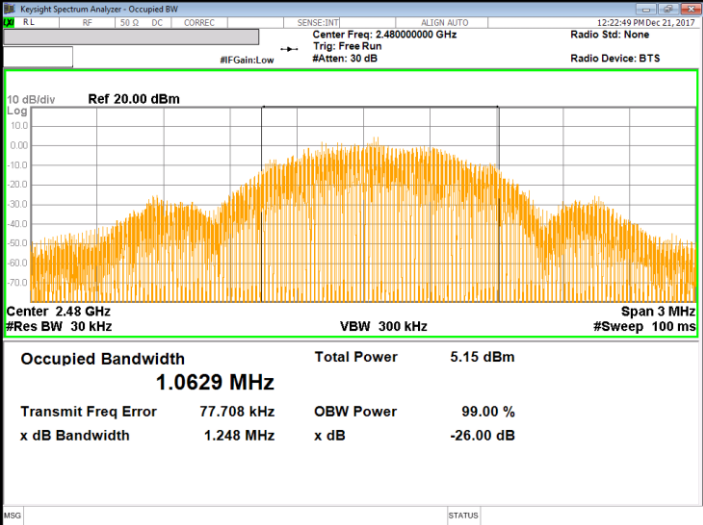
TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to ≥ 3 times the RBW. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	2402	1.063
Mid	2440	1.063
High	2480	1.063
Worst		1.063

99% BANDWIDTH PLOTS

Low CH	 Center Freq: 2.402000000 GHz Trig: Free Run #Atten: 30 dB Radio Std: None Radio Device: BTS 10 dB/div Ref 20.00 dBm Center 2.402 GHz Span 3 MHz #Res BW 30 kHz VBW 300 kHz #Sweep 100 ms Occupied Bandwidth 1.0632 MHz Total Power 6.16 dBm Transmit Freq Error 69.262 kHz OBW Power 99.00 % x dB Bandwidth 1.248 MHz x dB -26.00 dB
Middle CH	 Center Freq: 2.440000000 GHz Trig: Free Run #Atten: 30 dB Radio Std: None Radio Device: BTS 10 dB/div Ref 20.00 dBm Center 2.44 GHz Span 3 MHz #Res BW 30 kHz VBW 300 kHz #Sweep 100 ms Occupied Bandwidth 1.0631 MHz Total Power 6.02 dBm Transmit Freq Error 70.694 kHz OBW Power 99.00 % x dB Bandwidth 1.229 MHz x dB -26.00 dB
High CH	 Center Freq: 2.480000000 GHz Trig: Free Run #Atten: 30 dB Radio Std: None Radio Device: BTS 10 dB/div Ref 20.00 dBm Center 2.48 GHz Span 3 MHz #Res BW 30 kHz VBW 300 kHz #Sweep 100 ms Occupied Bandwidth 1.0629 MHz Total Power 5.15 dBm Transmit Freq Error 77.708 kHz OBW Power 99.00 % x dB Bandwidth 1.248 MHz x dB -26.00 dB

8. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result	Worst Case
15.247 (a)(2)	Occupied Band width (6dB)	>500KHz	Conducted	Pass	690.1 kHz
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-42.559 dBm
15.247 (b)(3)	TX conducted output power	<30dBm		Pass	7.602 dBm (Peak)
15.247 (e)	PSD	<8dBm		Pass	-5.77 dBm (Peak)
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass	40.7 dBuV (Pk)
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass	47.15 dBuV/m (Av)

9. ANTENNA PORT TEST RESULTS

9.1. 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 DTS Meas Guidance v04: 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.

RESULTS

Channel	Frequency [MHz]	6 dB Bandwidth [kHz]	Minimum Limit [kHz]
Low	2402	695.1	500.0
Mid	2440	694.3	500.0
High	2480	690.1	500.0
Worst		690.1	500.0

The figure displays three screenshots of a Keysight Spectrum Analyzer, showing the power spectral density (PSD) for three different channels: Low CH, Middle CH, and High CH. Each screenshot includes a frequency marker (Mkr1) and a power level measurement.

Low CH:

- Center: 2.4020000 GHz
- Res BW: 100 kHz
- Span: 1.500 MHz
- VBW: 300 kHz
- Sweep: 1.333 ms (20001 pts)
- Mkr1: 2.402 042 150 GHz, 7.124 dBm
- Power level: -6.00 dB at 695.125 kHz

Middle CH:

- Center: 2.4400000 GHz
- Res BW: 100 kHz
- Span: 1.500 MHz
- VBW: 300 kHz
- Sweep: 1.333 ms (20001 pts)
- Mkr1: 2.440 047 475 GHz, 7.465 dBm
- Power level: -6.00 dB at 694.342 kHz

High CH:

- Center: 2.4800000 GHz
- Res BW: 100 kHz
- Span: 1.500 MHz
- VBW: 300 kHz
- Sweep: 1.333 ms (20001 pts)
- Mkr1: 2.480 053 775 GHz, 6.349 dBm
- Power level: -6.00 dB at 690.109 kHz

9.2. OUTPUT POWER

LIMITS

FCC §15.247 (b)

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

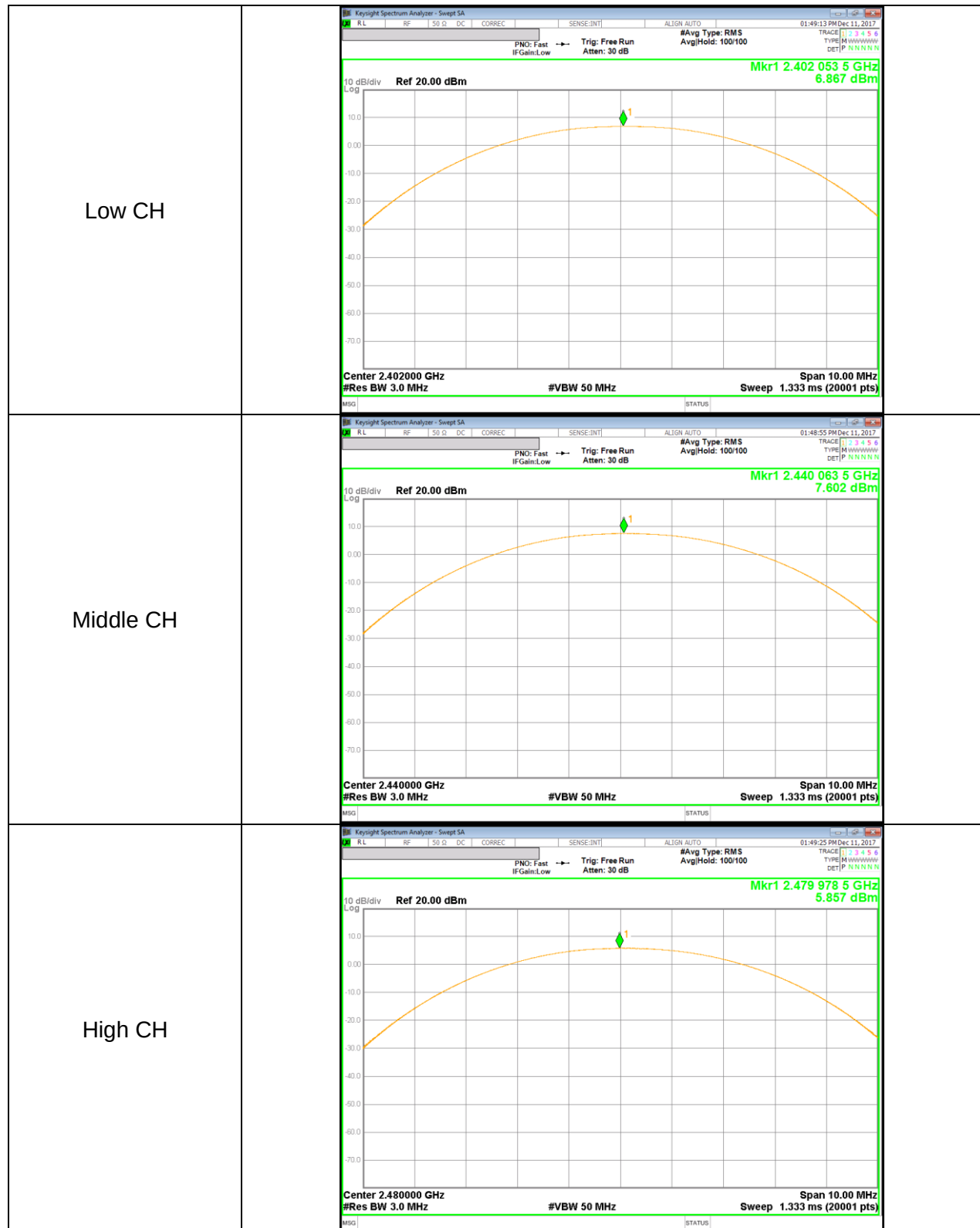
TEST PROCEDURE

Peak power is measured using KDB558074 D01 DTS Meas Guidance v04 under section 9.1.1 utilizing spectrum analyzer.

RESULTS

Channel	Frequency [MHz]	Peak Power Reading [dBm]	Limit [dBm]	Margin [dB]
Low	2402	6.867	30.000	-23.133
Mid	2440	7.602	30.000	-22.398
High	2480	5.857	30.000	-24.143
Worst		7.602		-22.398

OUTPUT POWER PLOTS



9.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	6.533	4.501
Middle	2440	7.143	5.180
High	2480	5.407	3.473

9.4. PSD

LIMITS

FCC §15.247

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.

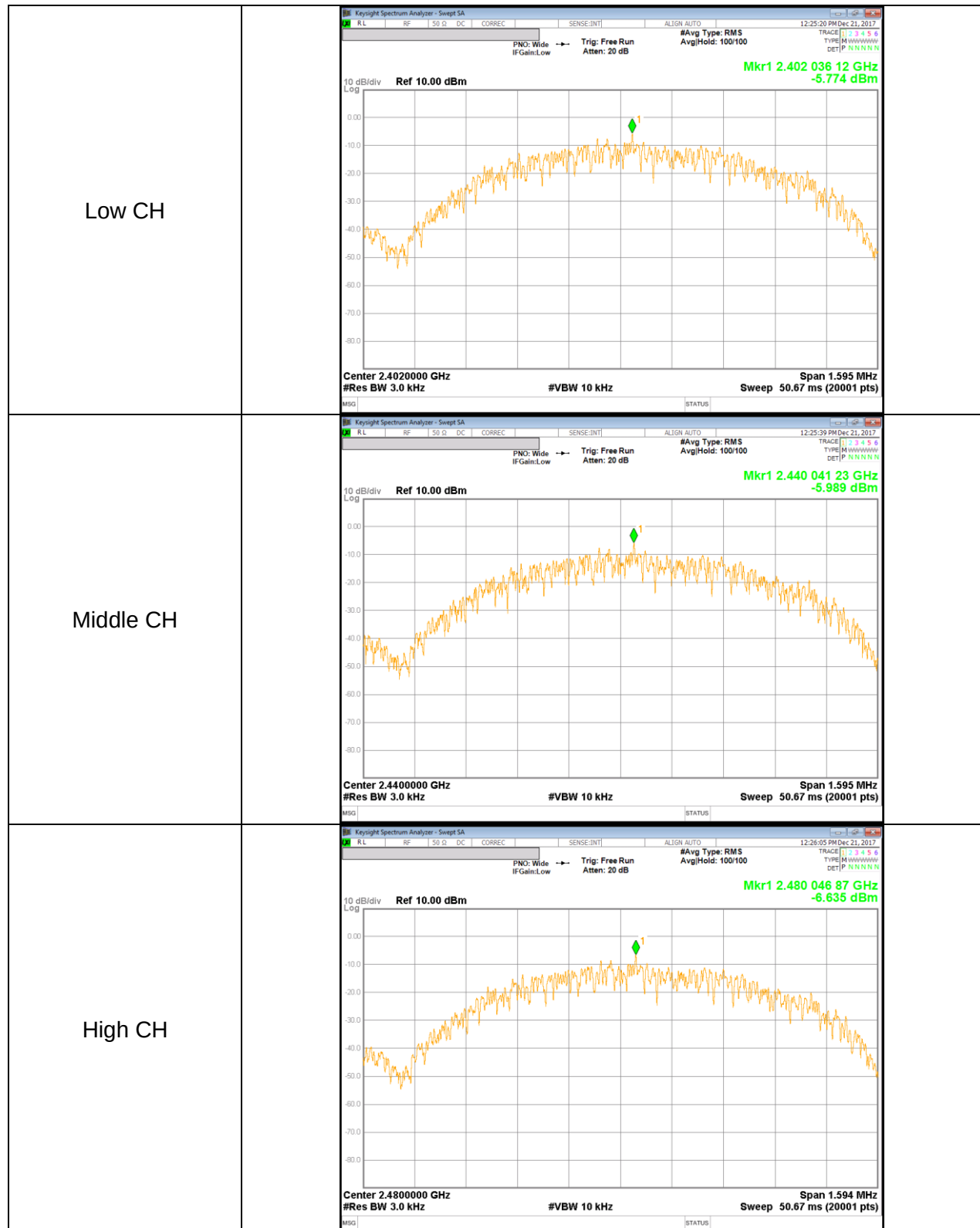
TEST PROCEDURE

Power Spectral Density was performed utilizing the “§10.2 Method PKPSD (Peak PSD)” under KDB558074 D01 DTS Meas Guidance v04

RESULTS

Channel	Frequency [MHz]	PSD [dBm]	Limit [dBm]	Margin [dB]
Low	2402	-5.77	8.00	-13.77
Mid	2440	-5.99	8.00	-13.99
High	2480	-6.64	8.00	-14.64

POWER SPECTRAL DENSITY PLOTS



9.5. OUT-OF-BAND EMISSIONS

LIMITS

FCC §15.247 (d)

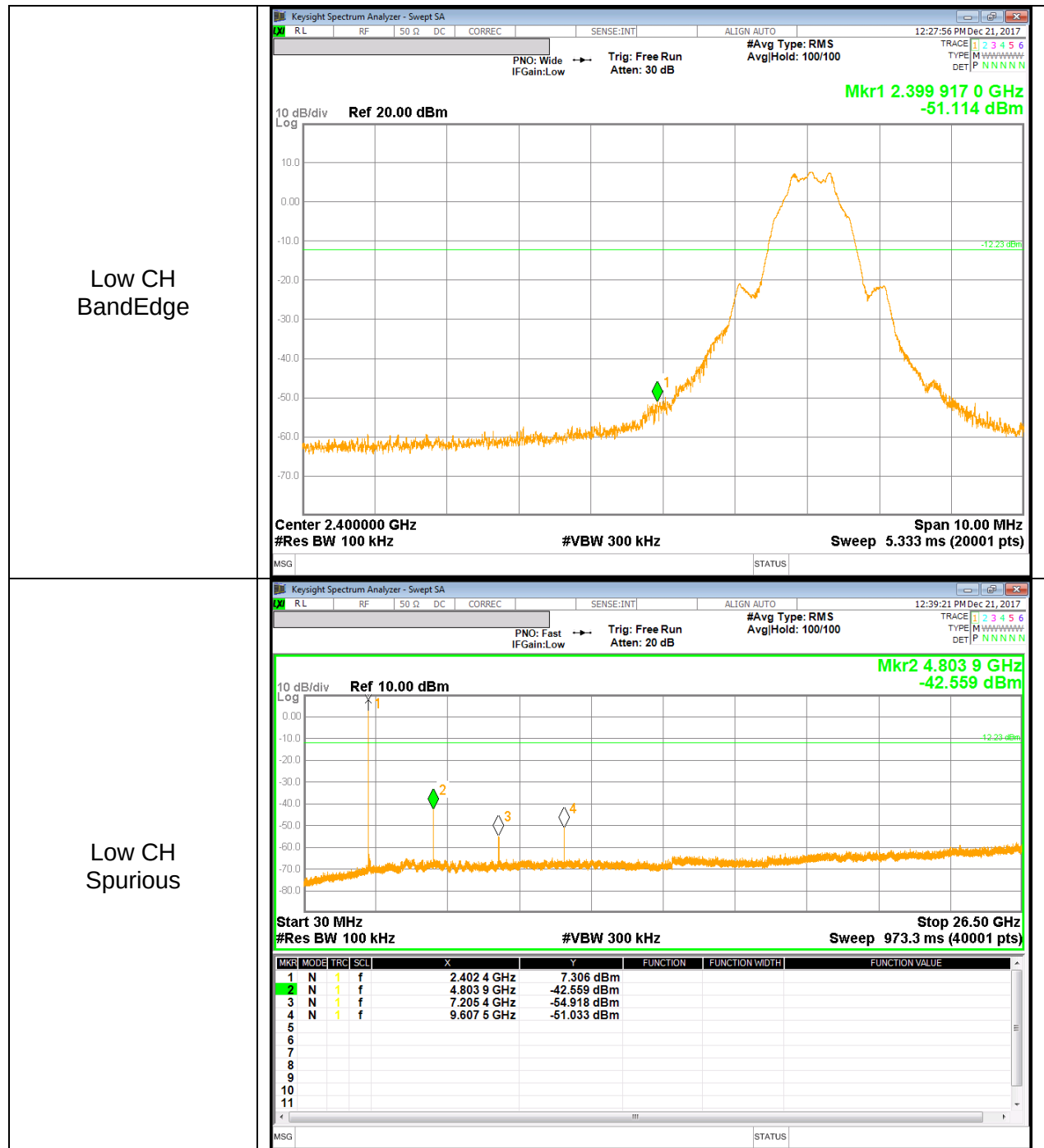
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

TEST PROCEDURE

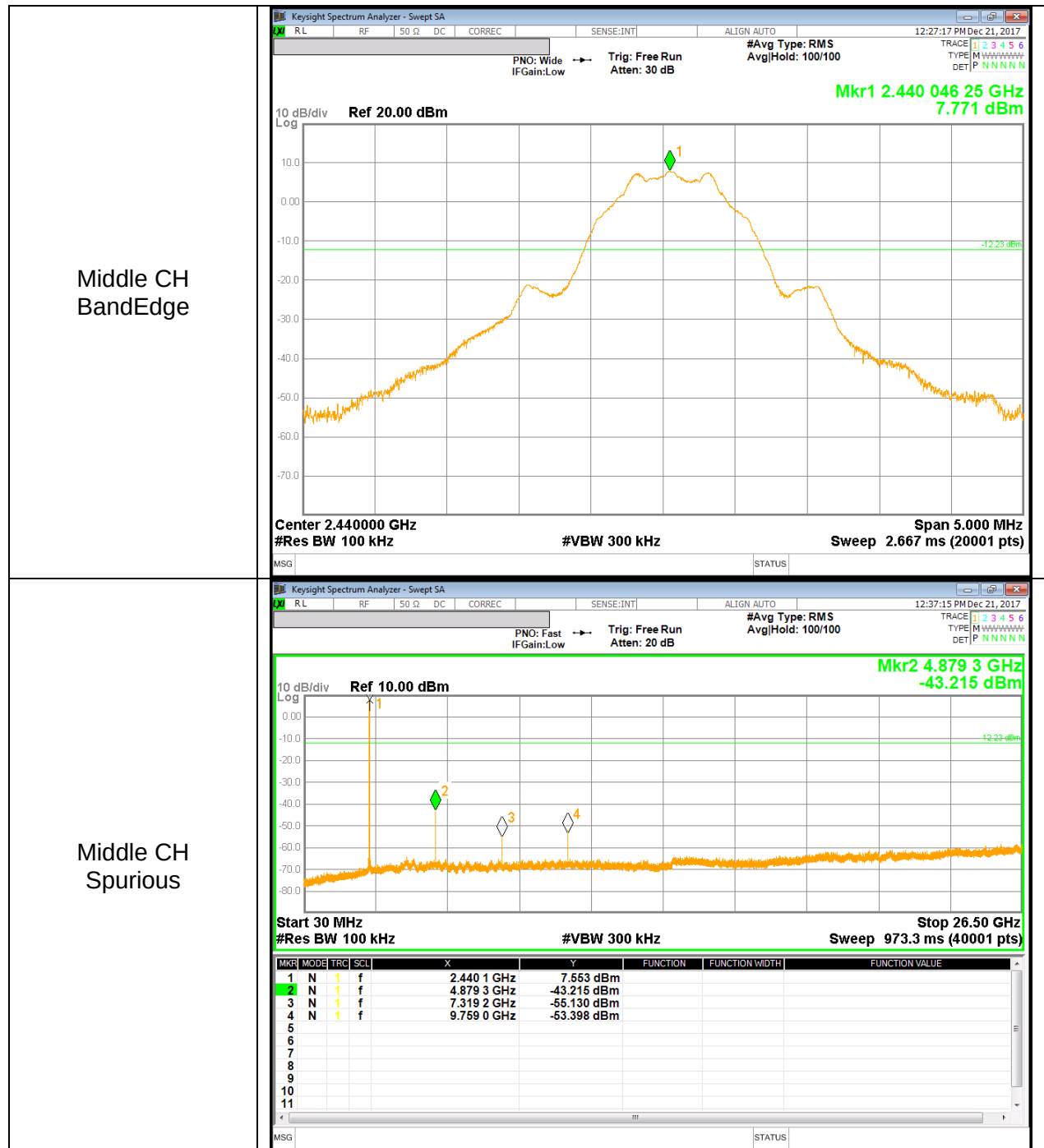
The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

RESULTS

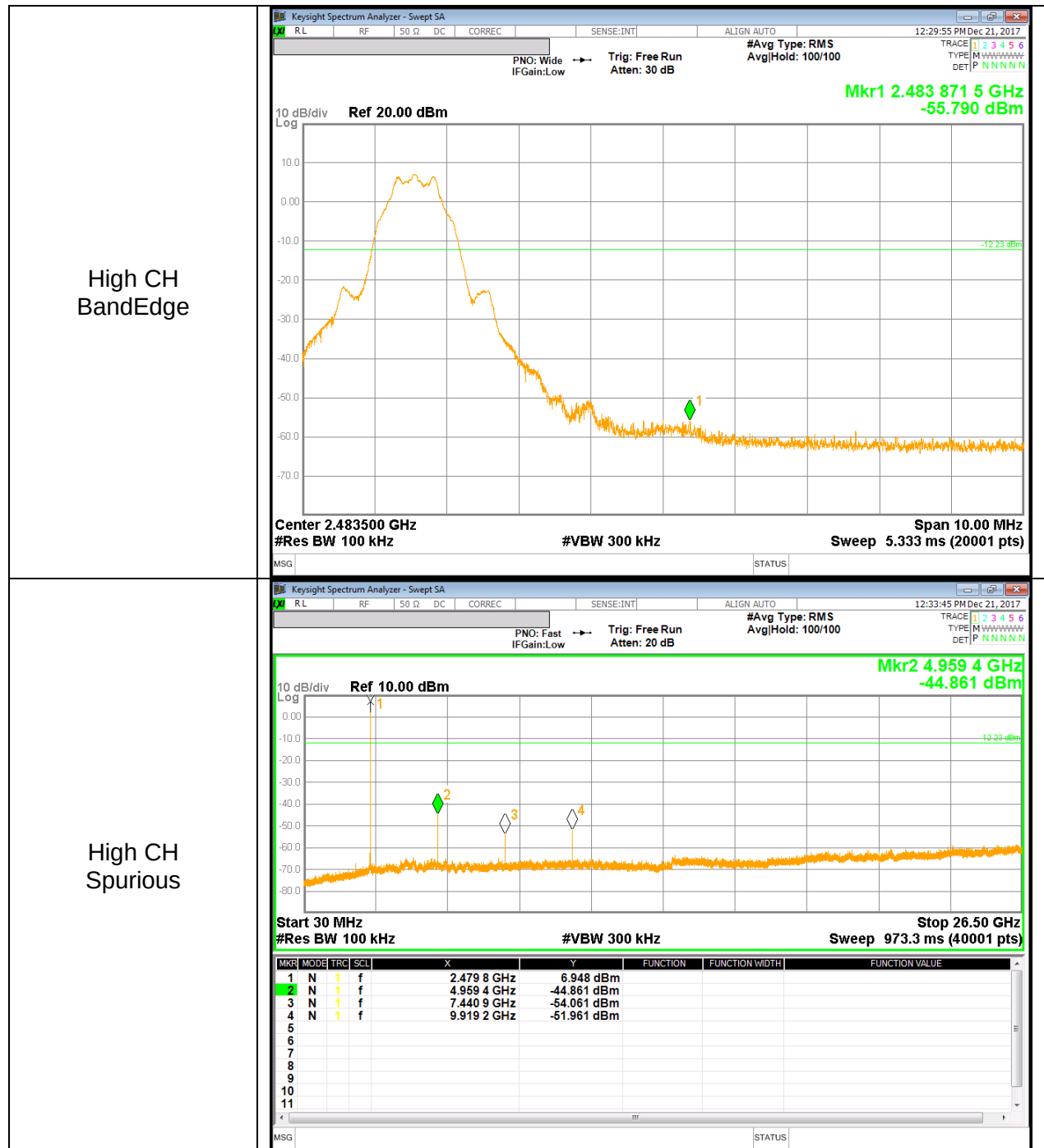
BANDEDGE & SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



10. RADIATED TEST RESULTS

10.1. LIMITS AND PROCEDURE

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.

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz and 150 cm for above 1GHz. 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, then 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: DCF = $10 \log(1/0.623) = 2.05\text{dB}$ (Spectrum Analyzer round it up to 2.05dB)

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 the 2.4 GHz band.
(From 30MHz to 1GHz, test was performed with the EUT set to transmit at the channel with highest output power)

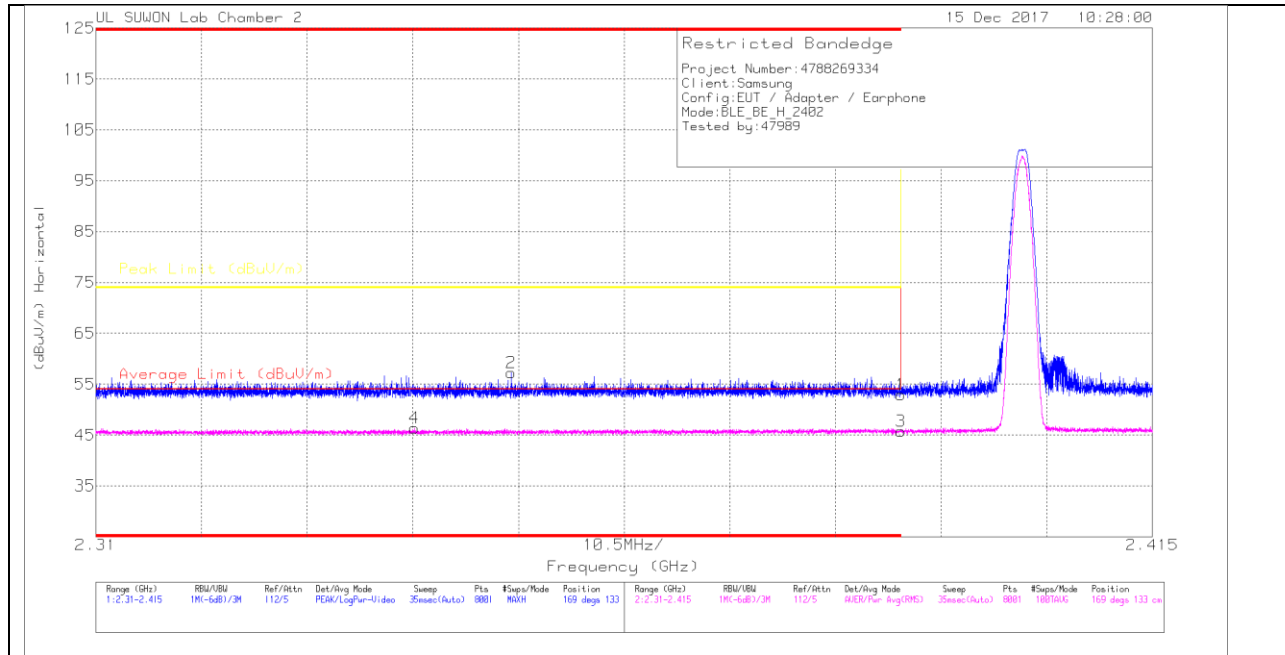
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

Note : Emission was pre-scanned from 9KHz to 30MHz; 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 area 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.

10.2. TRANSMITTER ABOVE 1 GHz RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

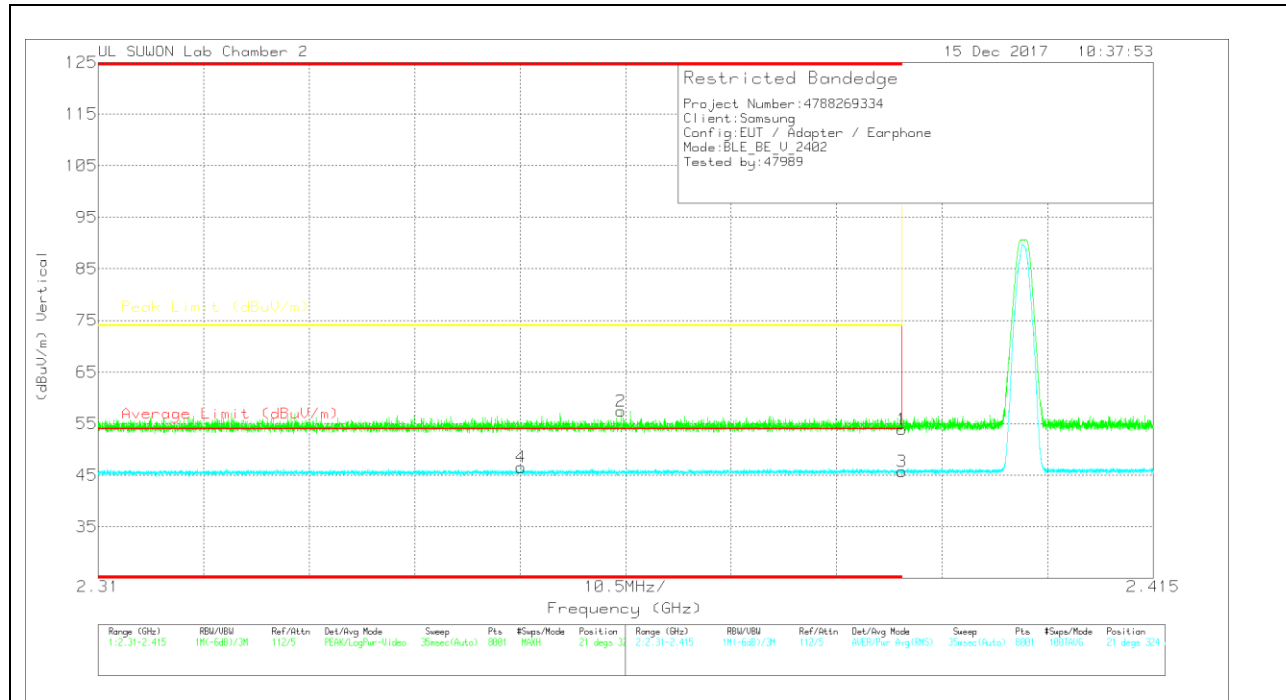
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	170531_3117(00168724)	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	* 2.39	39.77	Pk	31.3	-18.2	0	52.87	-	-	74	-21.13	169	133	H
2	* 2.351	44.36	Pk	31.2	-18.3	0	57.26	-	-	74	-16.74	169	133	H
3	* 2.39	30.61	RMS	31.3	-18.2	2.05	45.76	54	-8.24	-	-	169	133	H
4	* 2.342	31.41	RMS	31.2	-18.3	2.05	46.36	54	-7.64	-	-	169	133	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	170531_311700168724	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Pk Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	* 2.39	40.8	Pk	31.3	-18.2	0	53.9	-	-	74	-20.1	21	324	V
2	* 2.362	44.53	Pk	31.2	-18.3	0	57.43	-	-	74	-16.57	21	324	V
3	* 2.39	30.58	RMS	31.3	-18.2	2.05	45.73	54	-8.27	-	-	21	324	V
4	* 2.352	31.59	RMS	31.2	-18.3	2.05	46.54	54	-7.46	-	-	21	324	V

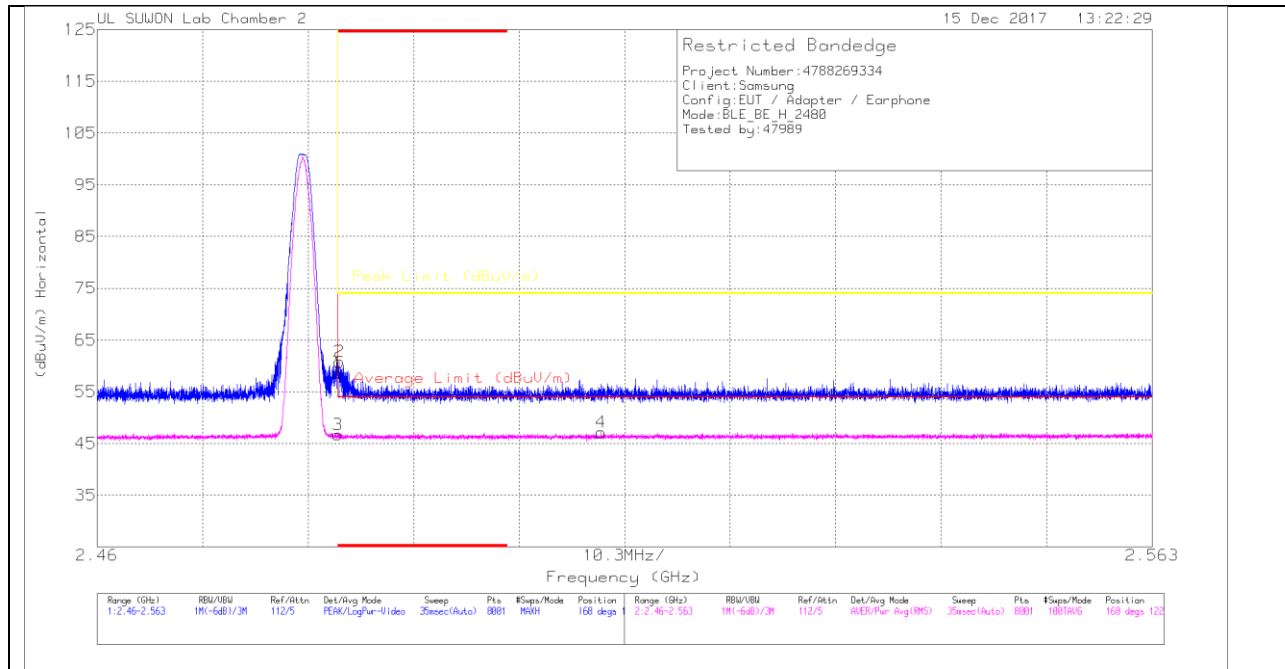
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

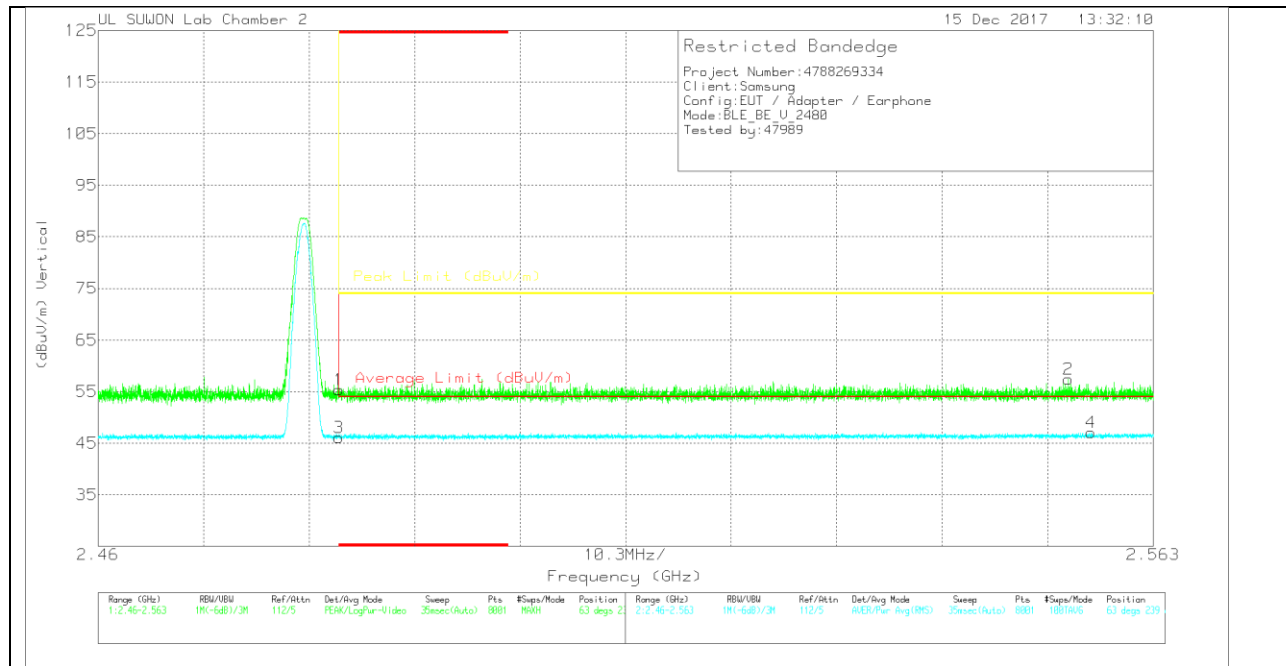
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	170531_311700168724	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	* 2.484	45.03	Pk		-18	0	58.63	-	-	74	-15.37	168	122	H
2	* 2.484	47.19	Pk		-18	0	60.79	-	-	74	-13.21	168	122	H
3	* 2.484	31.05	RMS		-18	2.05	46.7	54	-7.3	-	-	168	122	H
4	2.509	31.5	RMS		-18	2.05	47.15	54	-6.85	-	-	168	122	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	170531_3117[00168724]	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Asimuth (Degs)	Height (cm)	Polarity
1	* 2.484	41.76	Pk		31.6	-18	0	55.36	-	74	-18.64	63	239	V
2	2.555	43.7	Pk		31.7	-18	0	57.4	-	74	-16.6	63	239	V
3	* 2.484	30.45	RMS		31.6	-18	2.05	46.1	54	-7.9	-	63	239	V
4	2.557	31.33	RMS		31.7	-18	2.05	47.08	54	-6.92	-	63	239	V

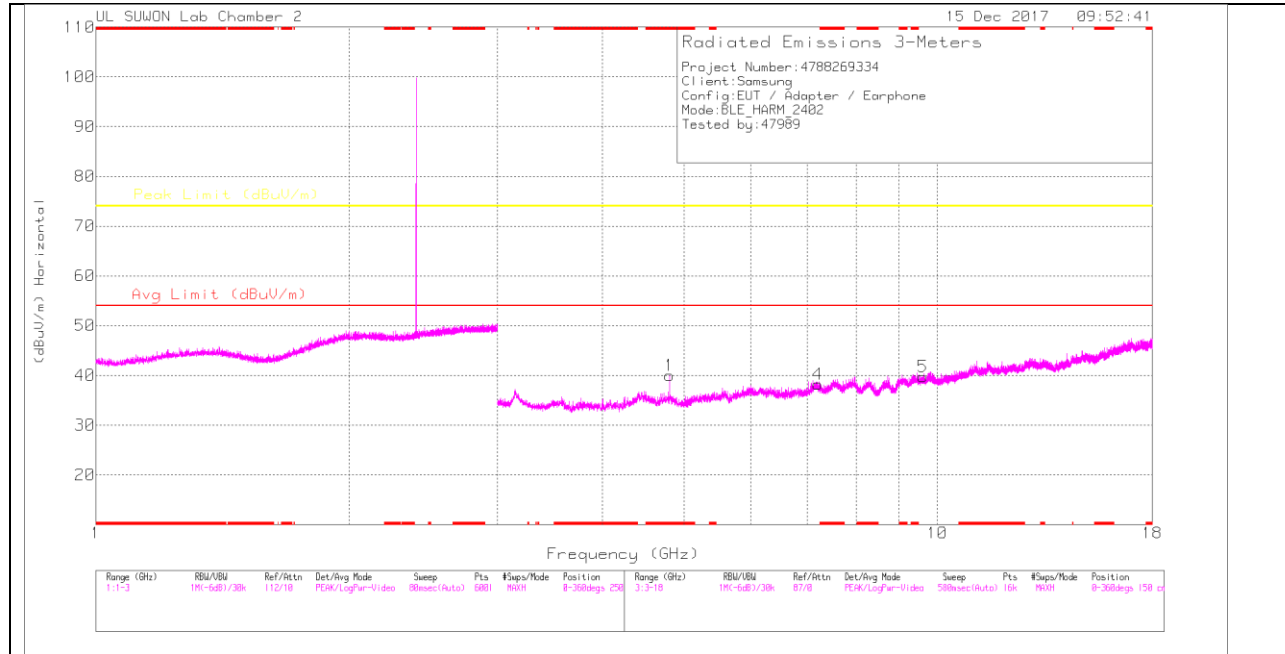
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

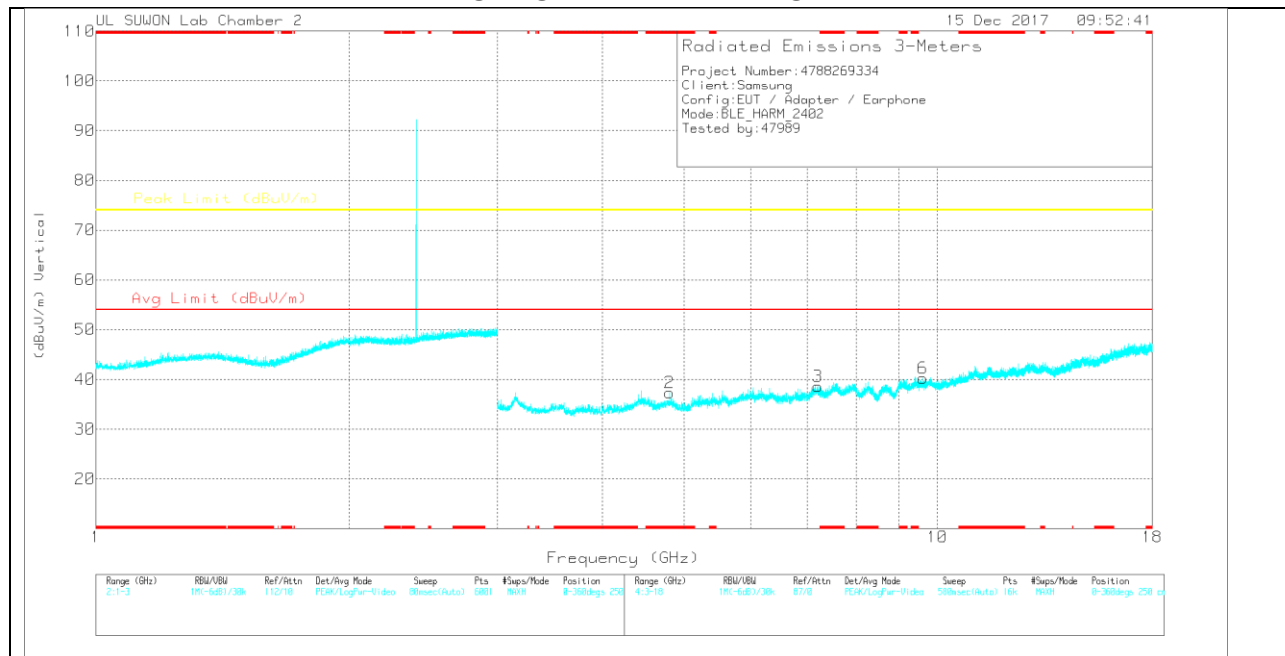
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL 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.

LOW CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	170531_3117[00168724]	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
1	* 4.804	30.45	PK	33.8	-24.3	0	39.95	-	-	74	-34.05	0-360	150	H
4	7.205	23.99	PK	35.9	-21.7	0	38.19	-	-	74	-35.81	0-360	150	H
5	9.609	21.41	PK	36.7	-18.4	0	39.71	-	-	74	-34.29	0-360	150	H
2	* 4.805	27.81	PK	33.8	-24.3	0	37.31	-	-	74	-36.69	0-360	250	V
3	7.21	24.38	PK	35.9	-21.7	0	38.58	-	-	74	-35.42	0-360	250	V
6	9.609	21.89	PK	36.7	-18.4	0	40.19	-	-	74	-33.81	0-360	250	V

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

PK – Peak Detector

Radiated Emissions

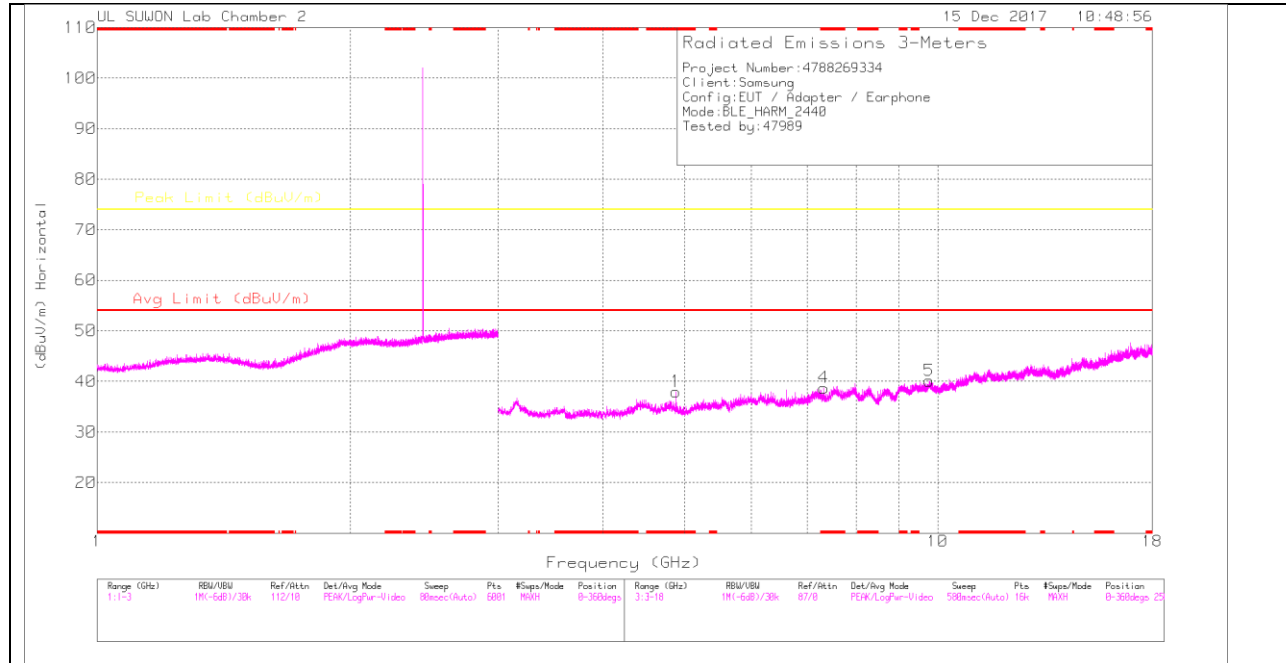
Frequency (GHz)	Meter Reading (dBuV)	Det	170531_3117[0 0168724]	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.805	37.77	PK2	33.8	-24.3	0	47.27	-	-	74	-26.73	46	130	H
* 4.804	27.68	MAv1	33.8	-24.3	2.05	39.23	54	-14.77	-	-	46	130	H
* 4.804	36.01	PK2	33.8	-24.3	0	45.51	-	-	74	-28.49	312	326	V
* 4.804	24.59	MAv1	33.8	-24.3	2.05	36.14	54	-17.86	-	-	312	326	V

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

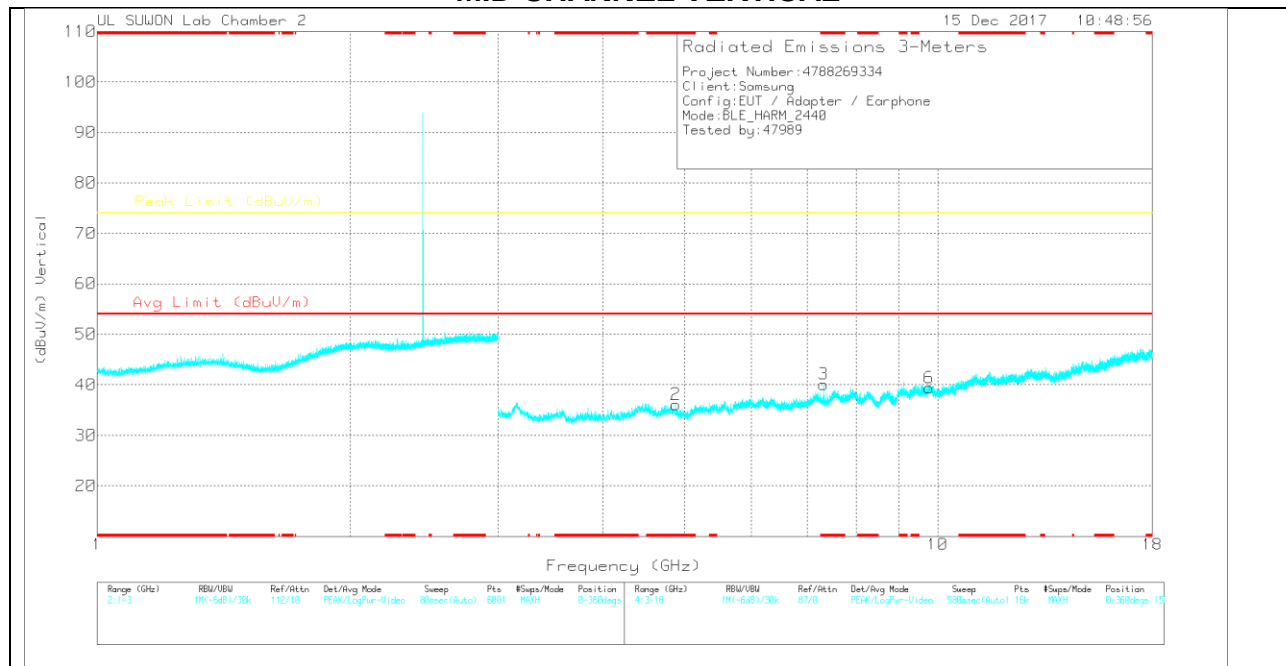
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL HORIZONTAL



MID CHANNEL 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.

MID CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	170531_3117[00168724]	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
1	* 4.88	28.77	PK	33.8	-24.6	0	37.97	-	-	74	-36.03	0-360	150	H
4	* 7.321	24.83	PK	35.9	-22	0	38.73	-	-	74	-35.27	0-360	250	H
5	9.768	21.23	PK	36.9	-18	0	40.13	-	-	74	-33.87	0-360	150	H
2	* 4.88	26.91	PK	33.8	-24.6	0	36.11	-	-	74	-37.89	0-360	150	V
3	* 7.32	26.2	PK	35.9	-22	0	40.1	-	-	74	-33.9	0-360	250	V
6	9.769	20.53	PK	36.9	-18	0	39.43	-	-	74	-34.57	0-360	150	V

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

PK – Peak detector

Radiated Emissions

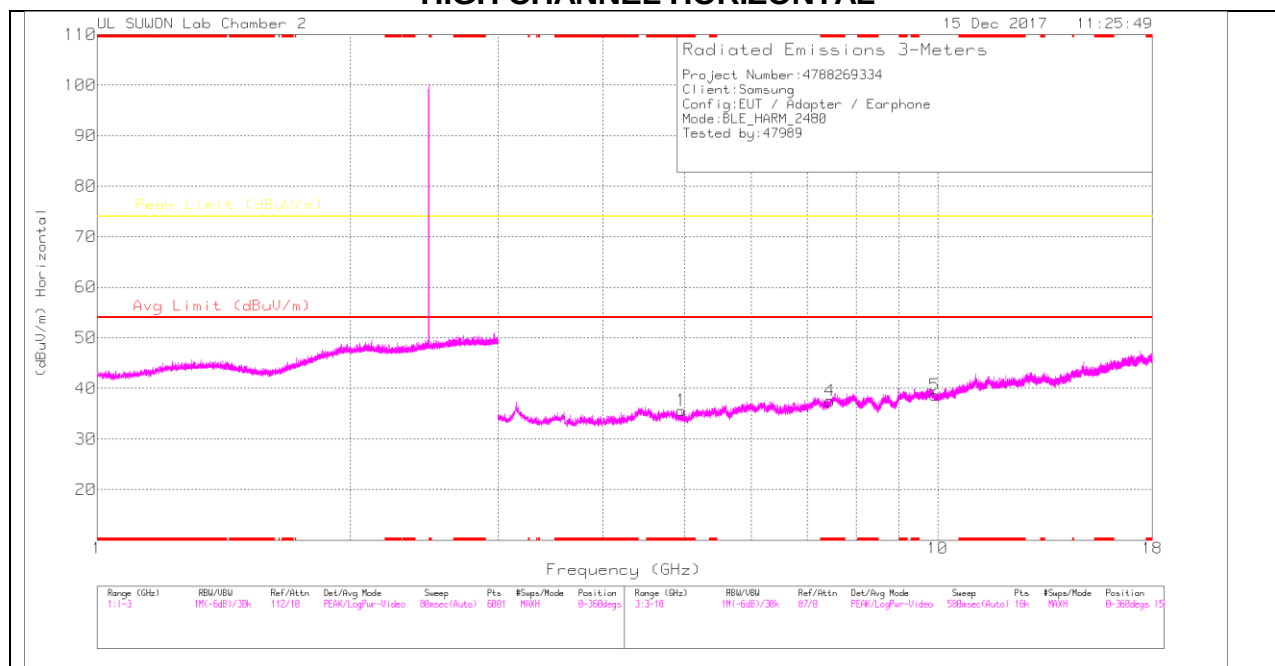
Frequency (GHz)	Meter Reading (dBuV)	Det	170531_3117[00168724]	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.881	37.61	PK2	33.8	-24.6	0	46.81	-	-	74	-27.19	138	120	H
* 4.88	26.9	MAv1	33.8	-24.6	2.05	38.15	54	-15.85	-	-	138	120	H
* 4.88	36.11	PK2	33.8	-24.6	0	45.31	-	-	74	-28.69	355	113	V
* 4.88	24.32	MAv1	33.8	-24.6	2.05	35.57	54	-18.43	-	-	355	113	V
* 7.319	33.22	PK2	35.9	-22	0	47.12	-	-	74	-26.88	217	130	V
* 7.32	21.68	MAv1	35.9	-22	2.05	37.63	54	-16.37	-	-	217	130	V
* 7.319	33.81	PK2	35.9	-22	0	47.71	-	-	74	-26.29	151	152	H
* 7.319	22.8	MAv1	35.9	-22	2.05	38.75	54	-15.25	-	-	151	152	H

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

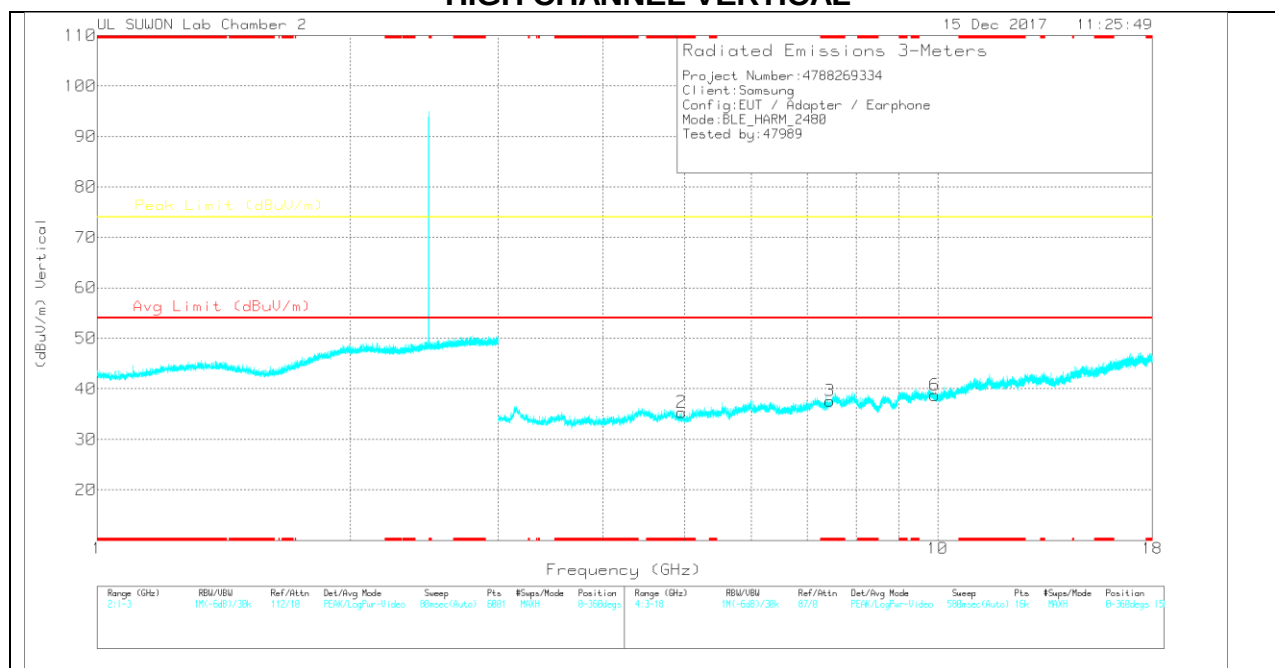
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL HORIZONTAL



HIGH CHANNEL 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.

HIGH CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	170531_3117(00168724)	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
1	* 4.959	26.49	PK	33.8	-24.7	0	35.59	-	-	74	-38.41	0-360	150	H
4	* 7.443	22.6	PK	35.9	-21	0	37.5	-	-	74	-36.5	0-360	250	H
5	9.917	19.58	PK	37.1	-18	0	38.68	-	-	74	-35.32	0-360	150	H
2	* 4.959	26.25	PK	33.8	-24.7	0	35.35	-	-	74	-38.65	0-360	250	V
3	* 7.441	22.72	PK	35.9	-21	0	37.62	-	-	74	-36.38	0-360	150	V
6	9.919	19.65	PK	37.1	-18	0	38.75	-	-	74	-35.25	0-360	250	V

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

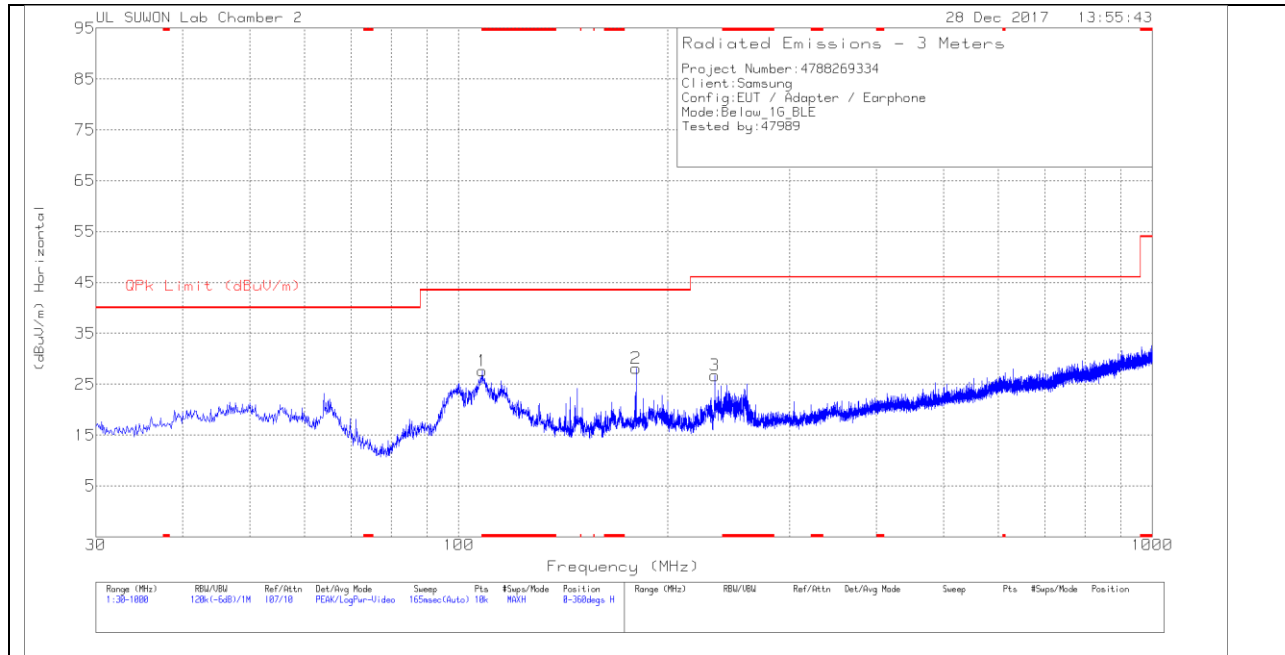
PK – Peak detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

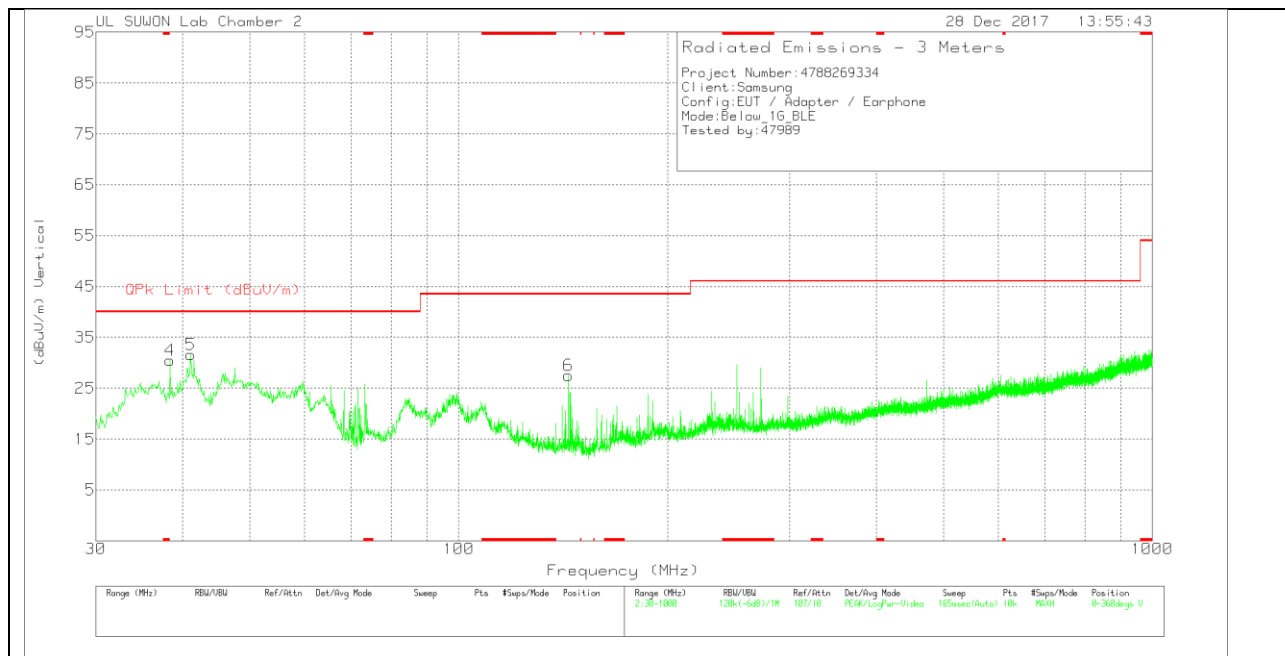
10.3. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)

HORIZONTAL PLOT



VERTICAL PLOT



BELOW 1 GHz TABLE

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163-749	30-1000MHz[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 108.279	41.48	Pk	17.2	-31	27.68	43.52	-15.84	0-360	300	H
2	180.156	43.32	Pk	15.4	-30.6	28.12	43.52	-15.4	0-360	400	H
3	233.991	39.3	Pk	17.7	-30.3	26.7	46.02	-19.32	0-360	100	H
4	38.342	43.68	Pk	18.4	-31.6	30.48	40	-9.52	0-360	100	V
5	41.058	43.85	Pk	19.2	-31.5	31.55	40	-8.45	0-360	100	V
6	143.975	44.82	Pk	13.5	-30.8	27.52	43.52	-16	0-360	200	V

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

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.

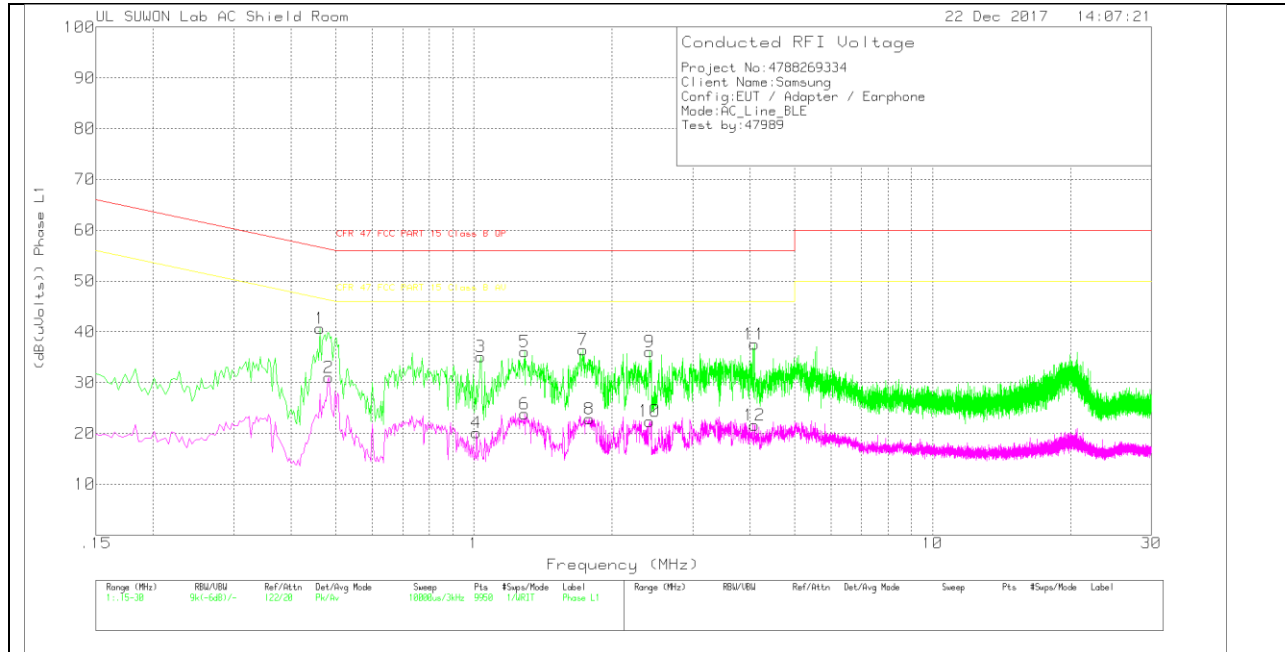
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

WORST EMISSIONS

LINE 1 PLOT



LINE 1 RESULTS

Trace Markers

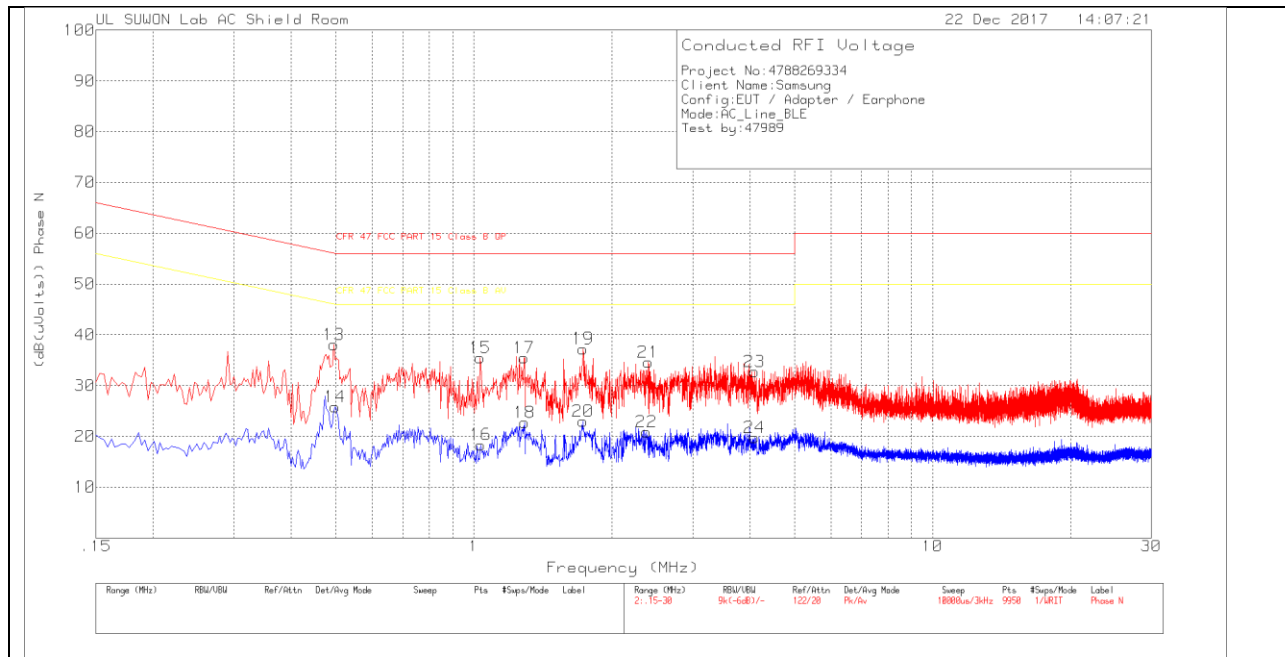
Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_L1_wit h extension	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)
1	.462	30.8	Pk	9.7	.2	40.7	56.66	-15.96	-	-
2	.483	21.09	Av	9.7	.2	30.99	-	-	46.29	-15.3
3	1.035	24.95	Pk	9.8	.3	35.05	56	-20.95	-	-
4	1.014	10.07	Av	9.8	.3	20.17	-	-	46	-25.83
5	1.29	25.84	Pk	9.9	.3	36.04	56	-19.96	-	-
6	1.29	13.67	Av	9.9	.3	23.87	-	-	46	-22.13
7	1.728	26.21	Pk	9.9	.3	36.41	56	-19.59	-	-
8	1.788	12.6	Av	9.9	.3	22.8	-	-	46	-23.2
9	2.415	25.97	Pk	9.8	.3	36.07	56	-19.93	-	-
10	2.415	12.32	Av	9.8	.3	22.42	-	-	46	-23.58
11	4.086	27.53	Pk	9.7	.3	37.53	56	-18.47	-	-
12	4.086	11.67	Av	9.7	.3	21.67	-	-	46	-24.33

Pk - Peak detector

Av - Average detection

LINE 2 PLOT



LINE 2 RESULTS

Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_N_with extension	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	.495	28.1	Pk	9.8	.2	38.1	56.08	-17.98	-	-
14	.498	15.77	Av	9.8	.2	25.77	-	-	46.03	-20.26
15	1.032	25.22	Pk	9.9	.3	35.42	56	-20.58	-	-
16	1.035	8.14	Av	9.9	.3	18.34	-	-	46	-27.66
17	1.287	25.27	Pk	9.9	.3	35.47	56	-20.53	-	-
18	1.29	12.52	Av	9.9	.3	22.72	-	-	46	-23.28
19	1.731	27.06	Pk	9.9	.3	37.26	56	-18.74	-	-
20	1.728	12.76	Av	9.9	.3	22.96	-	-	46	-23.04
21	2.4	24.42	Pk	9.9	.3	34.62	56	-21.38	-	-
22	2.379	10.65	Av	9.9	.3	20.85	-	-	46	-25.15
23	4.086	22.69	Pk	9.8	.3	32.79	56	-23.21	-	-
24	4.086	9.61	Av	9.8	.3	19.71	-	-	46	-26.29

Pk - Peak detector

Av - Average detection