



FCC CFR47 PART 15 SUBPART C

Bluetooth Low Energy

CERTIFICATION TEST REPORT

FOR

Wearable Health recording System

MODEL NUMBER : S-PATCH

FCC ID: A3LSPATCH

REPORT NUMBER: 4789186206-FR1V2

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Prepared for
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ACCREDITED

Testing Laboratory

TL-637

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	02/06/20	Initial issue	Hoonpyo Lee
V2	02/19/20	Updated to address for TCB's questions	Hoonpyo Lee

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SamSung Electronics
EUT DESCRIPTION: Wearable Health recording System
MODEL NUMBER: S-PATCH
SERIAL NUMBER: proto type(RADIATED);
proto type (CONDUCTED)
DATE TESTED: OCT 31, 2019 - NOV 08, 2019

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:



Changyoung Choi
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:



Hoonpyo 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 15.247 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
<input checked="" type="checkbox"/>	Chamber 2
<input type="checkbox"/>	Chamber 3

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

4.4. DECISION RULE

Decision rule for statement(s) of conformity is based on Procedure 1, Clause 4.4.2 in IEC Guide 115:2007.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is Wearable Health recording System.
This test report addresses the DTS (BLE) operational mode.

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	1Mbps	Peak	-0.74	0.84
		Average	-1.06	0.78

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an internal antenna, with a maximum gain of 3.4 dBi.

5.4. WORST-CASE CONFIGURATION AND MODE

Radiated emission below 1GHz was 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
Cradle	SAMSUNG	None	None	None
Data Cable	N/A	N/A	N/A	N/A
Notebook	N/A	N/A	N/A	N/A

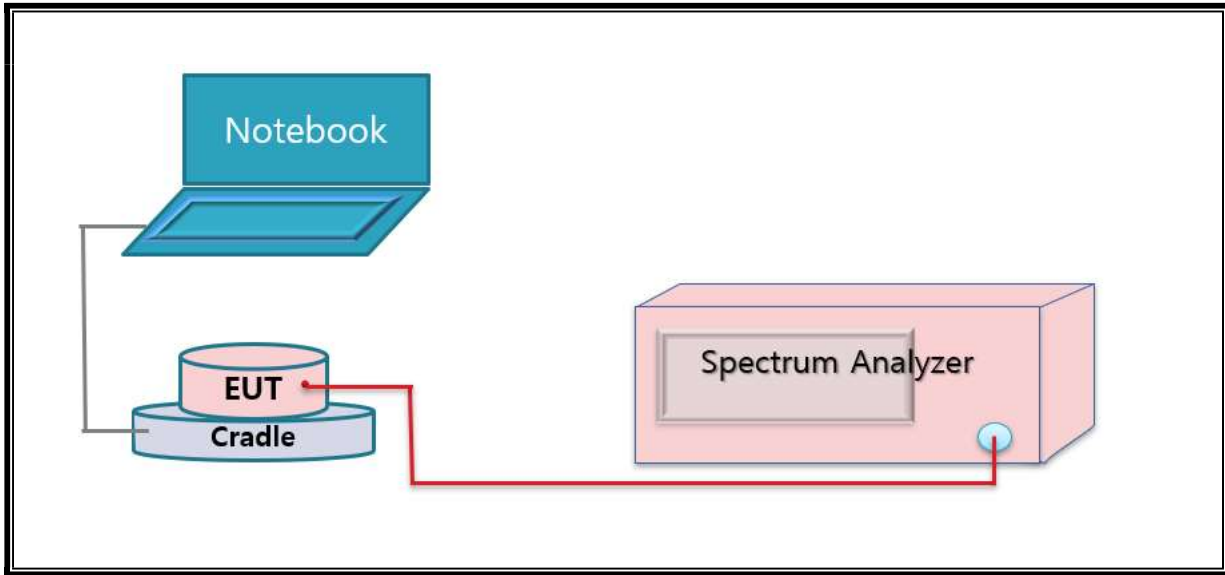
I/O CABLE

Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Data/Power	1	Micro USB Type	Shielded	1.0m	N/A

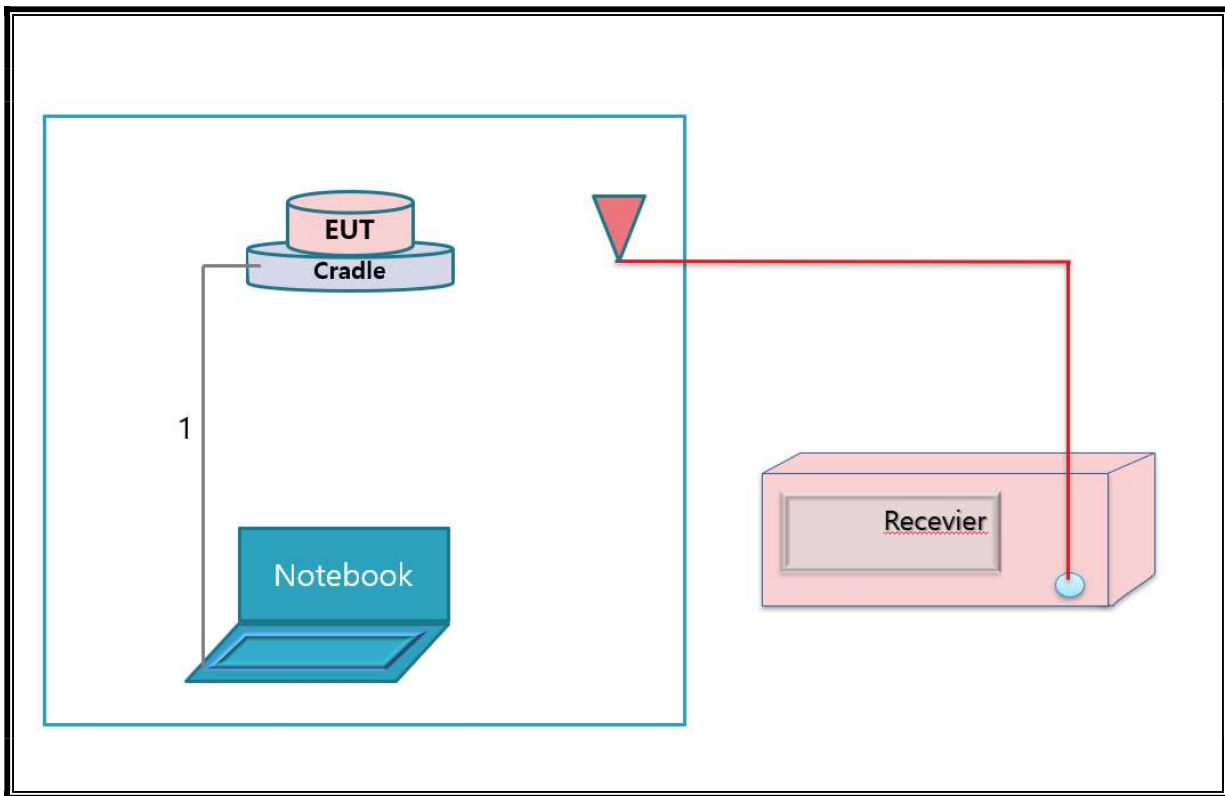
TEST SETUP

The EUT is a unit with cradle during the tests.
 The EUT was tested in forced transmit mode by software.

SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



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	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-04-20
Antenna, Horn, 18 GHz	ETS	3115	00167211	08-04-20
Antenna, Horn, 18 GHz	ETS	3115	00161451	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168724	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168717	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00205959	08-04-20
Antenna, Horn, 40 GHz	ETS	3116C	00166155	08-14-20
Antenna, Horn, 40 GHz	ETS	3116C	00168645	12-04-19
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	08-08-20
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-05-20
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-05-20
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-05-20
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-05-20
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-06-20
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	08-06-20
Signal Analyzer, 40 GHz	R&S	FSV40	101237	08-05-20
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-09-20
Attenuator	PASTERNAK	PE7087-10	A001	08-08-20
Attenuator	PASTERNAK	PE7087-10	A008	08-08-20
Attenuator	PASTERNAK	PE7087-10	2	08-08-20
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-06-20
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-06-20
EMI Test Receive, 44 GHz	R&S	ESW44	101590	08-05-20
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-05-20
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-05-20
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-06-20
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	020	08-06-20
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-06-20
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-05-20
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	08-06-20
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	08-06-20
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	08-05-20
High Pass Filter 6GHz	Micro-Tronics	HPS17542	021	08-06-20
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	09-30-20
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	

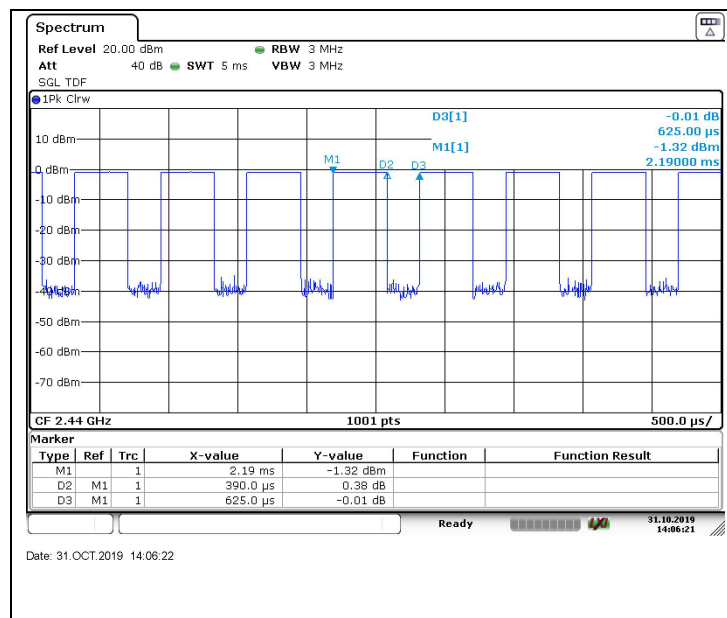
7. REFERENCE MEASUREMENT RESULTS

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	0.390	0.625	0.624	62.4%	2.05	2.564



7.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

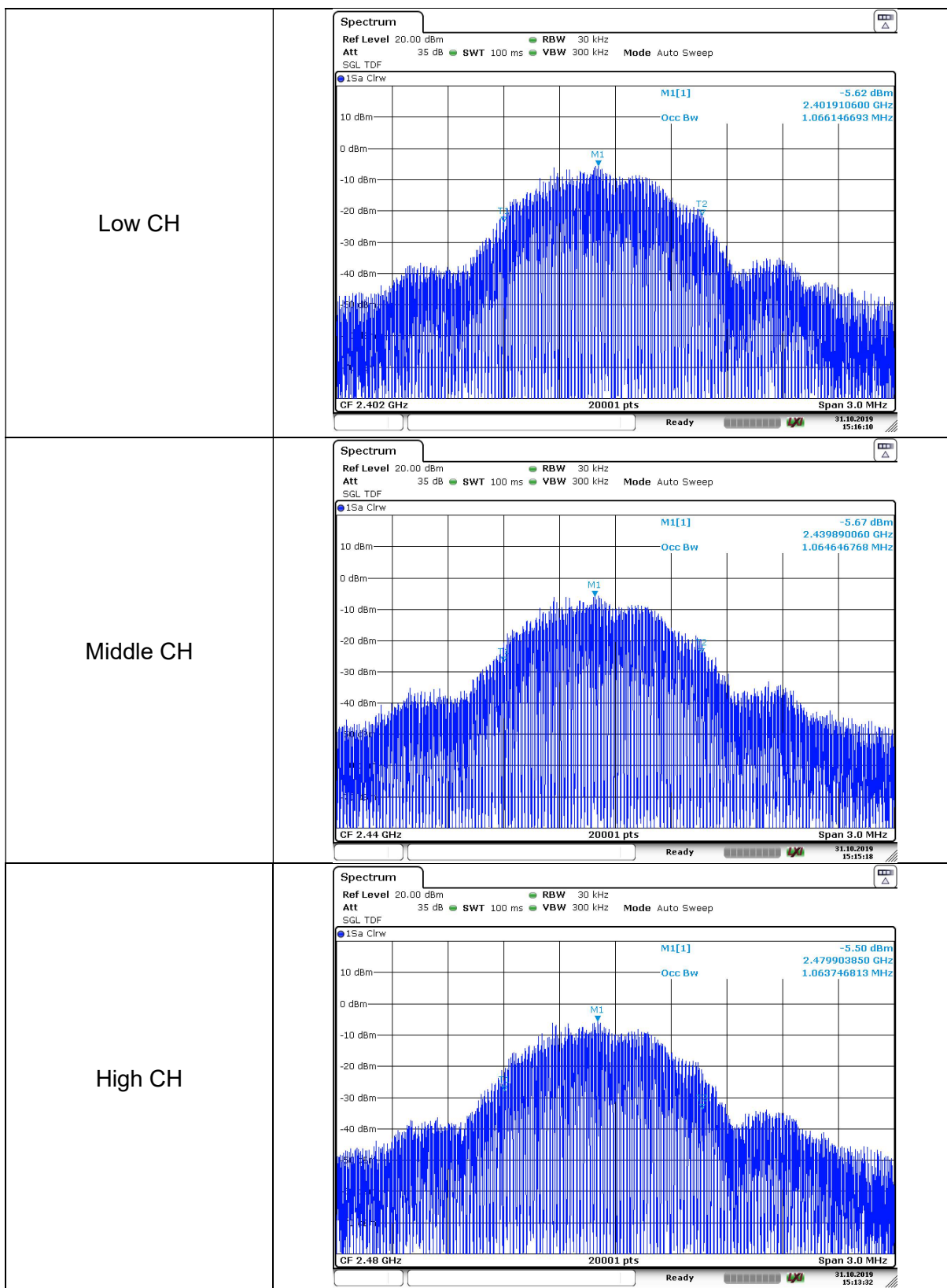
TEST PROCEDURE

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	1.066
Mid	2440	1.065
High	2480	1.064
Worst		1.066

99% BANDWIDTH PLOTS



8. MEASUREMENT METHODS

6 dB BW : KDB 558074 D01 v05r02, Section 8.2.

OUTPUT POWER : KDB 558074 D01 v05r02, Section 8.3.1.1

POWER SPECTRAL DENSITY : KDB 558074 D01 v05r02, Section 8.4.

Out-of-band Emissions (Conducted) : KDB 558074 D01 v05r02, Section 8.5.

Out-of-band Emissions in Non-restricted Bands: KDB 558074 D01 v05r02, Section 8.5.

Out-of-band Emissions in Restricted Bands : KDB 558074 D01 v05r02, Section 8.6.

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

9. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
15.247 (a)(2)	Occupied Band width (6dB)	>500KHz	Conducted	Pass
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-20dBc		Pass
15.247 (b)(3)	TX conducted output power	<30dBm		Pass
15.247 (e)	PSD	<8dBm		Pass
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line conducted	N/A note1
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m(Av)	Radiated	Pass

Note1 : This EUT is only supplied power by coin battery(DC 3V).

10. ANTENNA PORT TEST RESULTS

10.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2) / IC RSS-247 §5.2 (a)

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

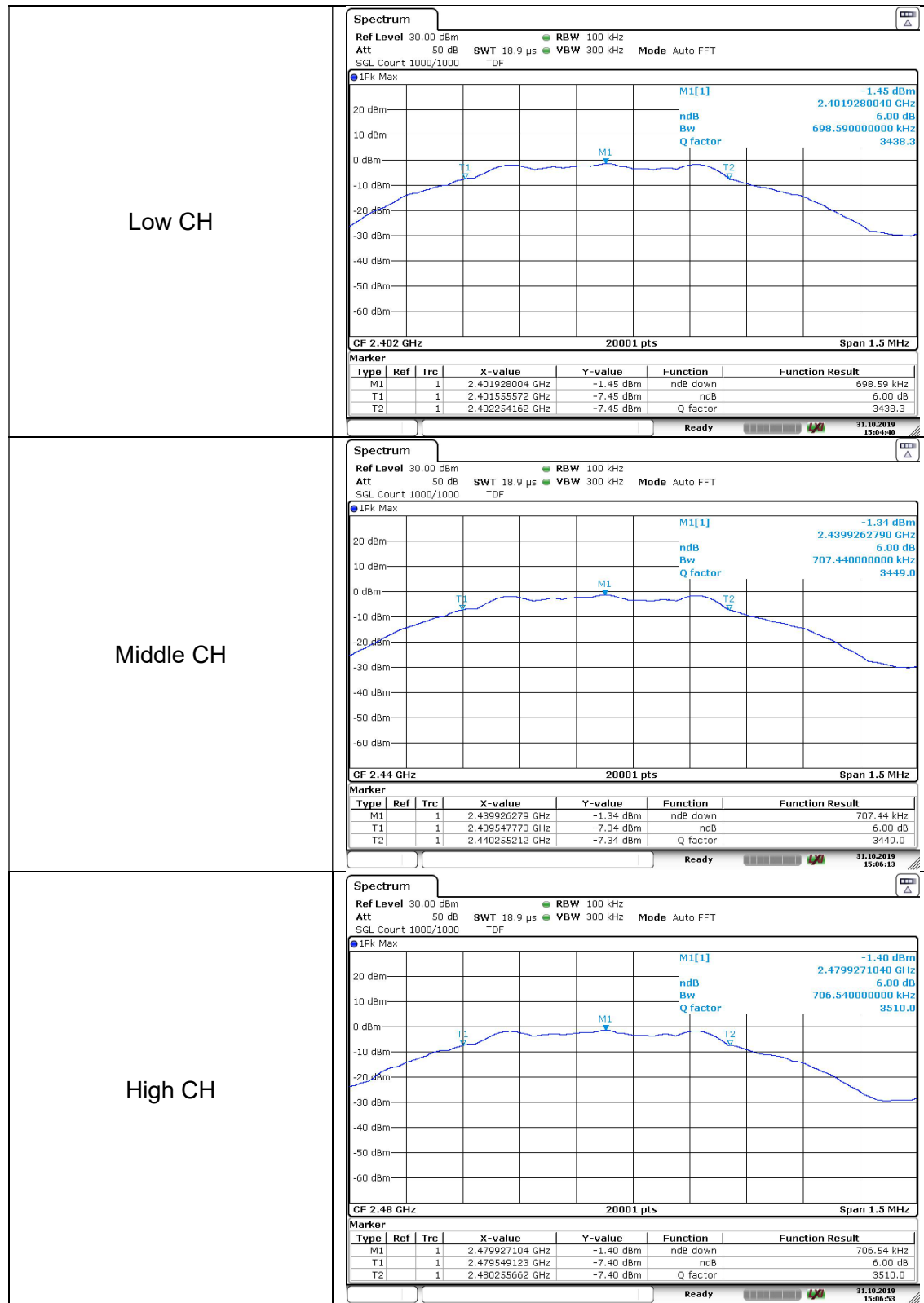
TEST PROCEDURE

Reference to section 11.8 in ANSI C63.10(2013): The transmitter output is connected to a spectrum analyzer with the RBW set to 100kHz, the VBW $\geq 3 \times$ RBW, peak detector and max hold.

RESULTS

Channel	Frequency [MHz]	6 dB Bandwidth [kHz]	Minimum Limit [kHz]
Low	2402	698.59	500.0
Mid	2440	707.44	500.0
High	2480	706.54	500.0
Worst		698.59	500.0

6 dB BANDWIDTH PLOTS



10.2. OUTPUT POWER

LIMITS

FCC §15.247 (b) / IC RSS-247 §5.4 (d)

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

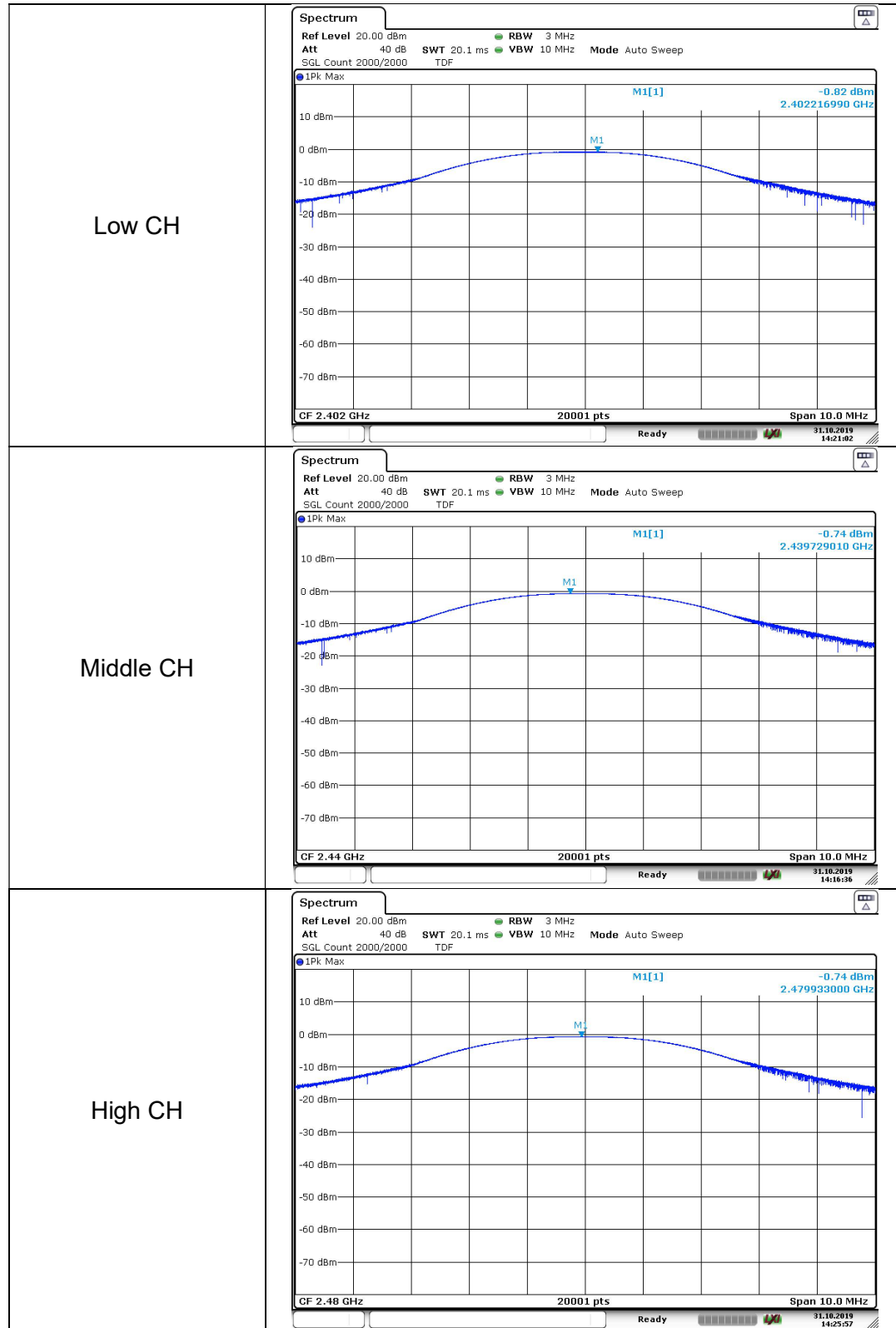
TEST PROCEDURE

Peak power is measured using ANSI C63.10(2013) under section 11.9.1.1 utilizing spectrum analyzer.

RESULTS

Channel	Frequency [MHz]	Peak Power Reading [dBm]	Limit [dBm]	Margin [dB]
Low	2402	-0.82	30.00	-30.82
Mid	2440	-0.74	30.00	-30.74
High	2480	-0.74	30.00	-30.74
Worst		-0.74	30.00	-30.74

OUTPUT POWER PLOTS



10.3. 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. The duty factor already has been added.

- 1Mbps

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	-1.13	0.77
Middle	2440	-1.06	0.78
High	2480	-1.06	0.78

10.4. PSD

LIMITS

FCC §15.247 / IC 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

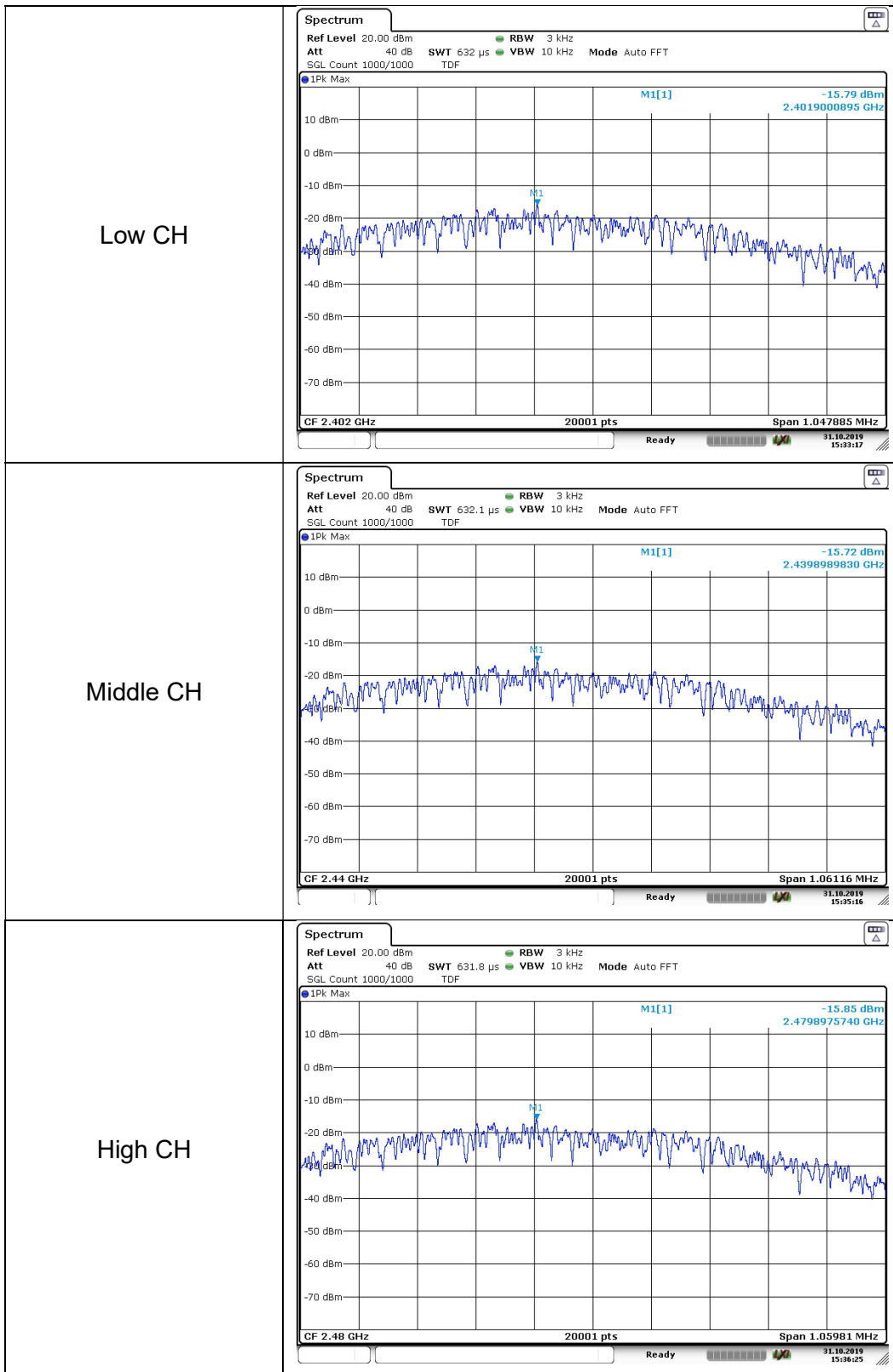
Power Spectral Density was performed utilizing the ANSI C63.10 section 11.10.2 (Method PKPSD).

RESULTS

- 1Mbps

Channel	Frequency [MHz]	PSD [dBm/3kHz]	Limit [dBm/3kHz]	Margin [dB]
Low	2402	-15.79	8.00	-23.79
Mid	2440	-15.72	8.00	-23.72
High	2480	-15.85	8.00	-23.85

POWER SPECTRAL DENSITY PLOTS



10.5. OUT-OF-BAND EMISSIONS

LIMITS

FCC §15.247 (d) / IC RSS-247 §5.5

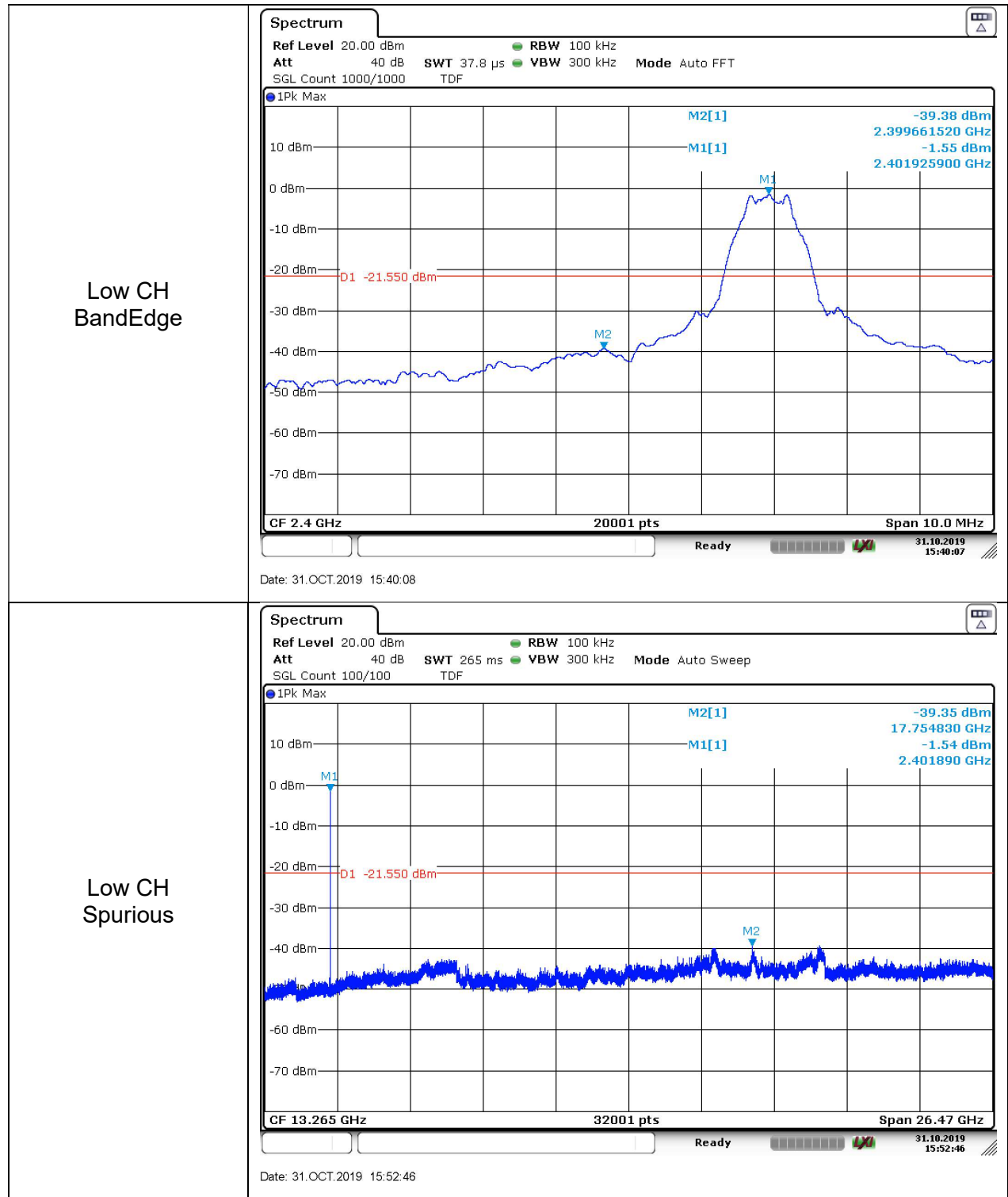
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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

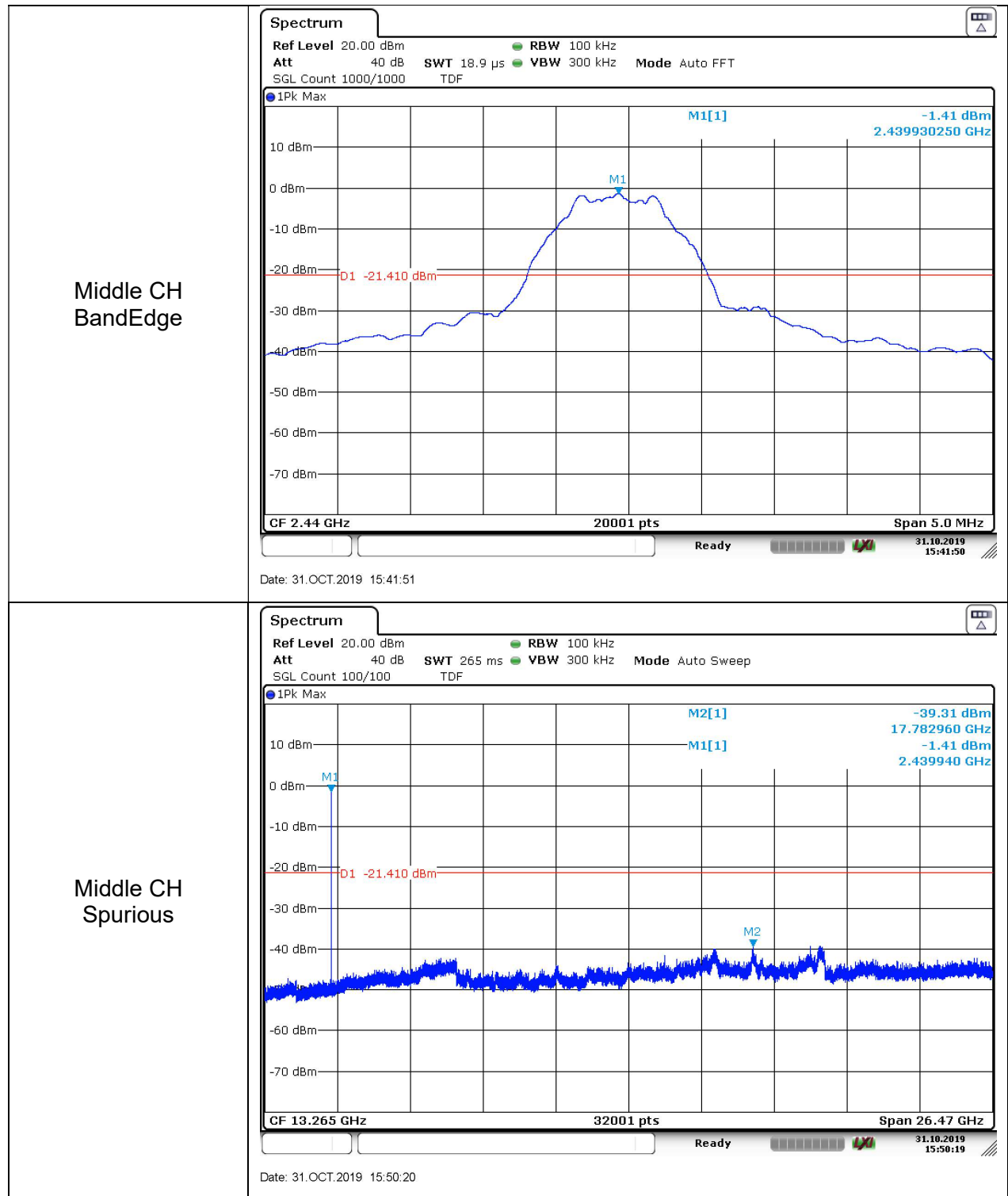
The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

RESULTS

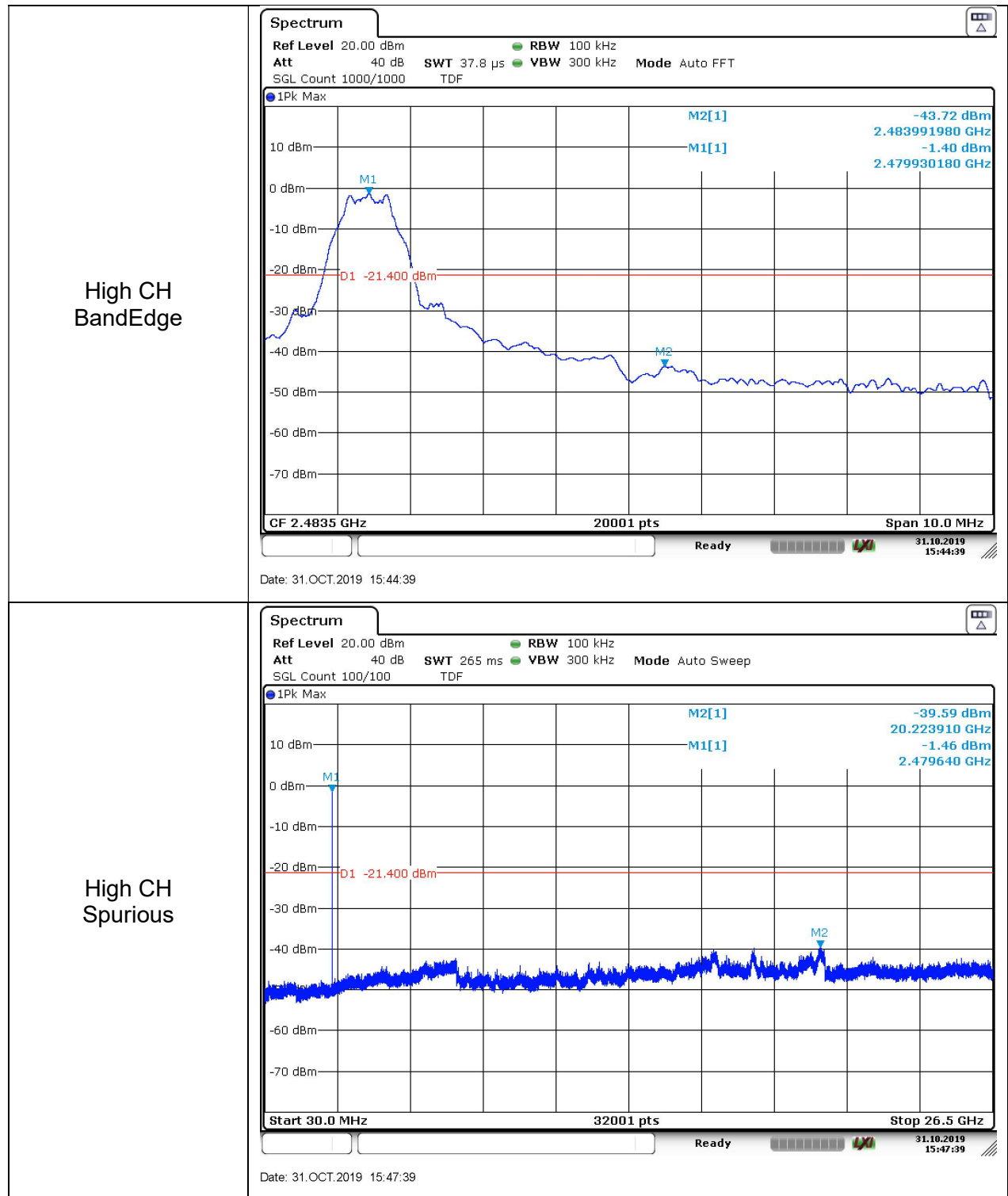
BANDEDGE & SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



11. RADIATED TEST RESULTS

11.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209
 IC RSS-GEN Clause 8.9 (Transmitter)
 IC RSS-GEN Clause 7 (Receiver)
 IC RSS-GEN Clause 8.10

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 = $10 \log(1/0.625)=2.06$ dB(Spectrum Analyzer round it up to 2.06 dB).

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.

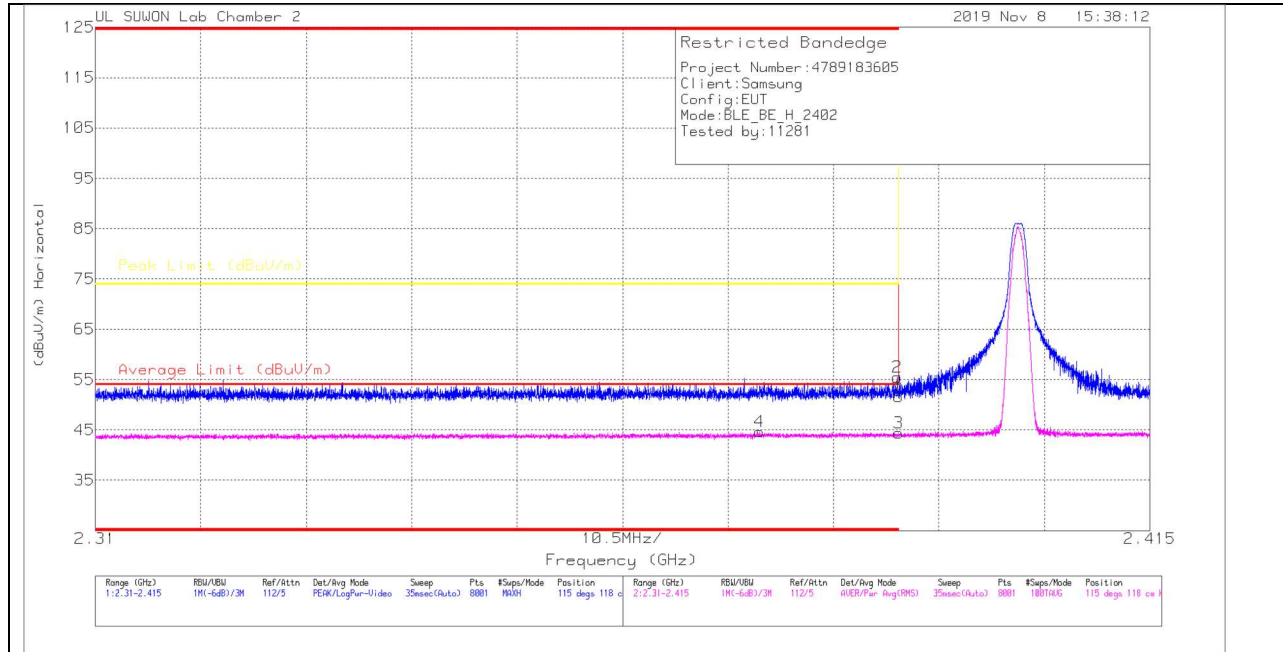
Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open field test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field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

11.2. TRANSMITTER ABOVE 1 GHz

11.2.1. BLE MODE

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

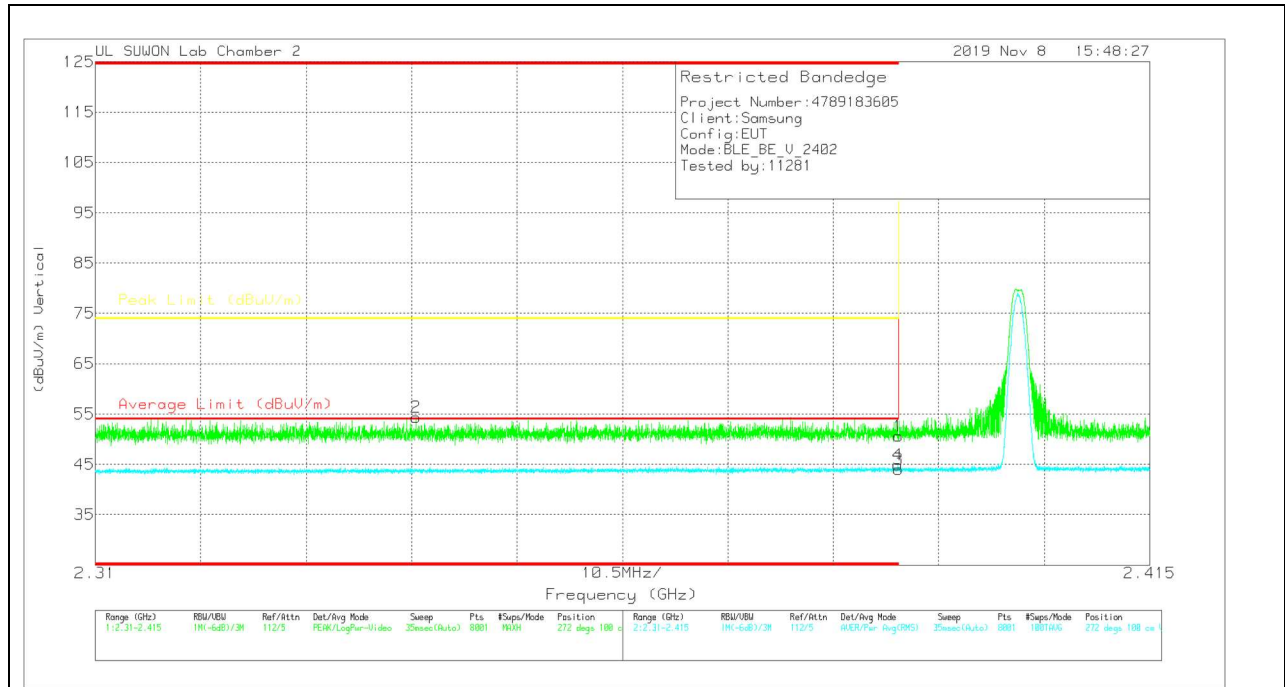
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*2.39	40.65	PK	31.6	-20.6	0	51.65	-	-	74	-22.35	115	118	H
2	*2.38984	44.5	PK	31.6	-20.6	0	55.5	-	-	74	-18.5	115	118	H
3	*2.39	31.35	RMS	31.6	-20.6	2.05	44.4	54	-9.6	-	-	115	118	H
4	*2.37611	31.57	RMS	31.6	-20.6	2.05	44.62	54	-9.38	-	-	115	118	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	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 (Degree)	Height (cm)	Polarity
1	* 2.39	39.61	Pk	31.6	-20.6	0	50.61	-	-	74	-23.39	272	100	V
2	* 2.34193	43.45	Pk	31.5	-20.6	0	54.35	-	-	74	-19.65	272	100	V
3	* 2.39	30.93	RMS	31.6	-20.6	2.05	43.98	54	-10.02	-	-	272	100	V
4	* 2.38994	31.79	RMS	31.6	-20.6	2.05	44.84	54	-9.16	-	-	272	100	V

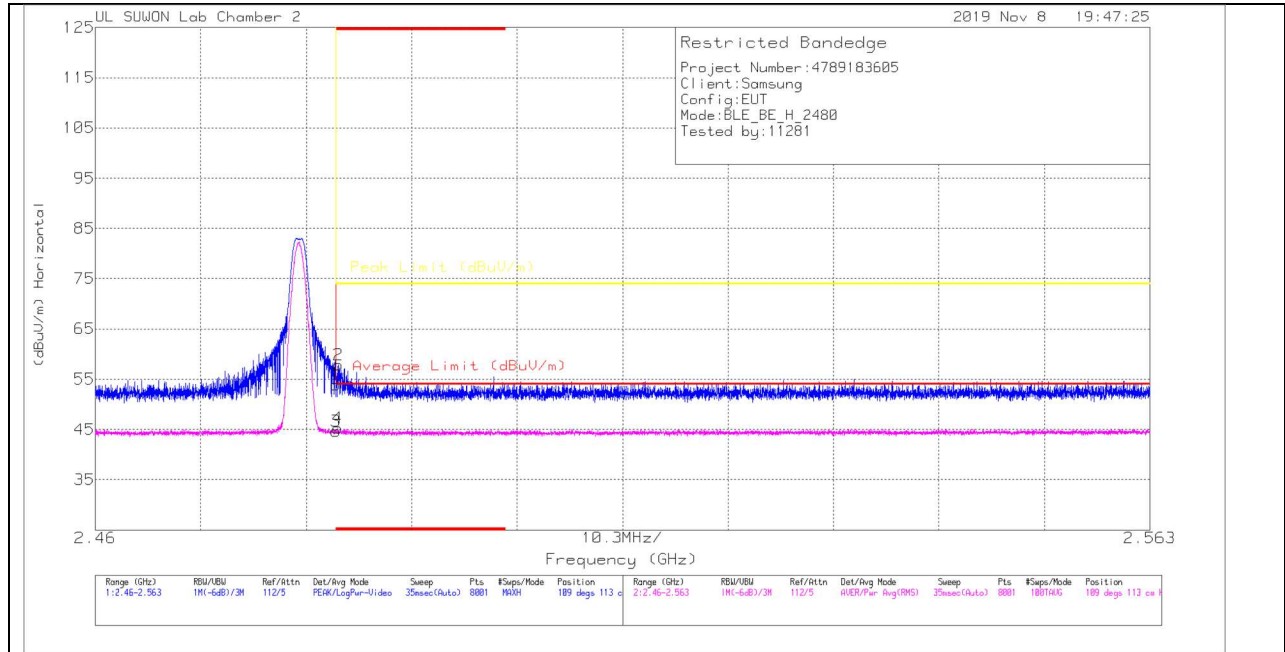
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

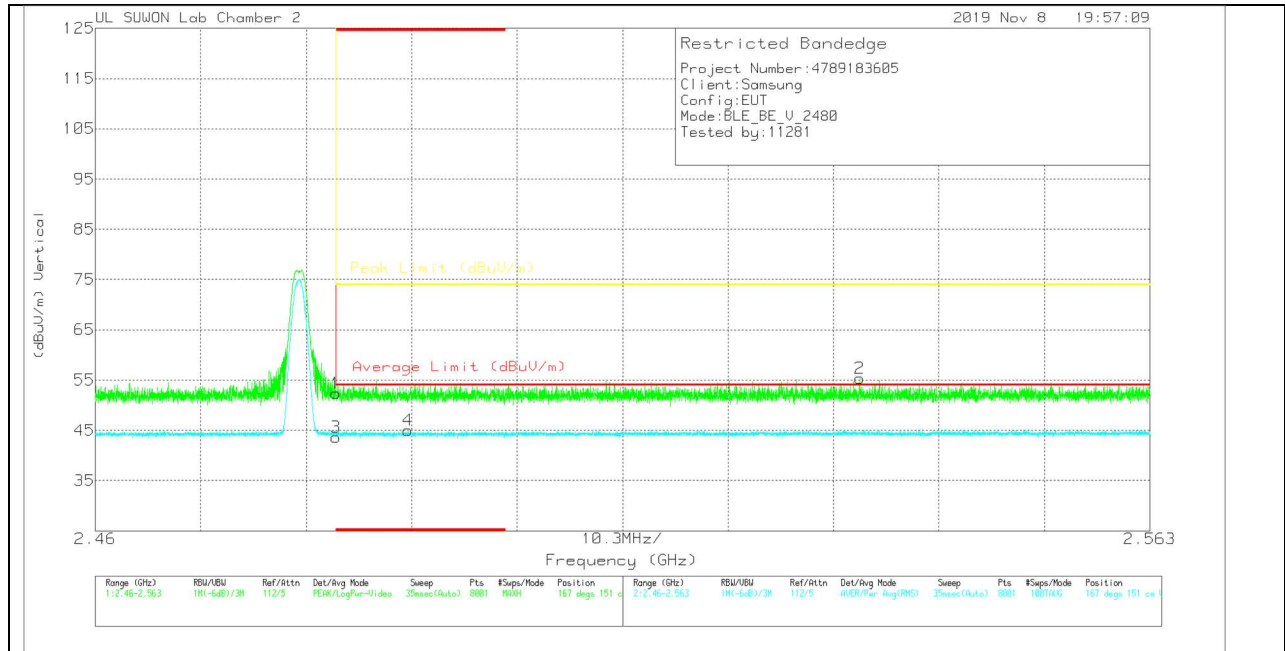
Marker	Frequency (GHz)	Meas Reading (dBuV)	Det	3117_00168724	10dB_ATT(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	42.43	Pk	31.9	-20.4	0	53.93	-	-	74	-20.07	109	113	H
2	* 2.48377	46.34	Pk	31.9	-20.4	0	57.84	-	-	74	-16.16	109	113	H
3	* 2.48351	31.12	RMS	31.9	-20.4	2.05	44.67	54	-9.33	-	-	109	113	H
4	* 2.4837	31.67	RMS	31.9	-20.4	2.05	45.22	54	-8.78	-	-	109	113	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	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	40.88	Pk	31.9	-20.4	0	52.38	-	-	74	-21.62	167	151	V
2	2.53464	43.71	Pk	32	-20.4	0	55.31	-	-	74	-18.69	167	151	V
3	* 2.48351	30.06	RMS	31.9	-20.4	2.05	43.61	54	-10.39	-	-	167	151	V
4	* 2.49054	31.6	RMS	31.9	-20.5	2.05	45.05	54	-8.95	-	-	167	151	V

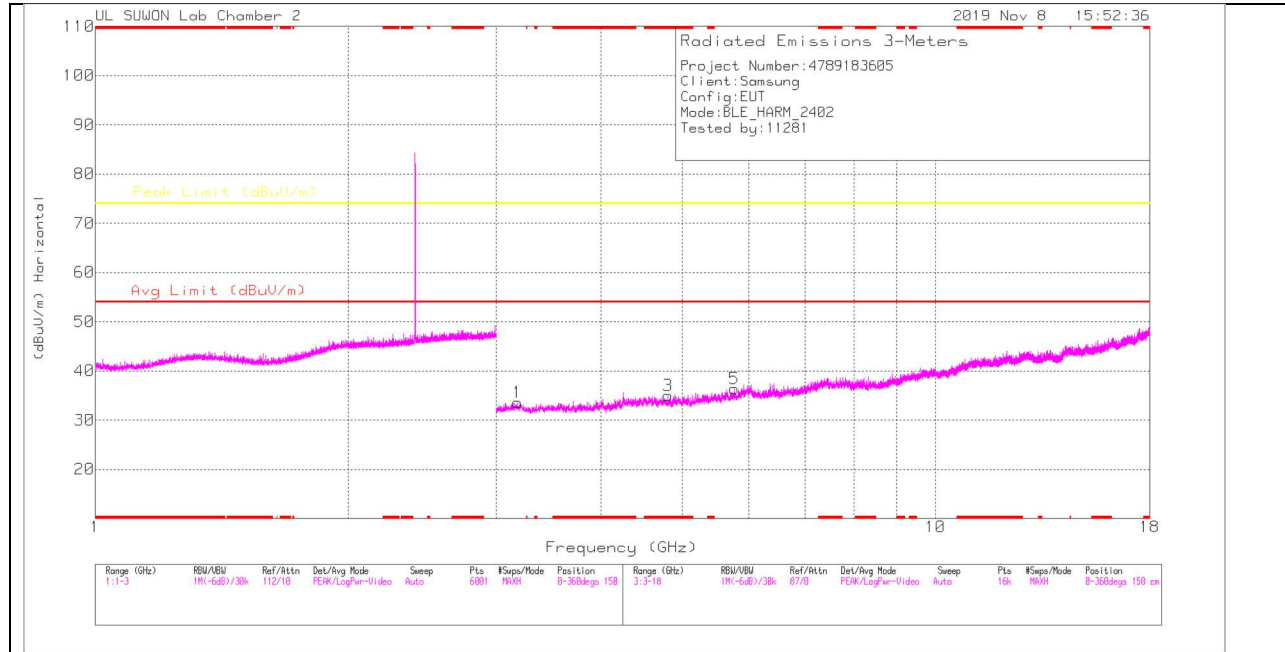
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

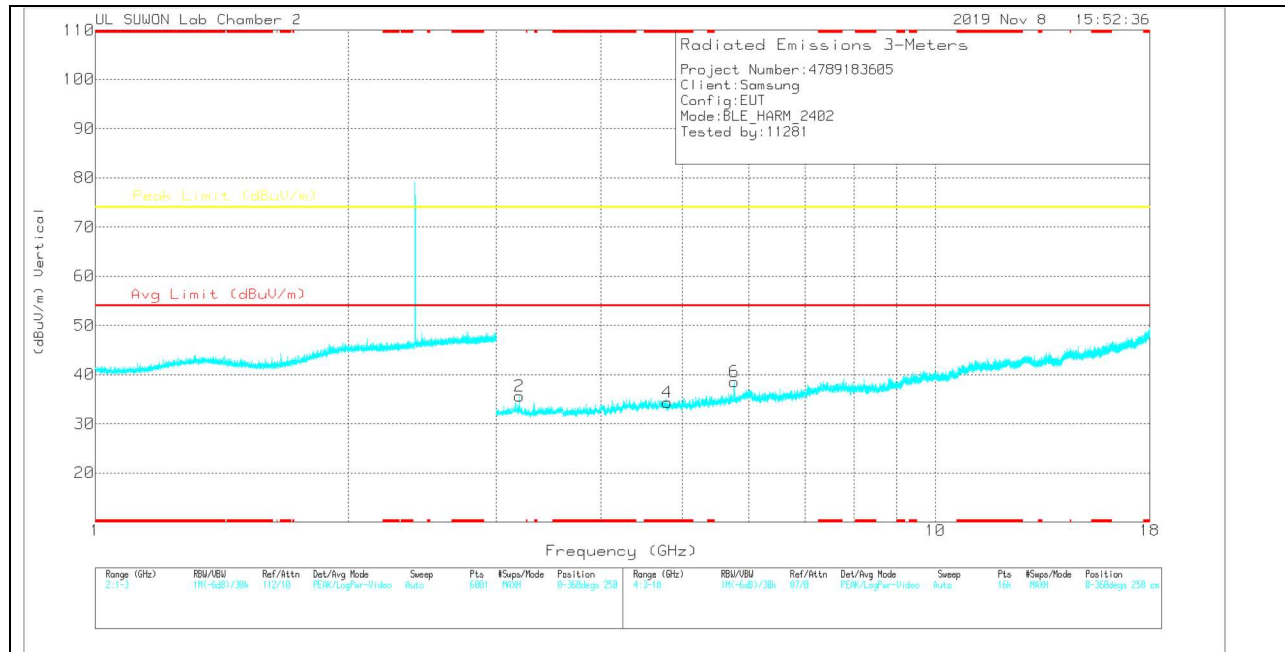
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



Note: Emission Limit 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	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	3.1828	28.94	PK	32.9	-28.3	0	33.54	-	-	74	-40.46	0-360	150	H
3	* 4.80457	28.92	PK	34	-27.9	0	35.02	-	-	74	-38.98	0-360	250	H
5	5.75983	28.76	PK	34.7	-27.1	0	36.36	-	-	74	-37.64	0-360	150	H
2	3.19874	30.89	PK	32.9	-28.2	0	35.59	-	-	74	-38.41	0-360	250	V
4	* 4.79332	28.16	PK	34	-27.8	0	34.36	-	-	74	-39.64	0-360	250	V
6	5.75983	30.99	PK	34.7	-27.1	0	38.59	-	-	74	-35.41	0-360	250	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK – Peak Detector

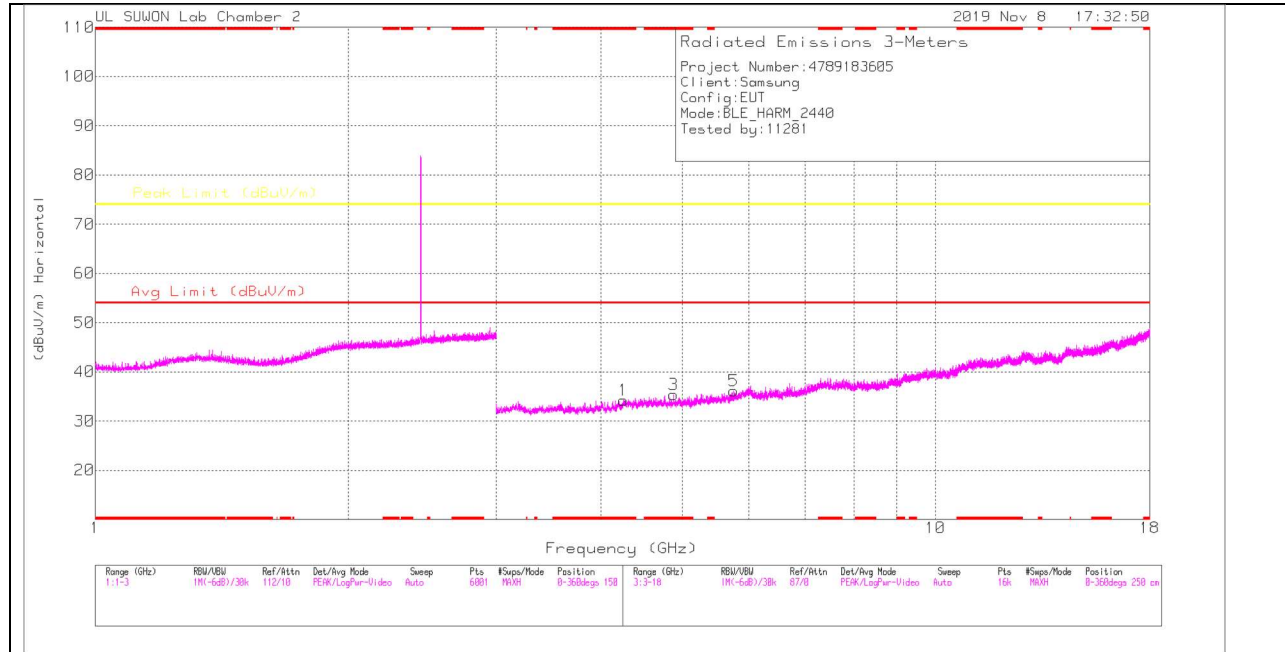
Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	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
3.1872	36.98	PK2	32.9	-28.3	0	41.58	-	-	74	-32.42	267	102	H
3.18802	39.64	PK2	32.9	-28.3	0	44.24	-	-	74	-29.76	264	130	V
* 4.80377	36.29	PK2	34	-28	0	42.29	-	-	74	-31.71	360	100	H
* 4.80459	37.07	PK2	34	-27.9	0	43.17	-	-	74	-30.83	360	100	V
5.75975	36.77	PK2	34.7	-27.1	0	44.37	-	-	74	-29.63	260	100	H
5.75935	37.68	PK2	34.7	-27.1	0	45.28	-	-	74	-28.72	305	102	V

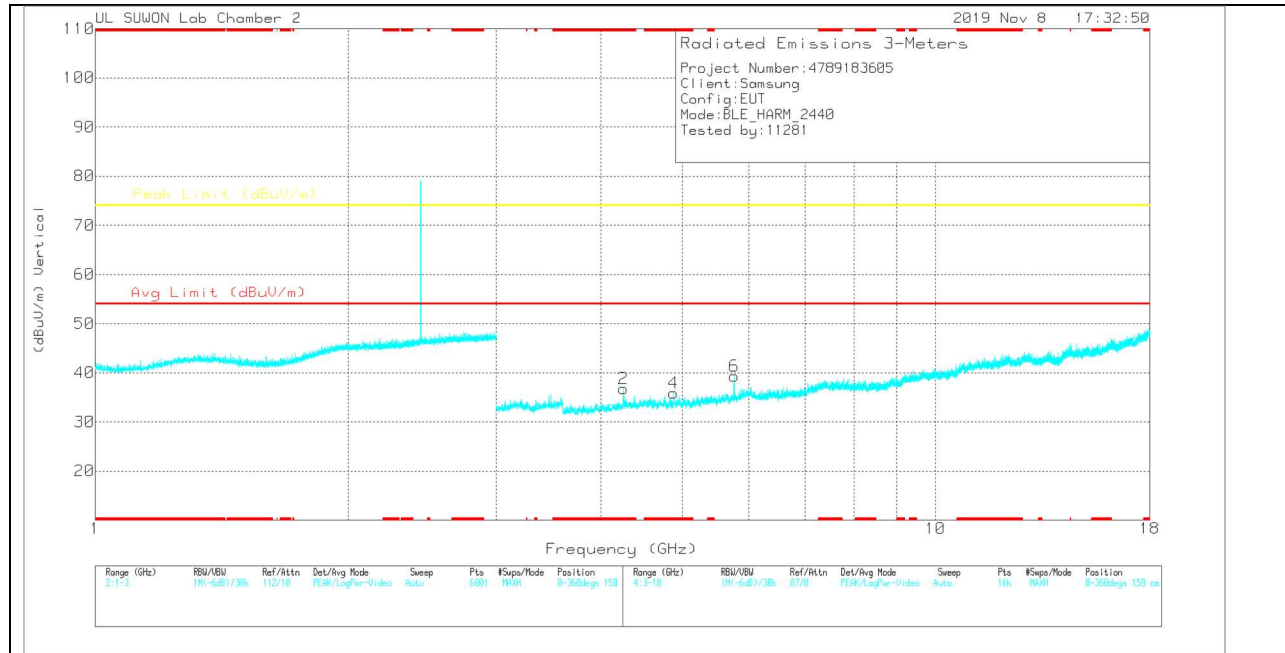
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak

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

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	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	* 4.25617	28.04	PK	33.5	-27.3	0	34.24	-	-	74	-39.76	0-360	150	H
3	* 4.87863	29.21	PK	34	-27.8	0	35.41	-	-	74	-38.59	0-360	250	H
5	5.75795	28.4	PK	34.7	-27	0	36.1	-	-	74	-37.9	0-360	150	H
2	* 4.2543	30.61	PK	33.5	-27.3	0	36.81	-	-	74	-37.19	0-360	250	V
4	* 4.87957	29.71	PK	34	-27.8	0	35.91	-	-	74	-38.09	0-360	150	V
6	5.75983	31.7	PK	34.7	-27.1	0	39.3	-	-	74	-34.7	0-360	250	V

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

PK – Peak Detector

Radiated Emissions

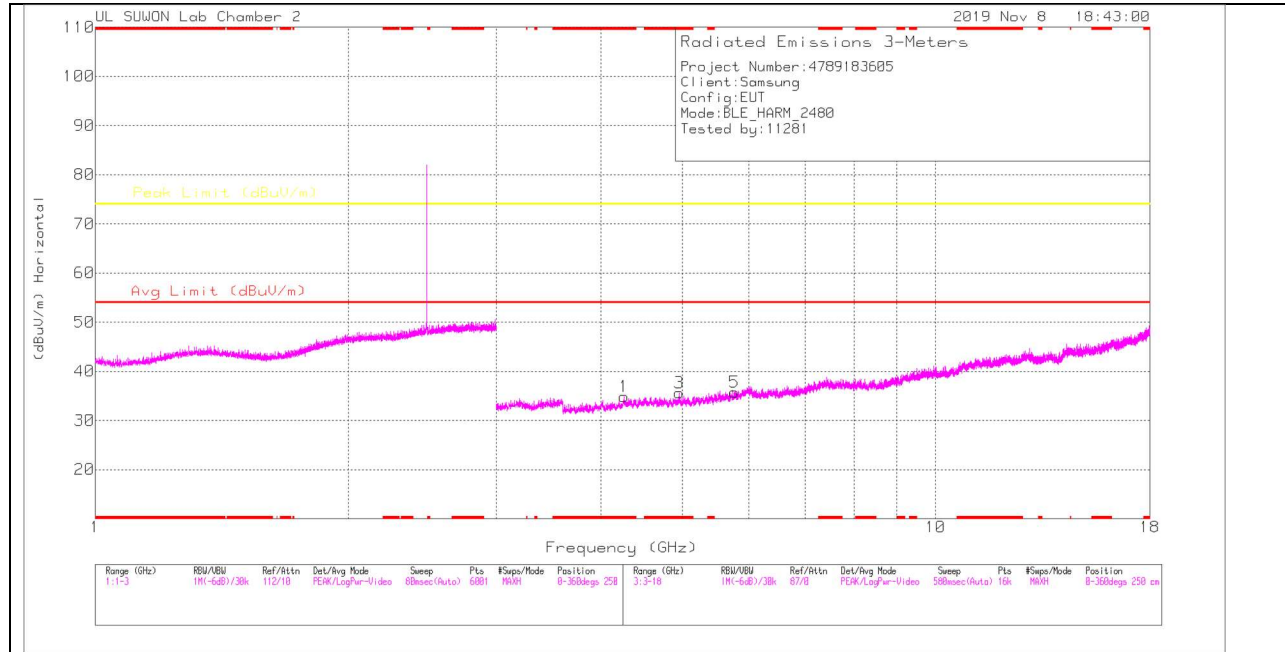
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.25895	40.19	PK2	33.5	-27.3	0	46.39	-	-	74	-27.61	197	274	H
* 4.25459	38.81	PK2	33.5	-27.3	0	45.01	-	-	74	-28.99	280	146	V
* 4.88007	37.74	PK2	34	-27.8	0	43.94	-	-	74	-30.06	285	160	H
* 4.88015	39.01	PK2	34	-27.8	0	45.21	-	-	74	-28.79	215	400	V
5.76025	37.26	PK2	34.7	-27.1	0	44.86	-	-	74	-29.14	136	297	H
5.76023	36.57	PK2	34.7	-27.1	0	44.17	-	-	74	-29.83	81	365	V

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

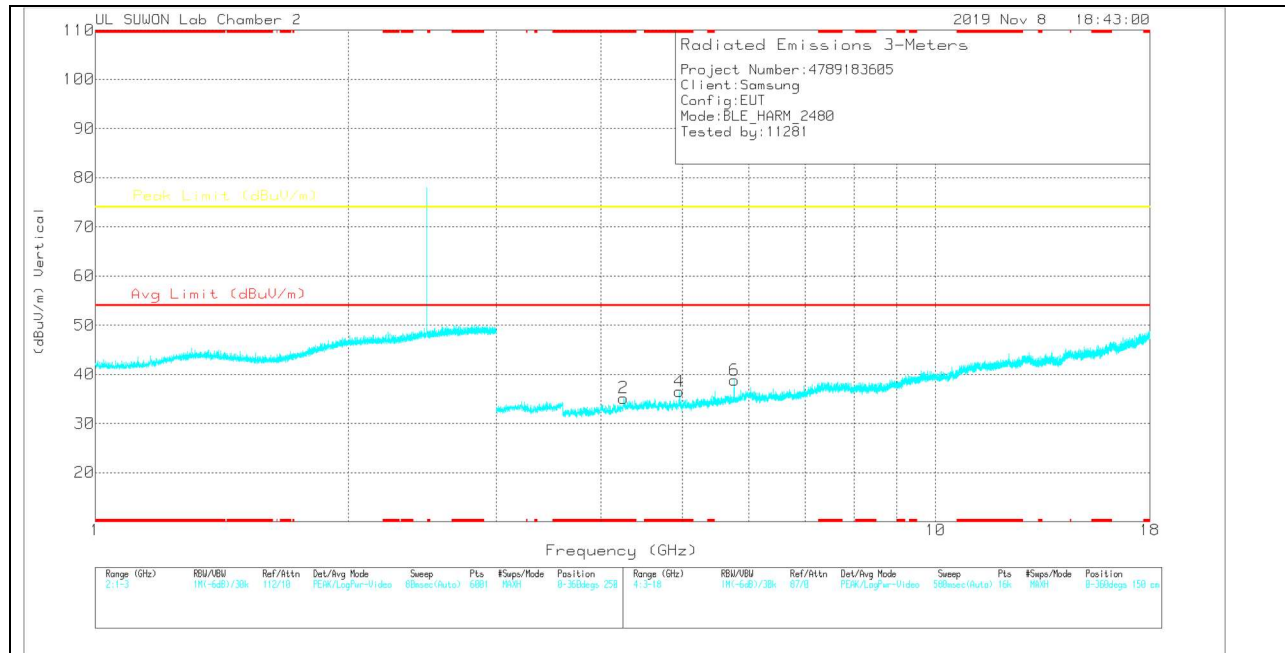
PK2 - KDB558074 Method: Maximum Peak

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

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	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	* 4.26086	28.52	PK	33.5	-27.2	0	34.82	-	-	74	-39.18	0-360	150	H
3	* 4.95925	28.54	PK	34.1	-27	0	35.64	-	-	74	-38.36	0-360	150	H
5	5.75983	28.17	PK	34.7	-27.1	0	35.77	-	-	74	-38.23	0-360	250	H
2	* 4.25055	29.07	PK	33.5	-27.4	0	35.17	-	-	74	-38.83	0-360	250	V
4	* 4.95925	29.35	PK	34.1	-27	0	36.45	-	-	74	-37.55	0-360	250	V
6	5.75983	31.15	PK	34.7	-27.1	0	38.75	-	-	74	-35.25	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	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
* 4.26183	39.69	PK2	33.5	-27.2	0	45.99	-	-	74	-28.01	183	261	H
* 4.25398	39.87	PK2	33.5	-27.3	0	46.07	-	-	74	-27.93	257	163	V
* 4.95927	37.52	PK2	34.1	-27	0	44.62	-	-	74	-29.38	281	394	H
* 4.96037	37.75	PK2	34.1	-27	0	44.85	-	-	74	-29.15	211	386	V
5.7595	36.22	PK2	34.7	-27.1	0	43.82	-	-	74	-30.18	159	324	H
5.75962	35.88	PK2	34.7	-27.1	0	43.48	-	-	74	-30.52	286	107	V

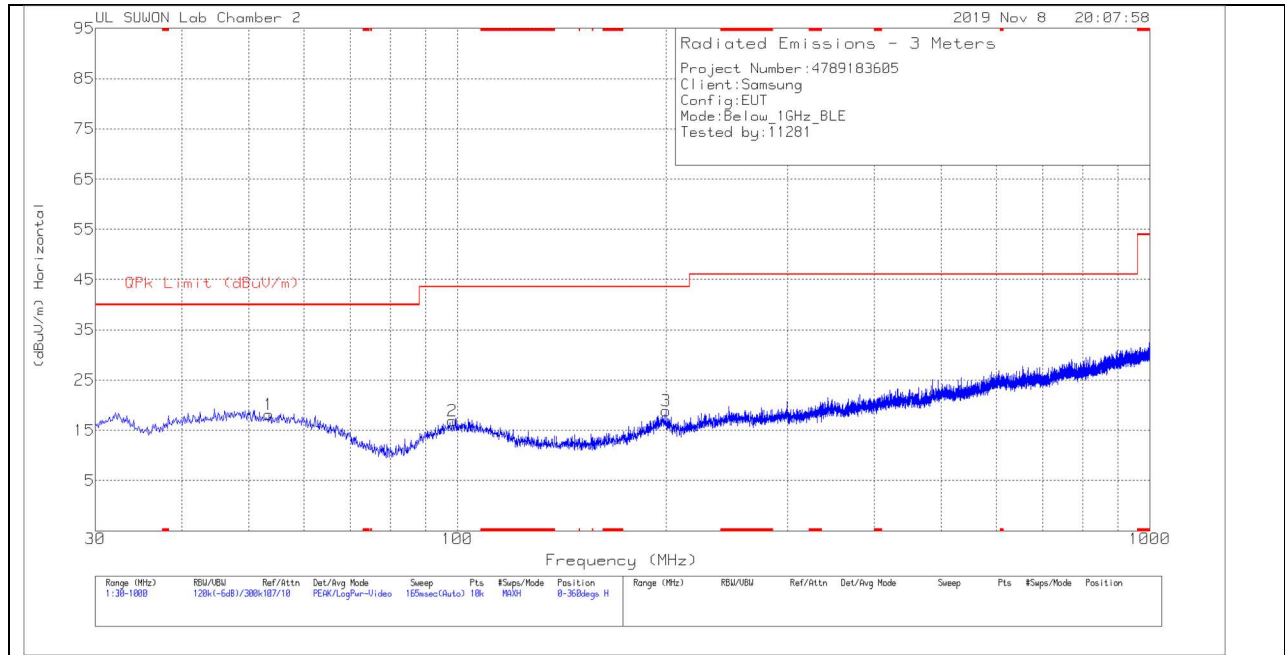
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak

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

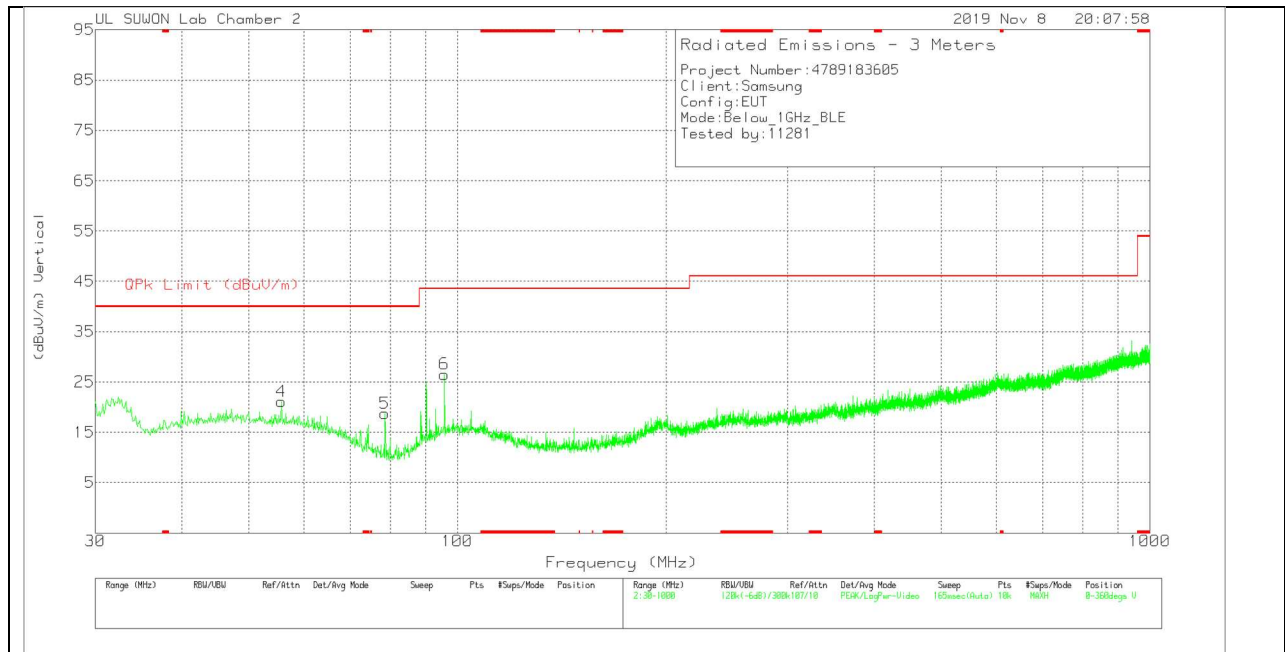
11.3. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz

HORIZONTAL PLOT



VERTICAL PLOT



BELOW 1 GHz TABLE

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	53.377	30.41	Pk	19.5	-31.8	18.11	40	-21.89	0-360	100	H
2	98.385	30.54	Pk	17.6	-31.3	16.84	43.52	-26.68	0-360	100	H
3	200.138	31.69	Pk	18	-30.8	18.89	43.52	-24.63	0-360	200	H
4	55.705	33.66	Pk	19.2	-31.7	21.16	40	-18.84	0-360	100	V
5	78.597	37.62	Pk	12.6	-31.5	18.72	40	-21.28	0-360	100	V
6	95.766	40.65	Pk	17.3	-31.4	26.55	43.52	-16.97	0-360	200	V

Pk - Peak detector

12. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)
IC RSS-GEN Clause 8.8

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 (Not applicable)

This EUT is only supplied power by coin battery(DC 3V).