



FCC CFR47 PART 15 SUBPART C

Bluetooth Low Energy

CERTIFICATION TEST REPORT

FOR

Bluetooth/BLE Earset

MODEL NUMBER : SM-R140

FCC ID: A3LSMR140L

REPORT NUMBER: 4788060293-E3V2

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Prepared for
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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	07/28/17	Initial issue	Junwhan Lee
V2	08/08/17	Removed ISED information	Junwhan Lee

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: Bluetooth/BLE Earset
MODEL NUMBER: SM-R140
SERIAL NUMBER: R3AJ7002T6J, R3AJ7002T9D (RADIATED);
R3AJ7002TAF (CONDUCTED)
DATE TESTED: JUL 10, 2017 - JUL 19, 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:

Tested By:



SungGil Park
Suwon Lab Engineer
UL Korea, Ltd.

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	4.14 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 Bluetooth/BLE Earset.
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	BLE	Peak	11.119	12.94
		Average	10.850	12.16

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an internal antenna, with a maximum gain of -4.94 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 Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

NONE

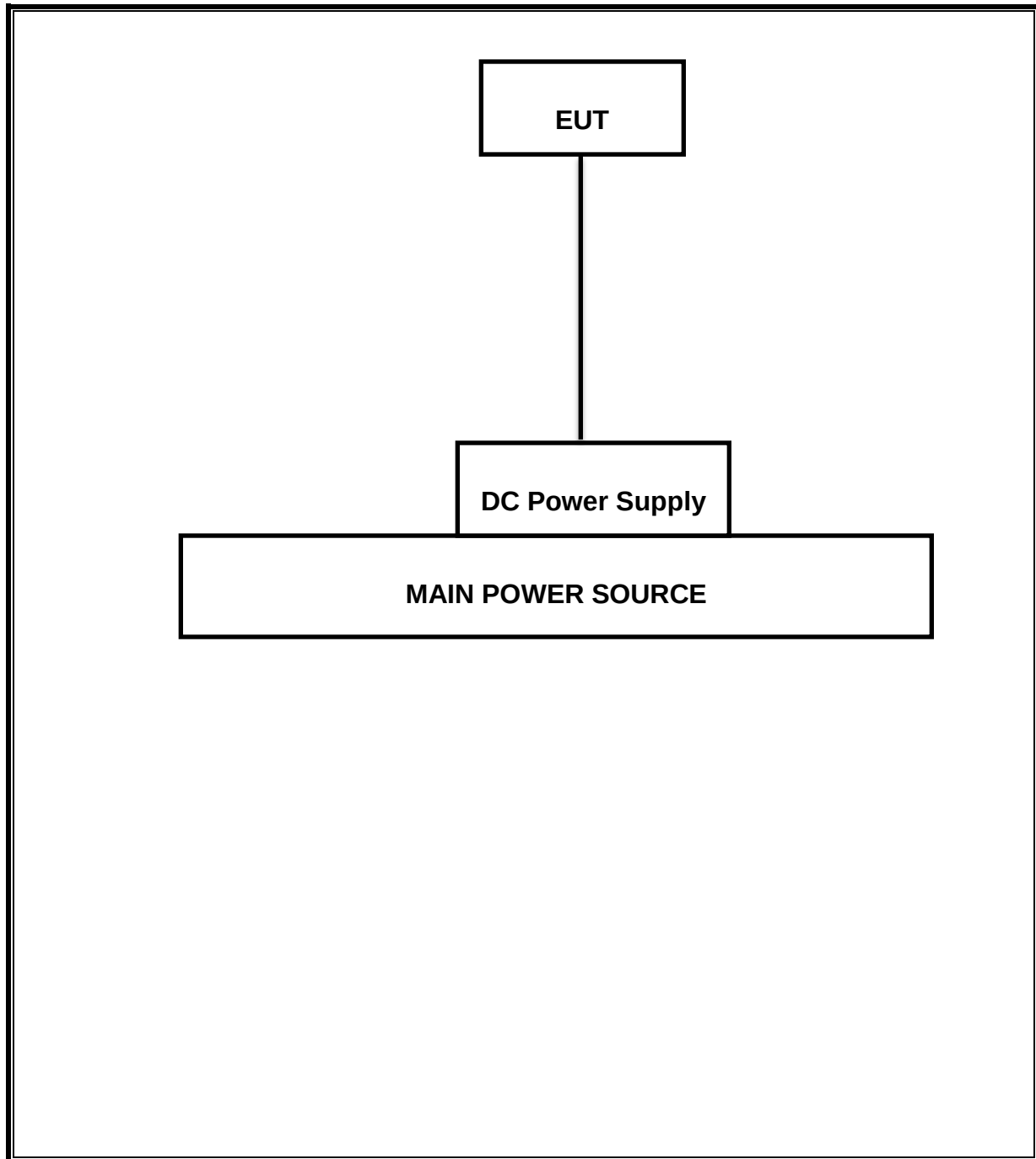
- This EUT didn't operated during charging mode.

TEST SETUP

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

SETUP DIAGRAM FOR TESTS(Conducted)

For radiated test, test were performed EUT standalone condition.



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	10-14-18
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	3117	00168724	05-31-19
Antenna, Horn, 18 GHz	ETS	3117	00168717	05-31-19
Antenna, Horn, 40 GHz	ETS	3116C	00166155	11-30-17
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	12-15-17
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-17-17
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-16-17
Preamplifier	ETS	3115-PA	00167475	08-17-17
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-16-17
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-17-17
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	03-09-18
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-17-17
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-17-17
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-16-17
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-16-17
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-17-17
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-16-17
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-17-17
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-16-17
High Pass Filter 6GHz	Micro-Tronics	HPM17542	009	08-17-17
High Pass Filter 6GHz	Micro-Tronics	HPM17542	016	08-16-17
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	11-25-17
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

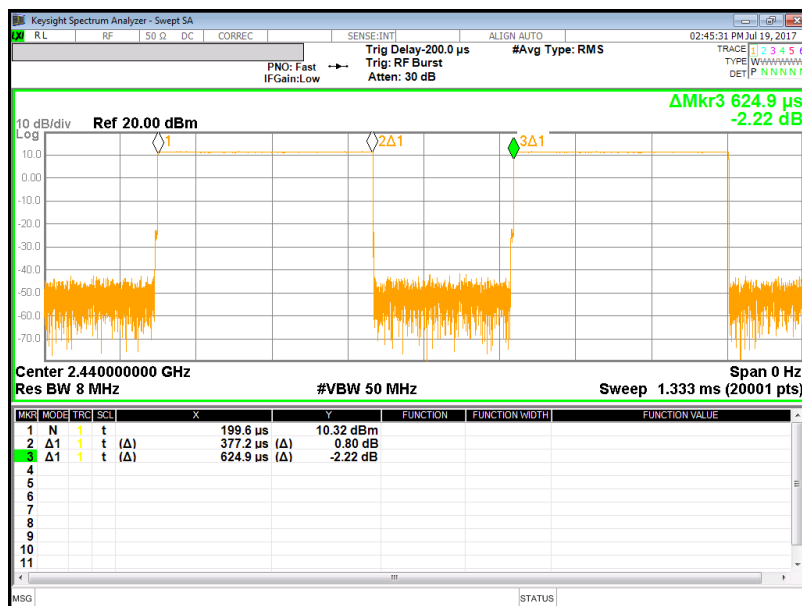
7. REFERENCE MEASUREMENT RESULTS

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	0.377	0.625	0.604	60.4%	2.19	2.651



7.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

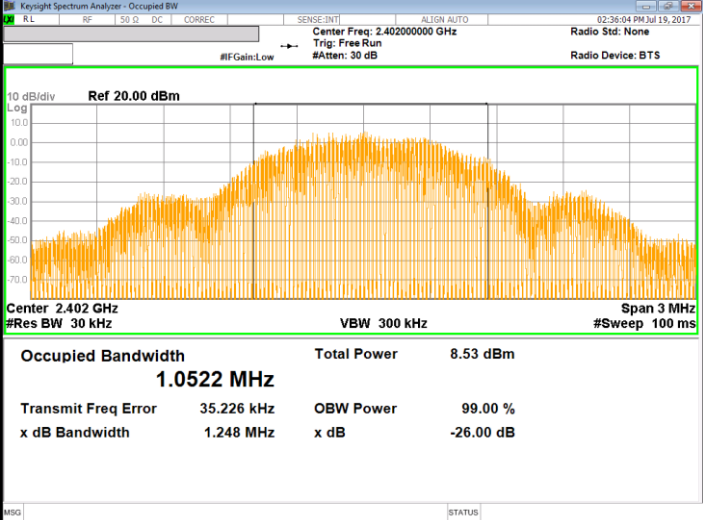
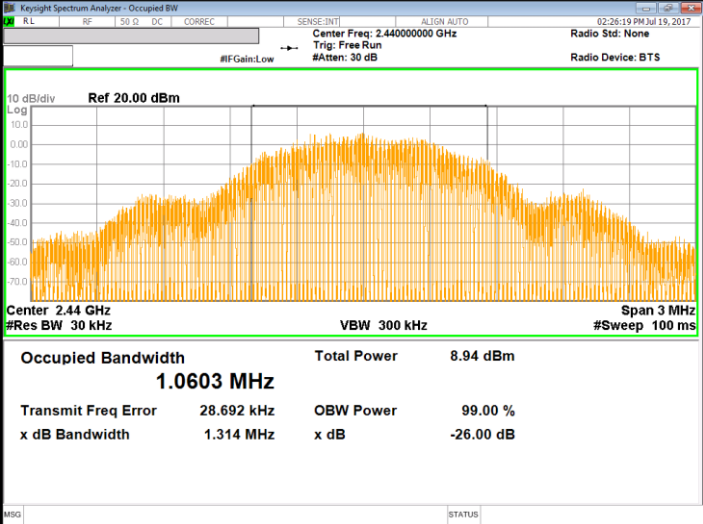
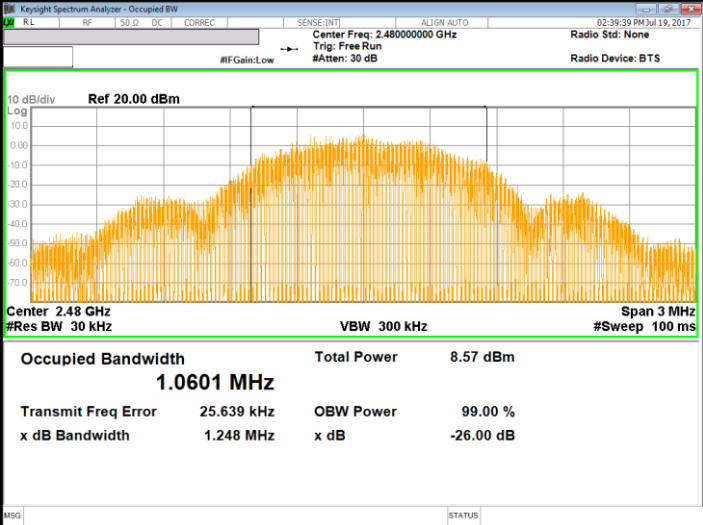
TEST PROCEDURE

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	1.052
Mid	2440	1.060
High	2480	1.060
Worst		1.060

99% BANDWIDTH PLOTS

Low CH	 Center Freq: 2.40200000 GHz Span 3 MHz Res BW 30 kHz VBW 300 kHz Sweep 100 ms Occupied Bandwidth 1.0522 MHz Total Power 8.53 dBm Transmit Freq Error 35.226 kHz OBW Power 99.00 % x dB Bandwidth 1.248 MHz x dB -26.00 dB
Middle CH	 Center Freq: 2.44000000 GHz Span 3 MHz Res BW 30 kHz VBW 300 kHz Sweep 100 ms Occupied Bandwidth 1.0603 MHz Total Power 8.94 dBm Transmit Freq Error 28.692 kHz OBW Power 99.00 % x dB Bandwidth 1.314 MHz x dB -26.00 dB
High CH	 Center Freq: 2.48000000 GHz Span 3 MHz Res BW 30 kHz VBW 300 kHz Sweep 100 ms Occupied Bandwidth 1.0601 MHz Total Power 8.57 dBm Transmit Freq Error 25.639 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	713.2 kHz
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-35.755 dBm
15.247 (b)(3)	TX conducted output power	<30dBm		Pass	11.119 dBm (Peak)
15.247 (e)	PSD	<8dBm		Pass	-4.41 dBm (Peak)
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass	48.19 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.

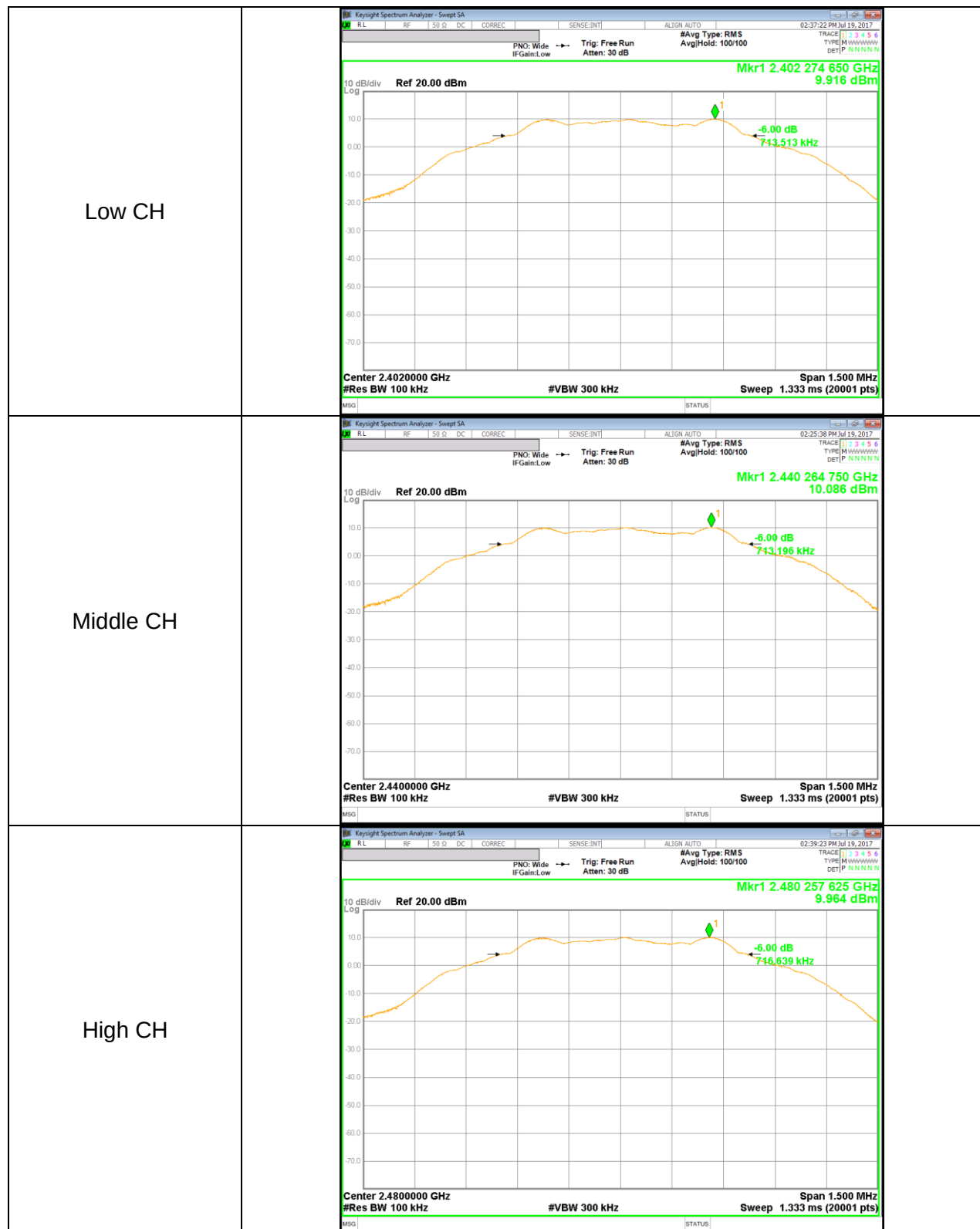
TEST PROCEDURE

Reference to KDB 558074 D01 DTS Meas Guidance v04: The transmitter output is connected to a spectrum analyzer with the RBW set to 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	713.5	500.0
Mid	2440	713.2	500.0
High	2480	716.6	500.0
Worst		713.2	500.0

6 dB BANDWIDTH PLOTS



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.

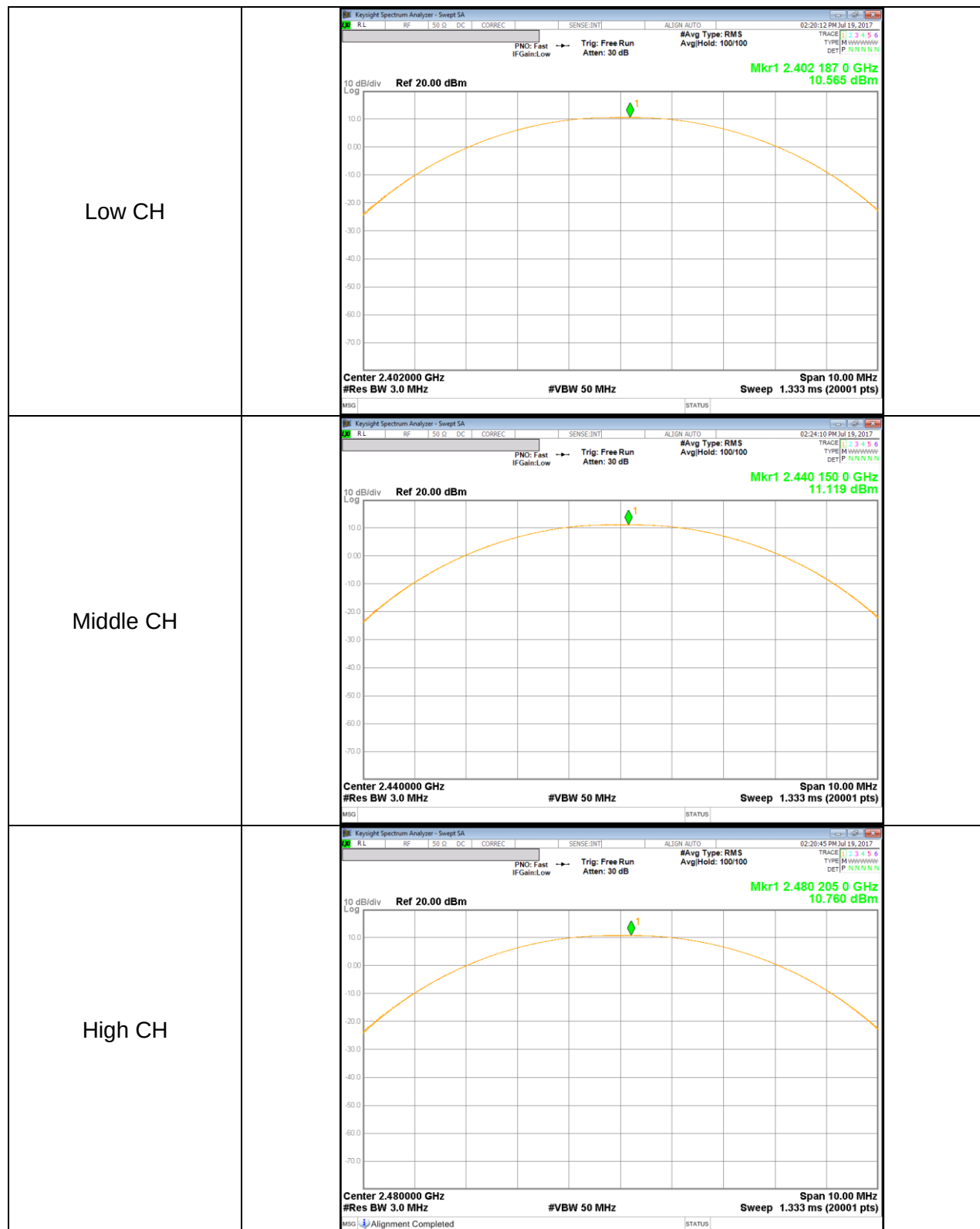
TEST PROCEDURE

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	10.565	30.000	-19.435
Mid	2440	11.119	30.000	-18.881
High	2480	10.760	30.000	-19.240
Worst		11.119		-18.881

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	10.278	10.661
Middle	2440	10.850	12.162
High	2480	10.520	11.272

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.

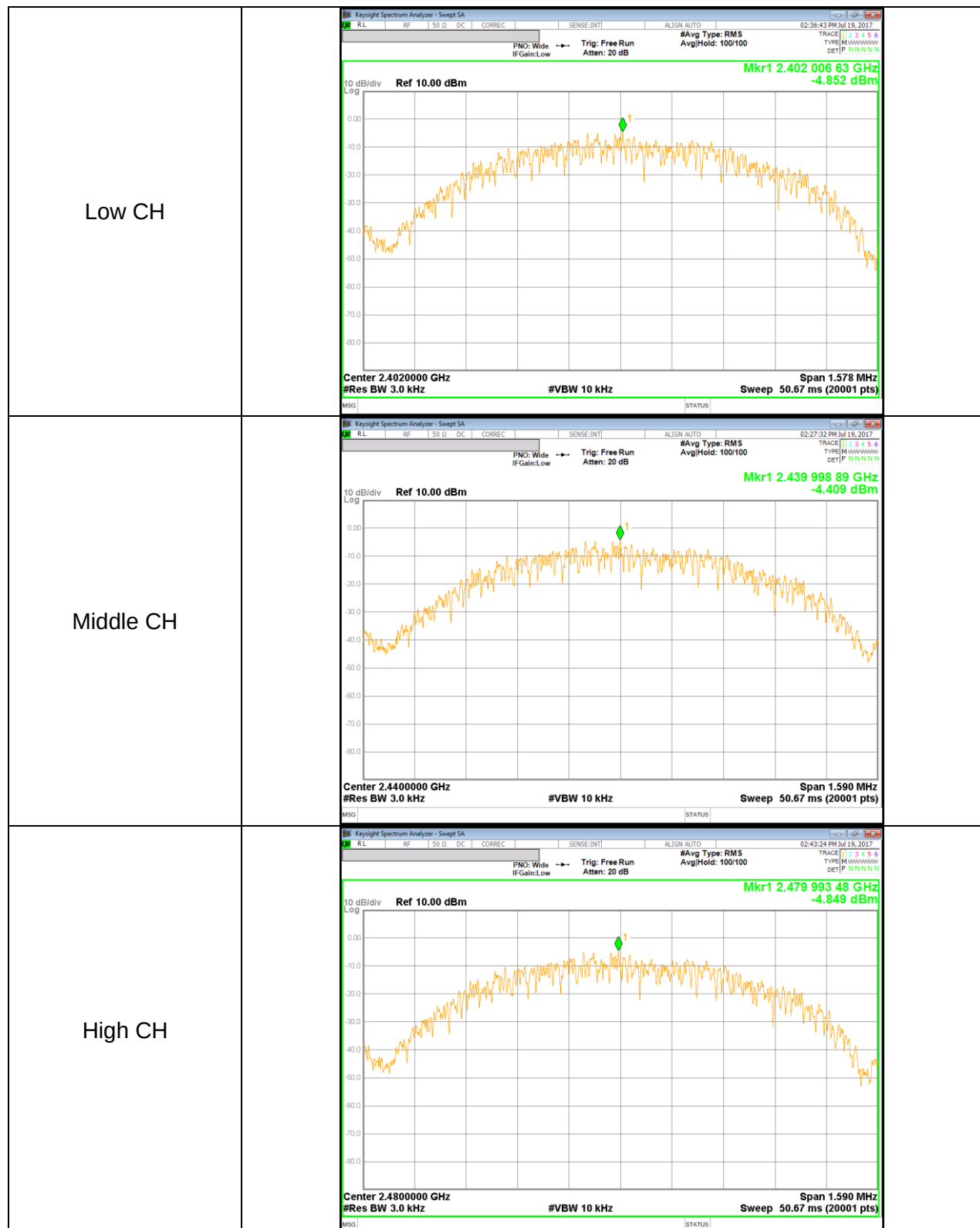
TEST PROCEDURE

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	-4.85	8.00	-12.85
Mid	2440	-4.41	8.00	-12.41
High	2480	-4.85	8.00	-12.85

POWER SPECTRAL DENSITY PLOTS



9.5. OUT-OF-BAND EMISSIONS

LIMITS

FCC §15.247 (d)

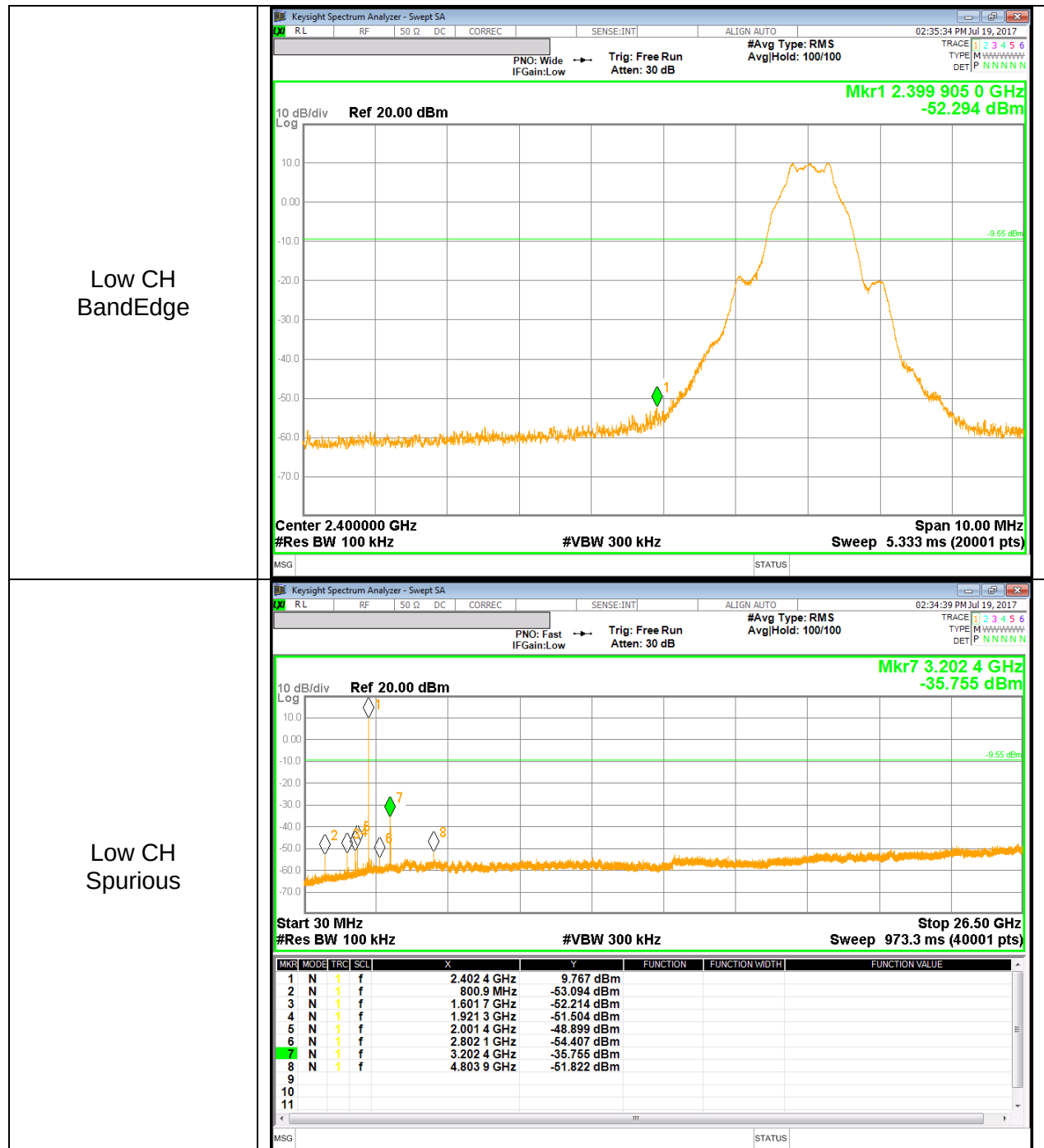
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the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

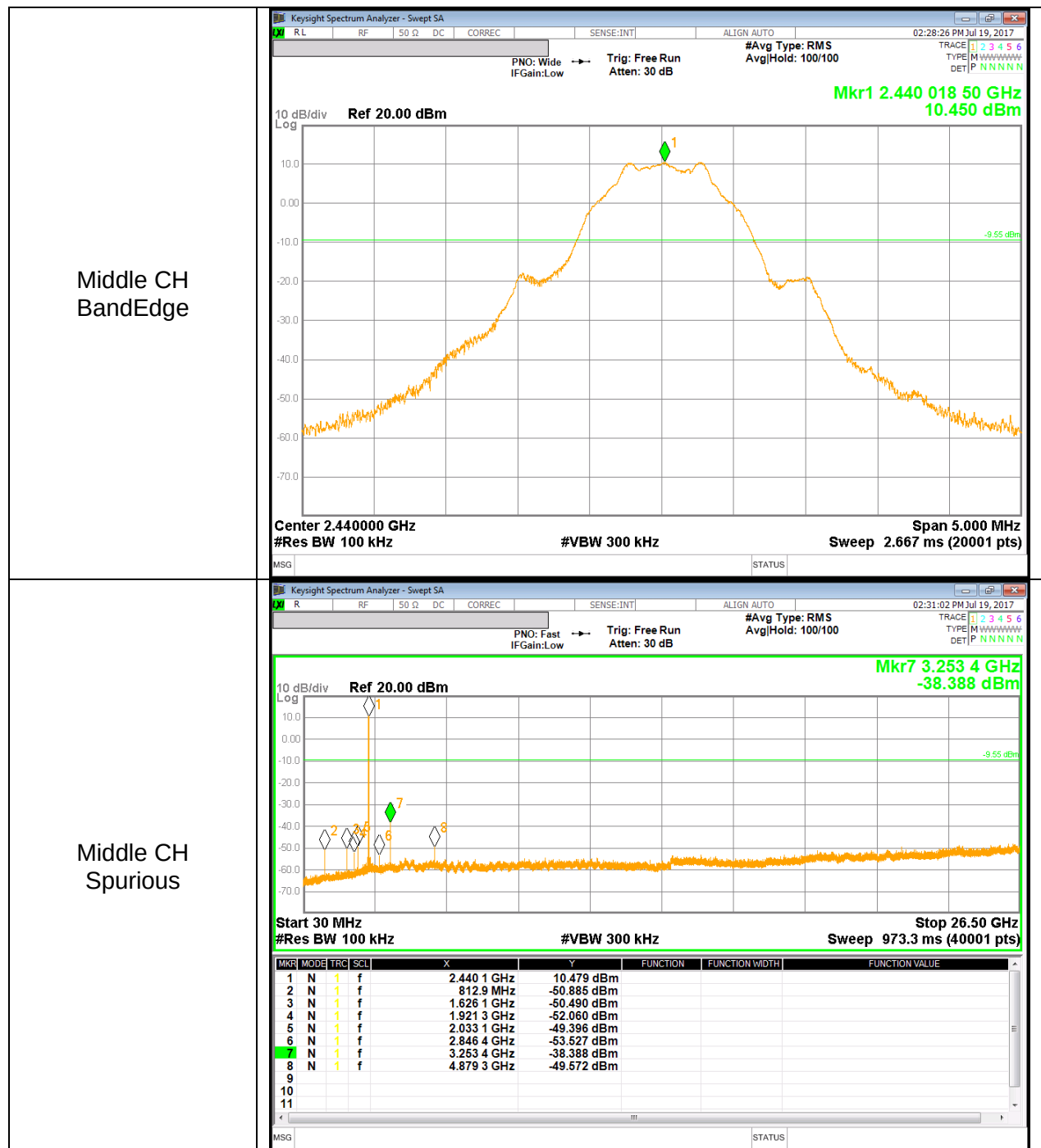
The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

RESULTS

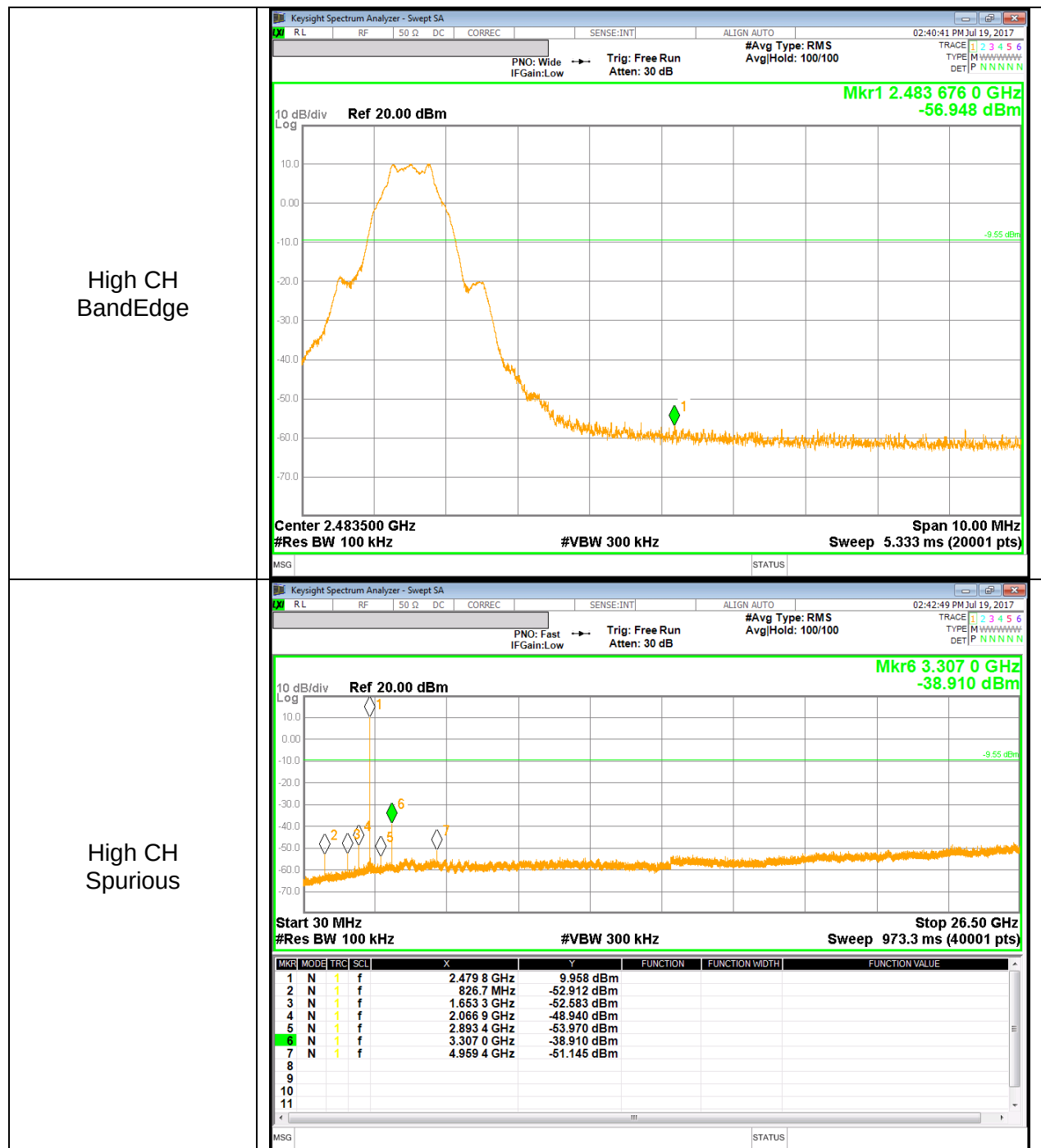
BANDEDGE & SPURIOUS EMISSIONS, LOW CHANNEL



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 = $10 \log(1/0.604) = 2.19 \text{ dB}$ (Spectrum Analyzer round it up to 2.19dB)

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.

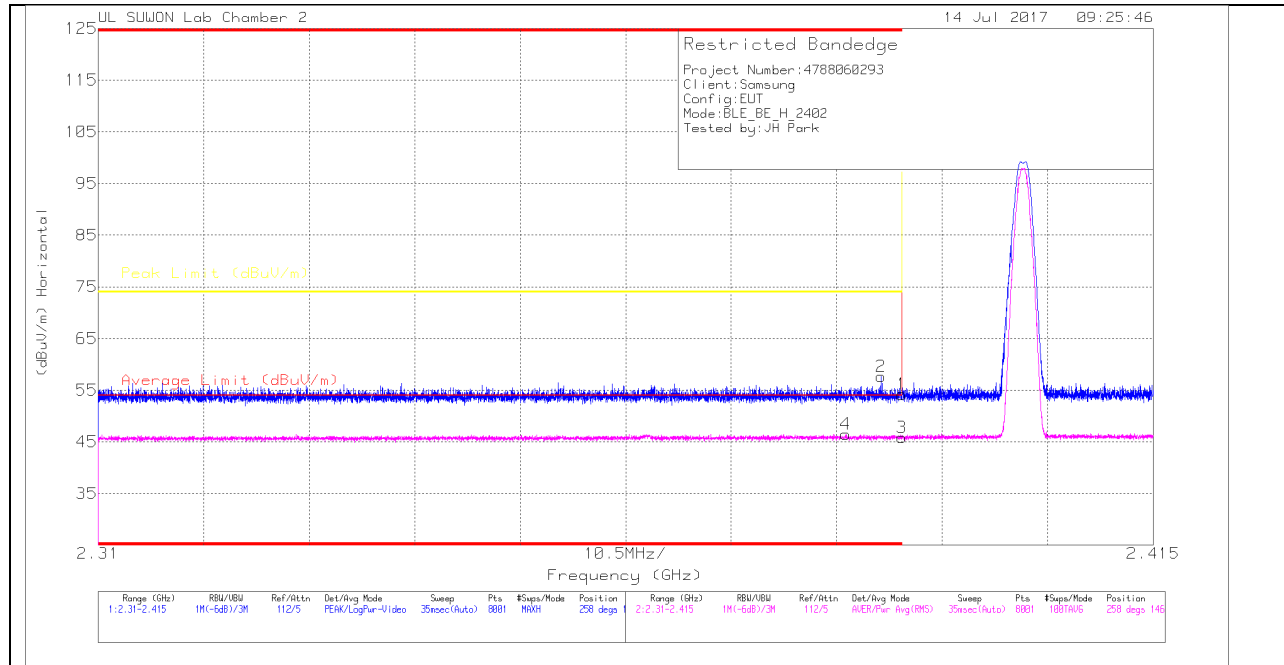
Unwanted emissions within Restricted Bands are measured using traditional radiated procedures.

Band edge emissions within Restricted Bands are measured using RMS with duty cycle factor offset method.

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.

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

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

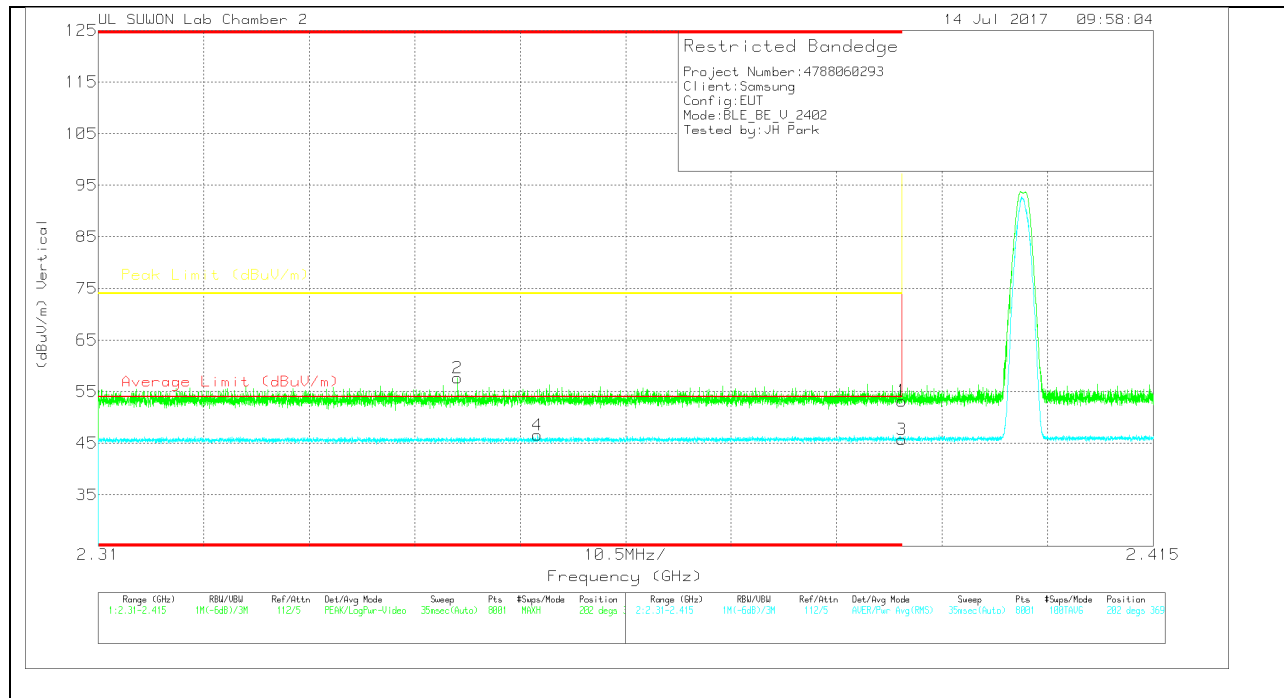
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	170531_3117 [00168724]	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.1	PK	31.3	-18.2	0	54.2	-	-	74	-19.8	258	146	H
2	* 2.388	44.56	PK	31.3	-18.2	0	57.66	-	-	74	-16.34	258	146	H
3	* 2.39	30.58	RMS	31.3	-18.2	2.19	45.87	54	-8.13	-	-	258	146	H
4	* 2.384	31.21	RMS	31.3	-18.2	2.19	46.5	54	-7.5	-	-	258	146	H

* - indicates frequency in CFR15.205/IC7.2.2 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)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.12	Pk	31.3	-18.2	0	53.22	-	-	74	-20.78	202	369	V
2	* 2.346	44.73	Pk	31.2	-18.3	0	57.63	-	-	74	-16.37	202	369	V
3	* 2.39	30.44	RMS	31.3	-18.2	2.19	45.73	54	-8.27	-	-	202	369	V
4	* 2.354	31.5	RMS	31.2	-18.3	2.19	46.59	54	-7.41	-	-	202	369	V

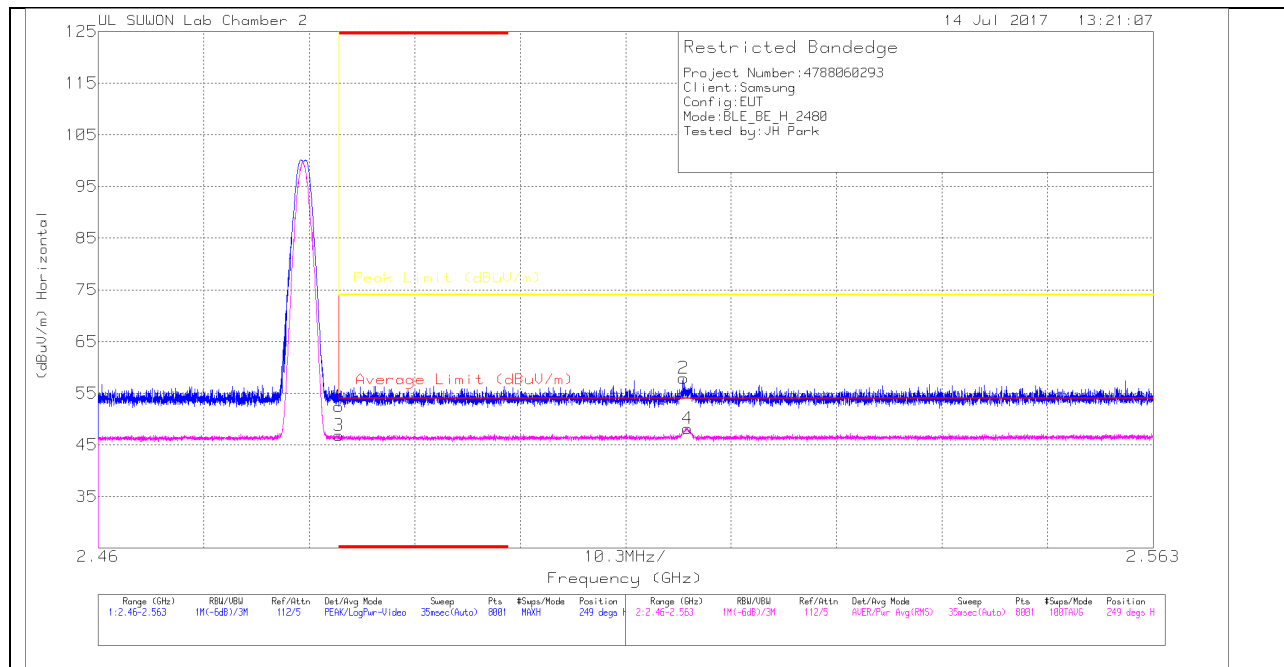
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

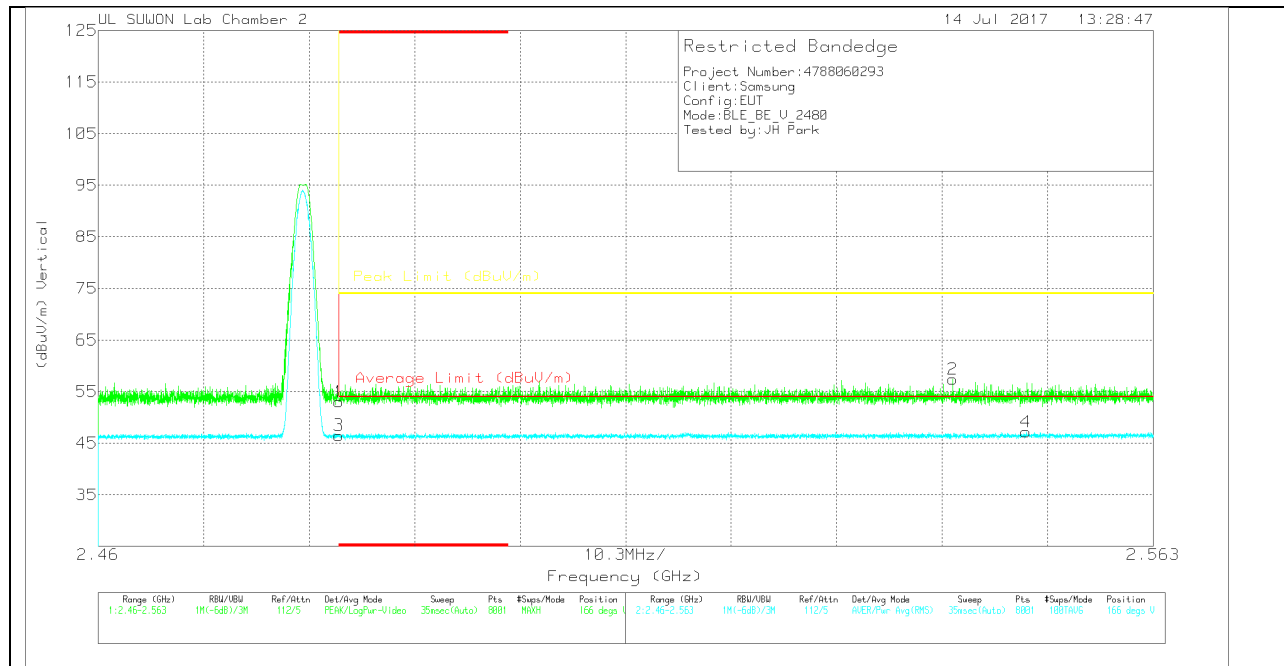
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	170531_3117 [00168724]	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	38.86	Pk	31.6	-18	0	52.46	-	-	74	-21.54	249	274	H
2	2.517	44.33	Pk	31.6	-18	0	57.93	-	-	74	-16.07	249	274	H
3	* 2.484	31.06	RMS	31.6	-18	2.19	46.85	54	-7.15	-	-	249	274	H
4	2.518	32.4	RMS	31.6	-18	2.19	48.19	54	-5.81	-	-	249	274	H

* - indicates frequency in CFR15.205/IC7.2.2 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)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	39.41	Pk	31.6	-18	0	53.01	-	-	74	-20.99	166	395	V
2	2.543	43.7	Pk	31.7	-18	0	57.4	-	-	74	-16.6	166	395	V
3	* 2.484	30.71	RMS	31.6	-18	2.19	46.5	54	-7.5	-	-	166	395	V
4	2.551	31.28	RMS	31.7	-18	2.19	47.17	54	-6.83	-	-	166	395	V

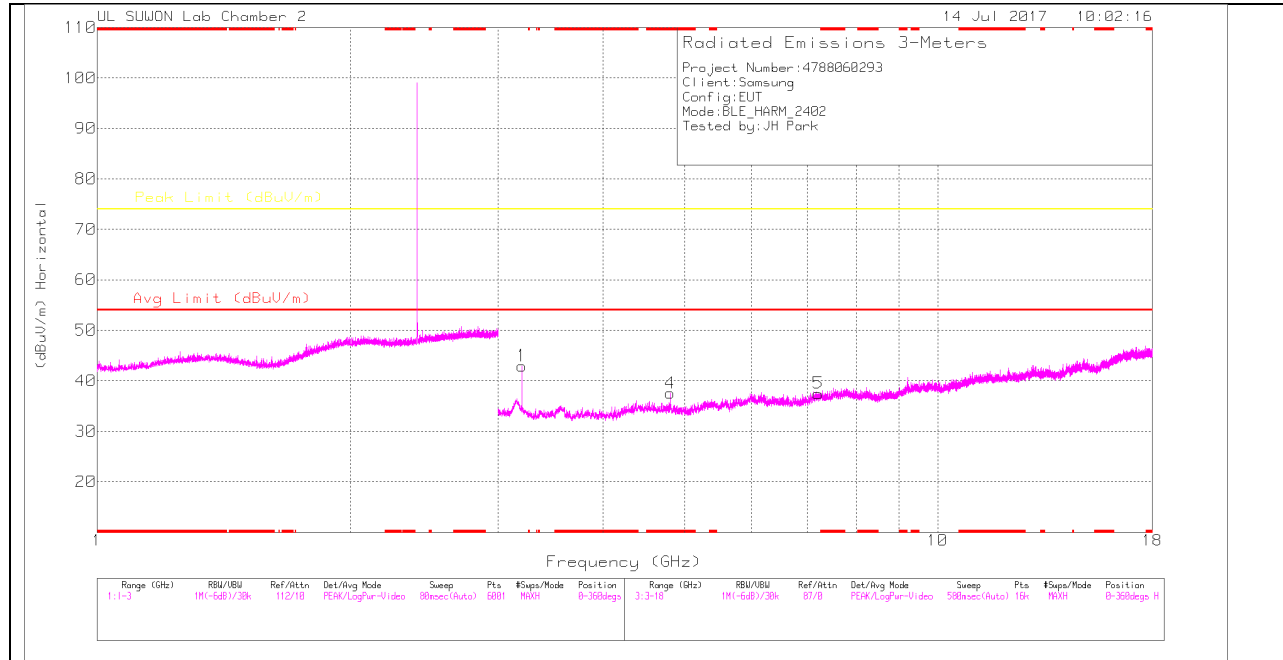
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

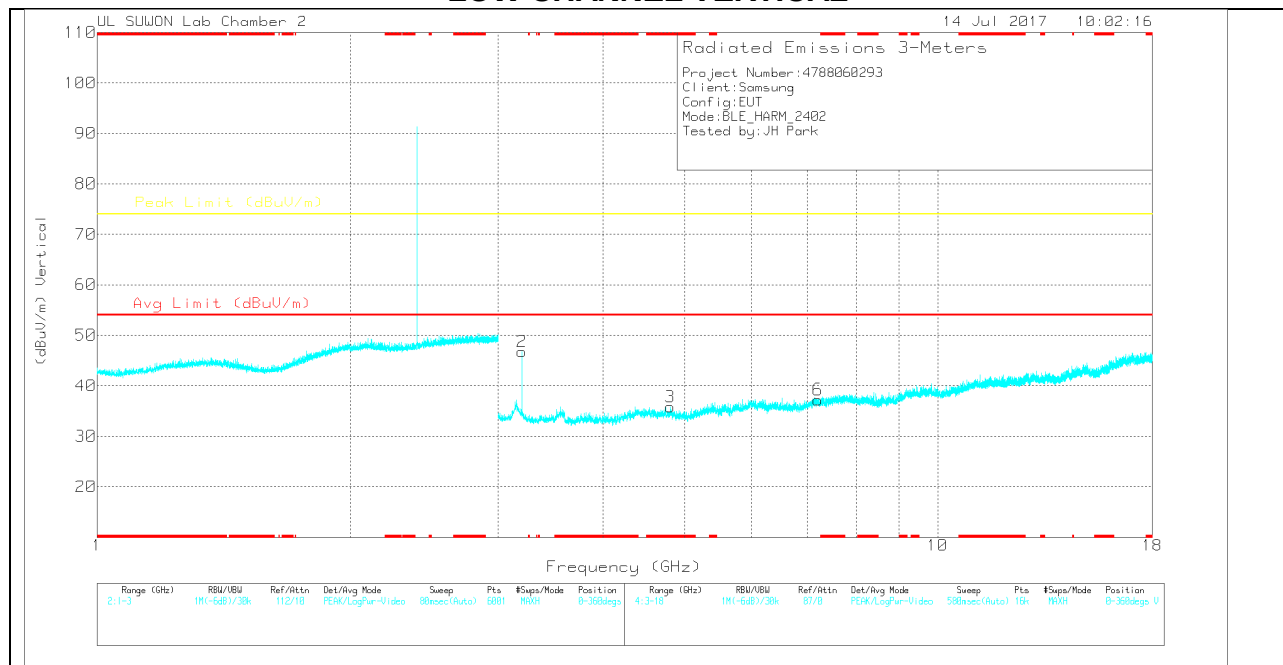
RMS - RMS detection

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	3.202	35.25	PK	33.4	-25.7	0	42.95	-	-	74	-31.05	0-360	150	H
4	* 4.804	28.05	PK	33.8	-24.3	0	37.55	-	-	74	-36.45	0-360	250	H
5	7.208	23.29	PK	35.9	-21.7	0	37.49	-	-	74	-36.51	0-360	150	H
2	3.202	39.03	PK	33.4	-25.7	0	46.73	-	-	74	-27.27	0-360	150	V
3	* 4.804	26.3	PK	33.8	-24.3	0	35.8	-	-	74	-38.2	0-360	150	V
6	7.203	22.91	PK	35.9	-21.6	0	37.21	-	-	74	-36.79	0-360	150	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak Detector

Radiated Emissions

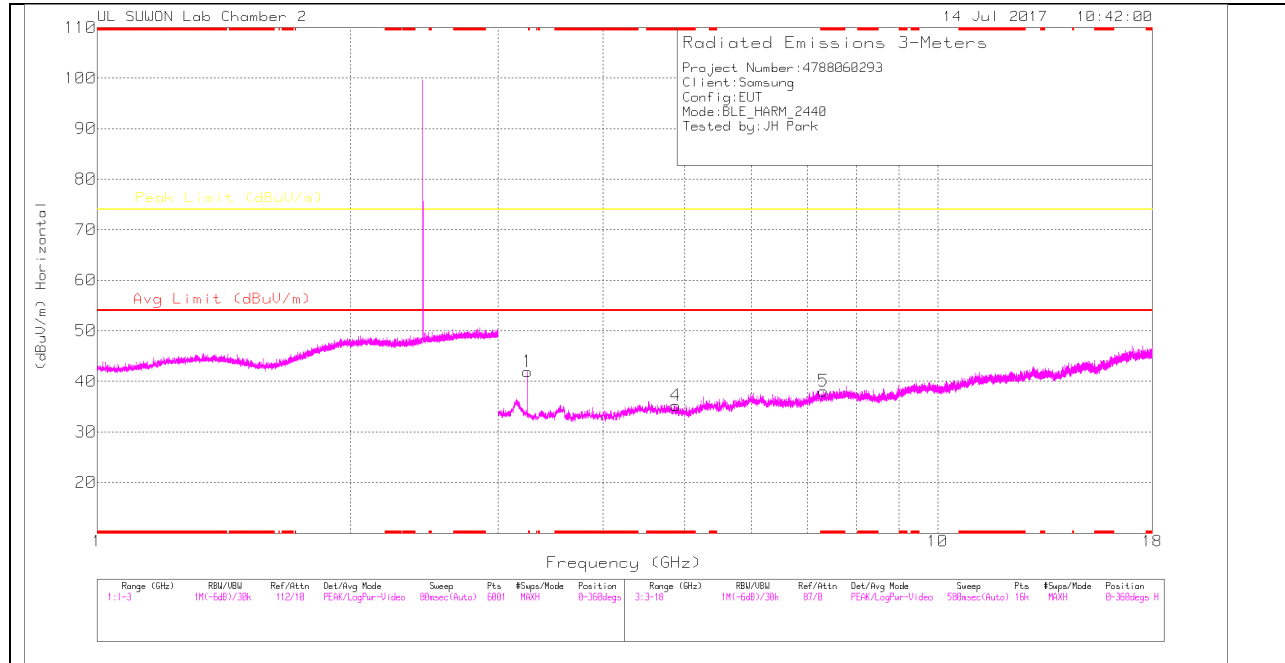
Frequency (GHz)	Meter Reading (dBuV)	Det	170531_3 117[00168724]	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3.203	41.91	PK2	33.4	-25.7	0	49.61	-	-	74	-24.39	254	235	H
3.203	43.83	PK2	33.4	-25.7	0	51.53	-	-	74	-22.47	176	159	V
* 4.803	36.47	PK2	33.8	-24.3	0	45.97	-	-	74	-28.03	54	309	V
* 4.804	24.68	MAV1	33.8	-24.3	2.19	36.37	54	-17.63	-	-	54	309	V
* 4.804	37.24	PK2	33.8	-24.3	0	46.74	-	-	74	-27.26	165	169	H
* 4.804	26	MAV1	33.8	-24.3	2.19	37.69	54	-16.31	-	-	165	169	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

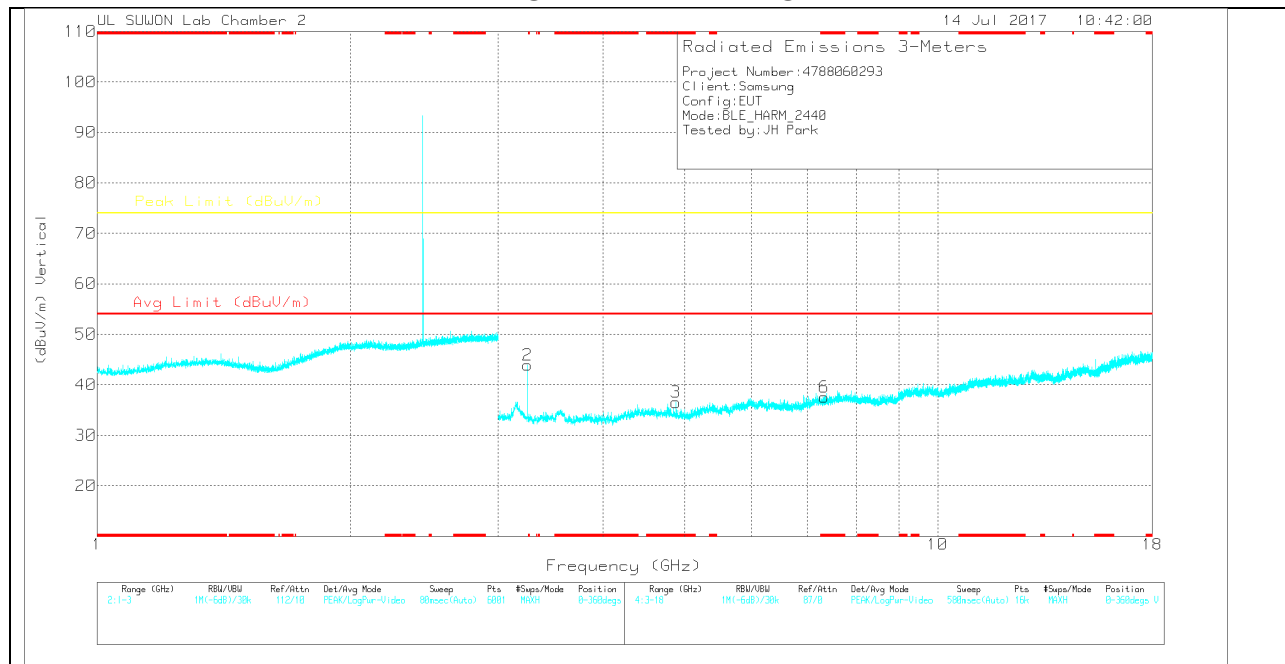
PK2 - KDB558074 Method: Maximum Peak

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	3.253	35.26	PK	32.7	-26	0	41.96	-	-	74	-32.04	0-360	250	H
4	* 4.88	26.03	PK	33.8	-24.6	0	35.23	-	-	74	-38.77	0-360	150	H
5	* 7.32	24.2	PK	35.9	-22	0	38.1	-	-	74	-35.9	0-360	150	H
2	3.253	37.18	PK	32.7	-26	0	43.88	-	-	74	-30.12	0-360	150	V
3	* 4.88	27.31	PK	33.8	-24.6	0	36.51	-	-	74	-37.49	0-360	150	V
6	* 7.324	23.55	PK	35.9	-21.9	0	37.55	-	-	74	-36.45	0-360	250	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak Detector

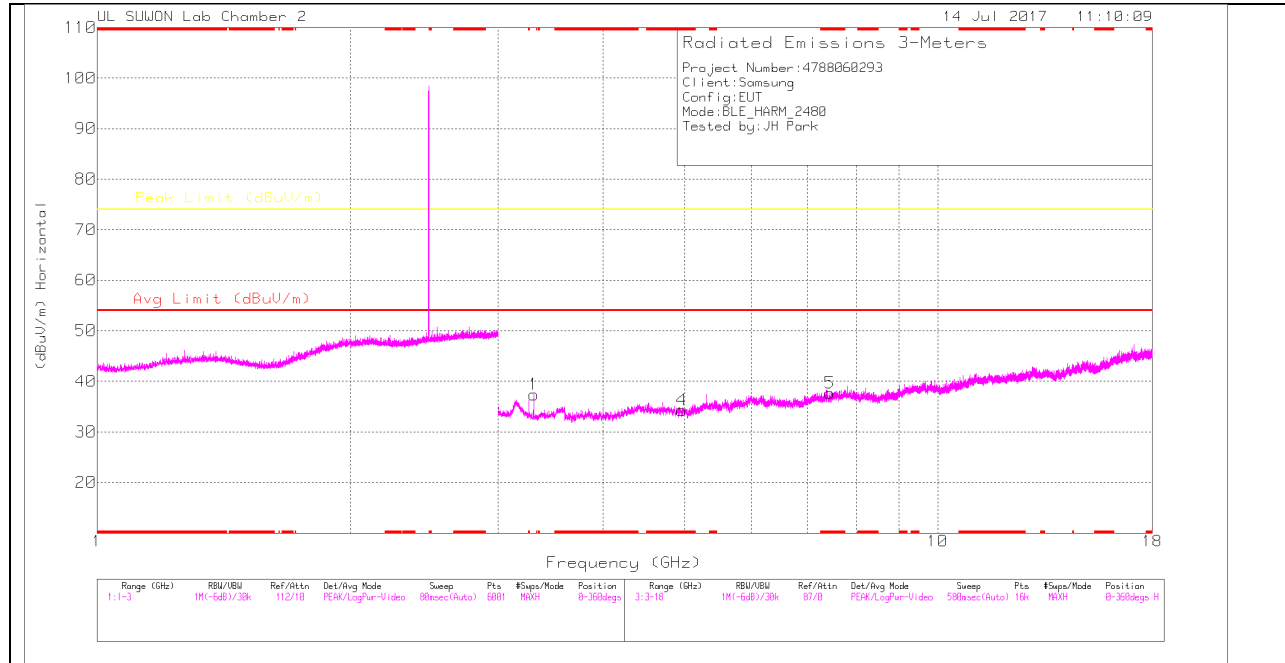
Radiated Emissions

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
3.254	41.53	PK2	32.7	-26	0	48.23	-	-	74	-25.77	275	247	H
3.253	43.35	PK2	32.7	-26	0	50.05	-	-	74	-23.95	189	102	V

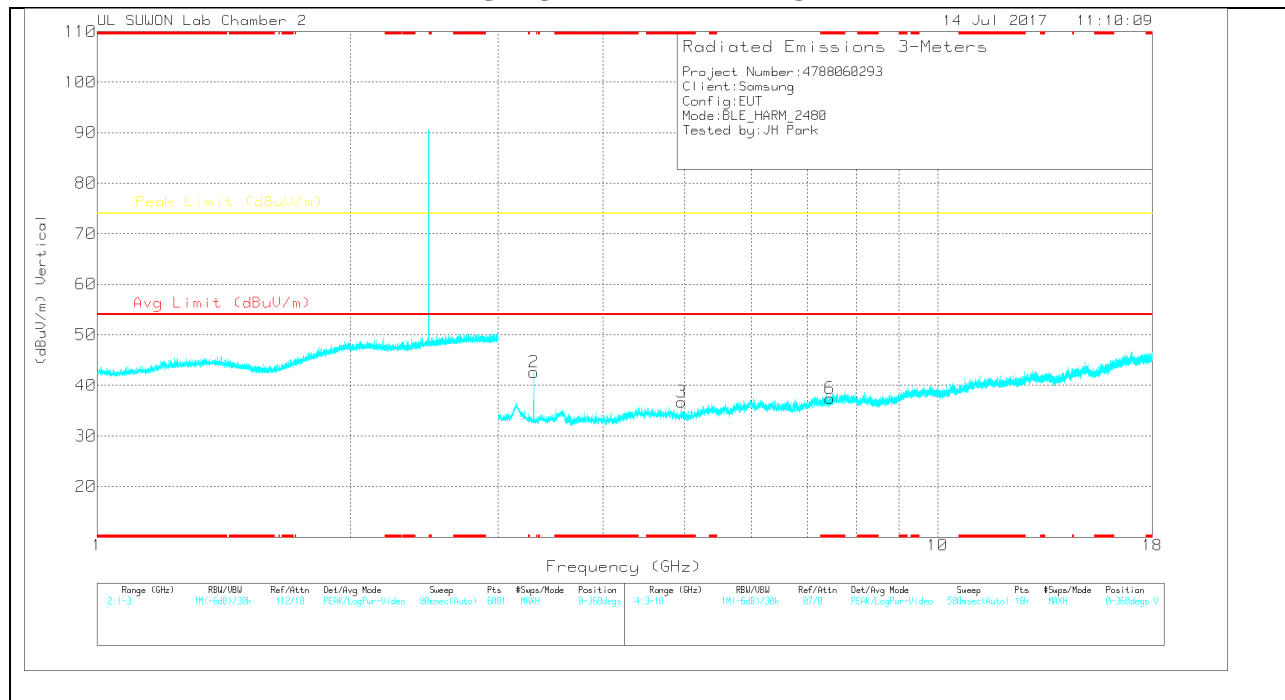
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

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	3.307	30.68	PK	32.5	-25.8	0	37.38	-	-	74	-36.62	0-360	150	H
4	* 4.962	25.17	PK	33.8	-24.7	0	34.27	-	-	74	-39.73	0-360	250	H
5	* 7.439	22.78	PK	35.9	-21	0	37.68	-	-	74	-36.32	0-360	150	H
2	3.307	35.91	PK	32.5	-25.8	0	42.61	-	-	74	-31.39	0-360	149	V
3	* 4.96	27.62	PK	33.8	-24.7	0	36.72	-	-	74	-37.28	0-360	149	V
6	* 7.438	22.56	PK	35.9	-21	0	37.46	-	-	74	-36.54	0-360	149	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak Detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	170531_3 117[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
3.307	39.36	PK2	32.5	-25.8	0	46.06	-	-	74	-27.94	255	276	H
3.307	41.76	PK2	32.5	-25.8	0	48.46	-	-	74	-25.54	210	158	V
* 4.958	36.1	PK2	33.8	-24.7	0	45.2	-	-	74	-28.8	145	106	V
* 4.958	21.89	MAV1	33.8	-24.7	0	30.99	54	-23.01	-	-	145	106	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

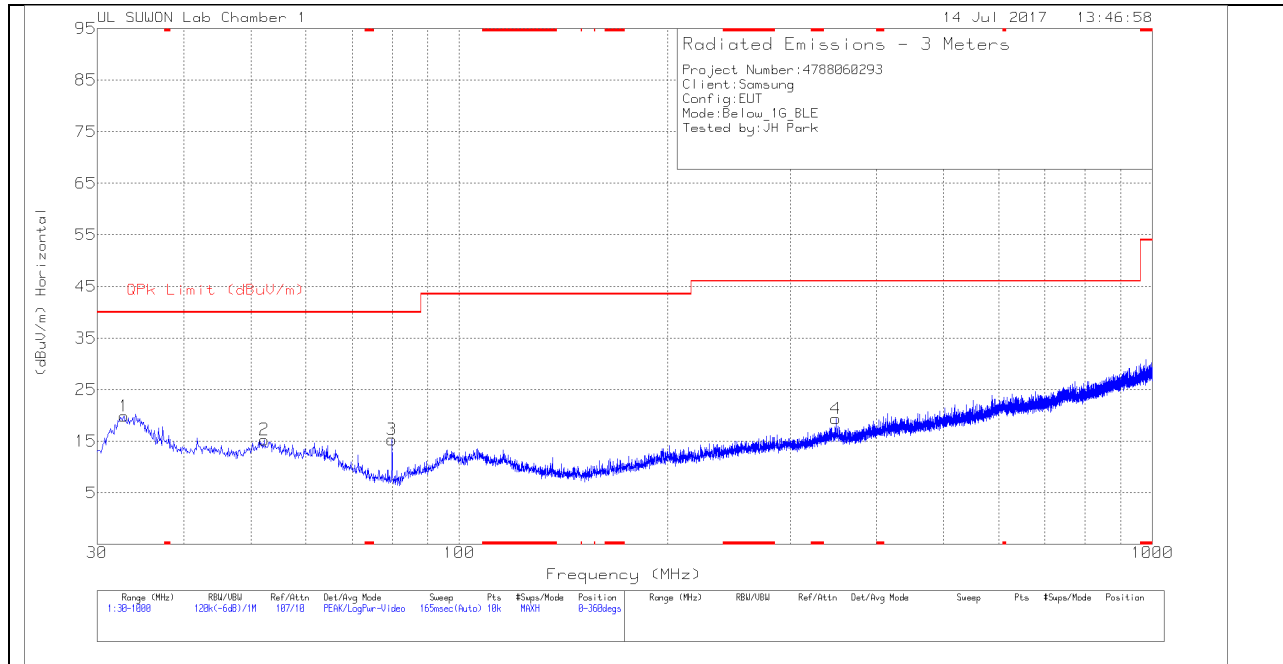
PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

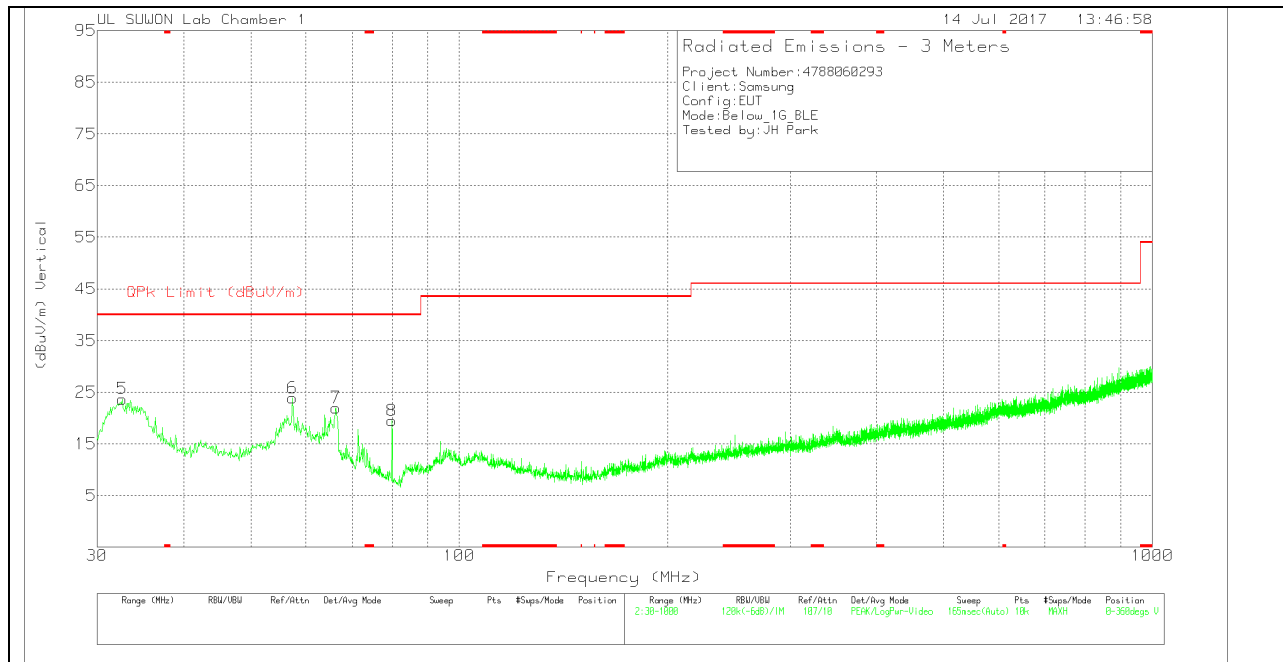
10.3. WORST-CASE BELOW 1 GHz

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_7 50(dB)	30-1000MHz[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	32.813	38.98	Pk	10.5	-29.6	19.88	40	-20.12	0-360	200	H
2	52.31	30.6	Pk	13.8	-29.1	15.3	40	-24.7	0-360	300	H
3	79.955	37.03	Pk	7	-28.7	15.33	40	-24.67	0-360	400	H
4	349.421	30.96	Pk	15	-26.6	19.36	46.02	-26.66	0-360	100	H
5	32.619	42.8	Pk	10.5	-29.6	23.7	40	-16.3	0-360	100	V
6	57.451	39.98	Pk	13.1	-29.2	23.88	40	-16.12	0-360	100	V
7	66.375	40.09	Pk	10.8	-28.9	21.99	40	-18.01	0-360	200	V
8	79.955	41.2	Pk	7	-28.7	19.5	40	-20.5	0-360	100	V

Pk - Peak detector