



FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Phone + Bluetooth/BLE, DTS/UNII a/b/g/n/ac and ANT+

MODEL NUMBER : SM-G903F

FCC ID: A3LSMG903F

REPORT NUMBER: 15K21054-E2

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Prepared for
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Revision History

Rev.	Issue Date	Revisions	Revised By
--	07/01/15	Initial issue	SungGil Park

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac, ANT+ and NFC
MODEL NUMBER: SM-G903F
SERIAL NUMBER: R38G60CA7KK (RADIATED); R38G60C9R5L(CONDUCTED)
DATE TESTED: JUN 15 - JUL 01, 2015

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:



CY Choi
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:



SungGil Park
Suwon Lab Engineer
UL Korea, Ltd.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15.

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, 443-823, 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 GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac, ANT+ and NFC. 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	6.47	4.44
		Average	6.22	4.19

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antennas, with a maximum gain of -1.89 dBi.

5.4. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

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

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA20EWE	N/A	N/A
Data Cable	SAMSUNG	EP-DN915UWE	N/A	N/A
Earphone	SAMSUNG	EHS64AVFWE	N/A	N/A

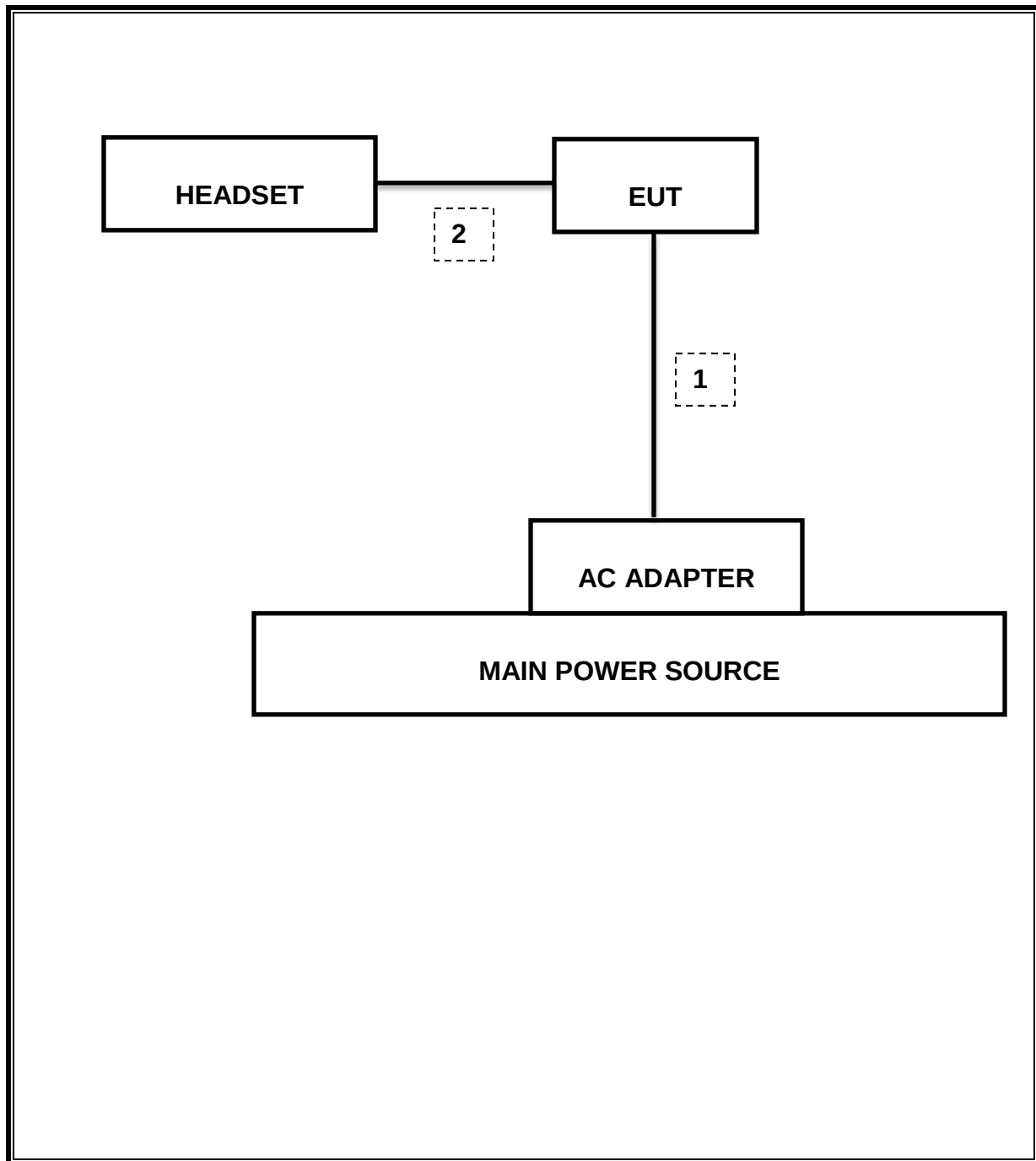
I/O CABLES

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	0.8m	N/A
2	Audio	1	Mini-Jack	Unshielded	1.0m	N/A

TEST SETUP

The EUT is a stand-alone unit during the tests. Test software exercised the radio card.

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	950	11-17-15
Antenna, Horn, 18 GHz	ETS	3115	00167211	09-20-15
Antenna, Horn, 40 GHz	ETS	3116C	00166255	09-23-15
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	09-29-15
Preamplifier, 1000 MHz	Sonoma	310N	341282	11-17-15
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	11-18-15
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	09-23-15
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	11-17-15
Average Power Sensor	R&S	NRZ-Z91	102681	11-17-15
Average Power Sensor	Agilent / HP	U2000	MY54270007	09-23-15
EMI Test Receive, 40 GHz	R&S	ESU40	100439	11-17-15
EMI Test Receive, 3 GHz	R&S	ESR3	101832	11-17-15
Attenuator / Switch driver	HP	11713A	3748A04272	N/A
Low Pass Filter 3GHz	Micro-Tronics	LPS17541	009	11-17-15
High Pass Filter 5GHz	Micro-Tronics	HPS17542	009	11-17-15
High Pass Filter 6GHz	Micro-Tronics	HPM17543	010	11-17-15
LISN	R&S	ENV-216	101836	04-09-16
LISN	R&S	ENV-216	101837	04-09-16

7. MEASUREMENT METHODS

KDB 558074 D01 DTS Meas Guidance v03r03: Measurement Procedure §9.1.1 is used for peak power and §10.2 PKPSD is used for power spectral density.

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.

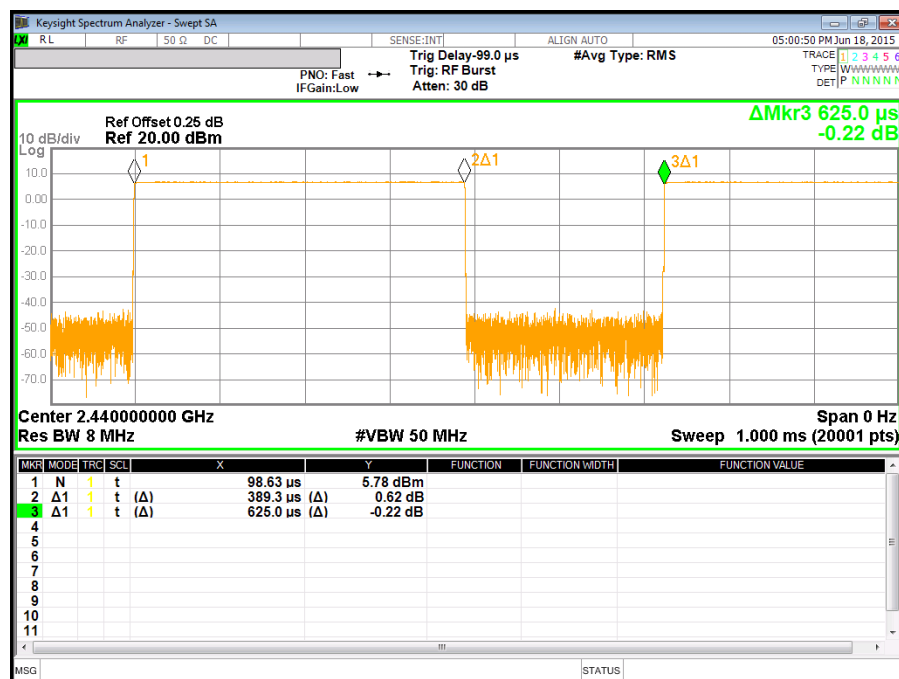
8. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

LIMITS

None: for reporting purposes only.

8.1. ON TIME AND DUTY CYCLE RESULTS

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%	2.06	2.569



9. 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	708.0 kHz
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-48.361 dBm
15.247	TX conducted output power	<30dBm		Pass	6.47 dBm
15.247	PSD	<8dBm		Pass	-7.85 dBm
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass	47.98 dBuV (QP)
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass	45.64 dBuV/m (AV)

10. ANTENNA PORT TEST RESULTS

10.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency [MHz]	6 dB Bandwidth [kHz]	Minimum Limit [kHz]
Low	2402	715.8	500.0
Mid	2440	712.5	500.0
High	2480	708.0	500.0
Worst		708.0	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 plot of PSD (dBm/Hz) versus frequency (GHz) and various measurement parameters.

Low CH: The plot shows a peak at 2.402014 GHz with a power level of 3.366 dBm. The reference offset is 0.25 dB, and the reference level is 20.00 dBm. The resolution bandwidth (RBW) is 100 kHz, and the video bandwidth (VBW) is 300 kHz. The span is 1.500 MHz, and the sweep time is 1.333 ms (20001 pts).

Middle CH: The plot shows a peak at 2.440017 GHz with a power level of 5.537 dBm. The reference offset is 0.25 dB, and the reference level is 20.00 dBm. The resolution bandwidth (RBW) is 100 kHz, and the video bandwidth (VBW) is 300 kHz. The span is 1.500 MHz, and the sweep time is 1.333 ms (20001 pts).

High CH: The plot shows a peak at 2.480021 GHz with a power level of 3.713 dBm. The reference offset is 0.25 dB, and the reference level is 20.00 dBm. The resolution bandwidth (RBW) is 100 kHz, and the video bandwidth (VBW) is 300 kHz. The span is 1.500 MHz, and the sweep time is 1.333 ms (20001 pts).

10.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

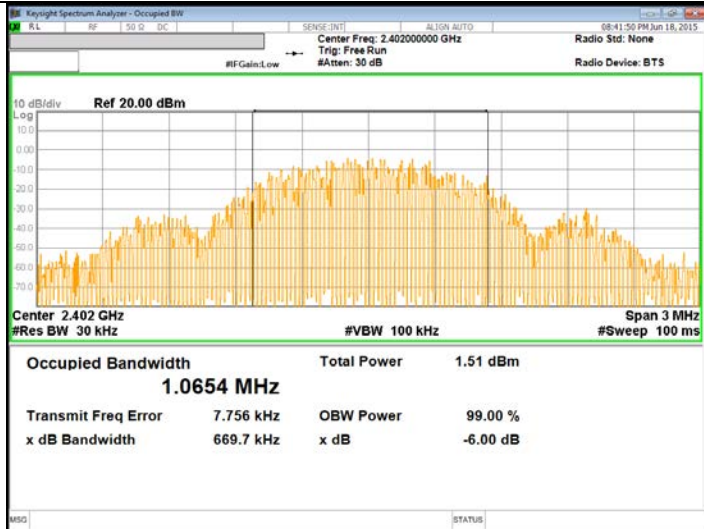
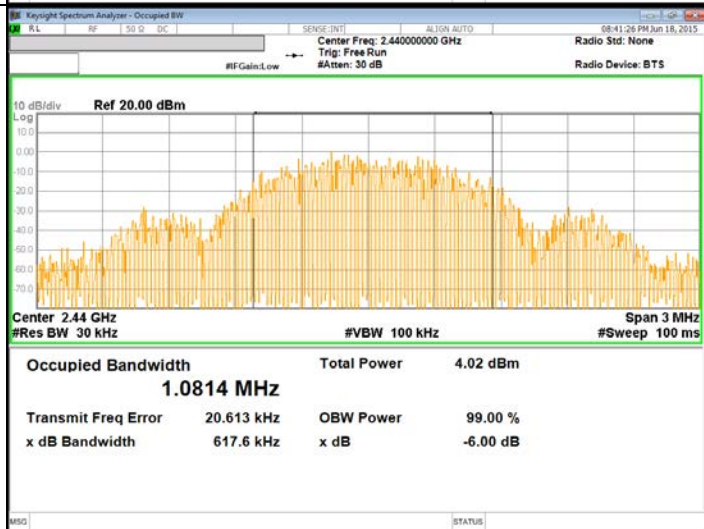
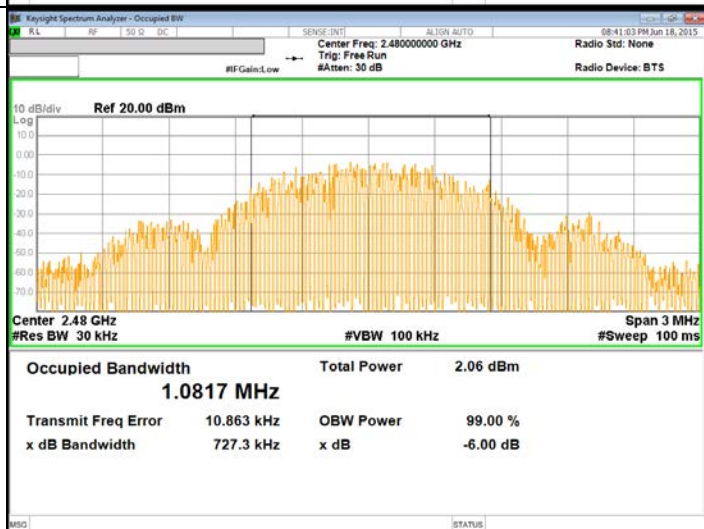
TEST PROCEDURE

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 sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	2402	1.065
Mid	2440	1.081
High	2480	1.082
Worst		1.082

99% BANDWIDTH PLOTS

Low CH	 KeySight Spectrum Analyzer - Occupied BW Center Freq: 2.40200000 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 100 kHz #Sweep 100 ms <table><tr><td>Occupied Bandwidth</td><td>Total Power</td><td>1.51 dBm</td></tr><tr><td>1.0654 MHz</td><td></td><td></td></tr><tr><td>Transmit Freq Error</td><td>7.756 kHz</td><td>OBW Power</td></tr><tr><td>x dB Bandwidth</td><td>669.7 kHz</td><td>x dB</td></tr><tr><td></td><td></td><td>99.00 %</td></tr><tr><td></td><td></td><td>-6.00 dB</td></tr></table>	Occupied Bandwidth	Total Power	1.51 dBm	1.0654 MHz			Transmit Freq Error	7.756 kHz	OBW Power	x dB Bandwidth	669.7 kHz	x dB			99.00 %			-6.00 dB
Occupied Bandwidth	Total Power	1.51 dBm																	
1.0654 MHz																			
Transmit Freq Error	7.756 kHz	OBW Power																	
x dB Bandwidth	669.7 kHz	x dB																	
		99.00 %																	
		-6.00 dB																	
Middle CH	 KeySight Spectrum Analyzer - Occupied BW Center Freq: 2.44000000 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 100 kHz #Sweep 100 ms <table><tr><td>Occupied Bandwidth</td><td>Total Power</td><td>4.02 dBm</td></tr><tr><td>1.0814 MHz</td><td></td><td></td></tr><tr><td>Transmit Freq Error</td><td>20.613 kHz</td><td>OBW Power</td></tr><tr><td>x dB Bandwidth</td><td>617.6 kHz</td><td>x dB</td></tr><tr><td></td><td></td><td>99.00 %</td></tr><tr><td></td><td></td><td>-6.00 dB</td></tr></table>	Occupied Bandwidth	Total Power	4.02 dBm	1.0814 MHz			Transmit Freq Error	20.613 kHz	OBW Power	x dB Bandwidth	617.6 kHz	x dB			99.00 %			-6.00 dB
Occupied Bandwidth	Total Power	4.02 dBm																	
1.0814 MHz																			
Transmit Freq Error	20.613 kHz	OBW Power																	
x dB Bandwidth	617.6 kHz	x dB																	
		99.00 %																	
		-6.00 dB																	
High CH	 KeySight Spectrum Analyzer - Occupied BW Center Freq: 2.48000000 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 100 kHz #Sweep 100 ms <table><tr><td>Occupied Bandwidth</td><td>Total Power</td><td>2.06 dBm</td></tr><tr><td>1.0817 MHz</td><td></td><td></td></tr><tr><td>Transmit Freq Error</td><td>10.863 kHz</td><td>OBW Power</td></tr><tr><td>x dB Bandwidth</td><td>727.3 kHz</td><td>x dB</td></tr><tr><td></td><td></td><td>99.00 %</td></tr><tr><td></td><td></td><td>-6.00 dB</td></tr></table>	Occupied Bandwidth	Total Power	2.06 dBm	1.0817 MHz			Transmit Freq Error	10.863 kHz	OBW Power	x dB Bandwidth	727.3 kHz	x dB			99.00 %			-6.00 dB
Occupied Bandwidth	Total Power	2.06 dBm																	
1.0817 MHz																			
Transmit Freq Error	10.863 kHz	OBW Power																	
x dB Bandwidth	727.3 kHz	x dB																	
		99.00 %																	
		-6.00 dB																	

10.3. 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.

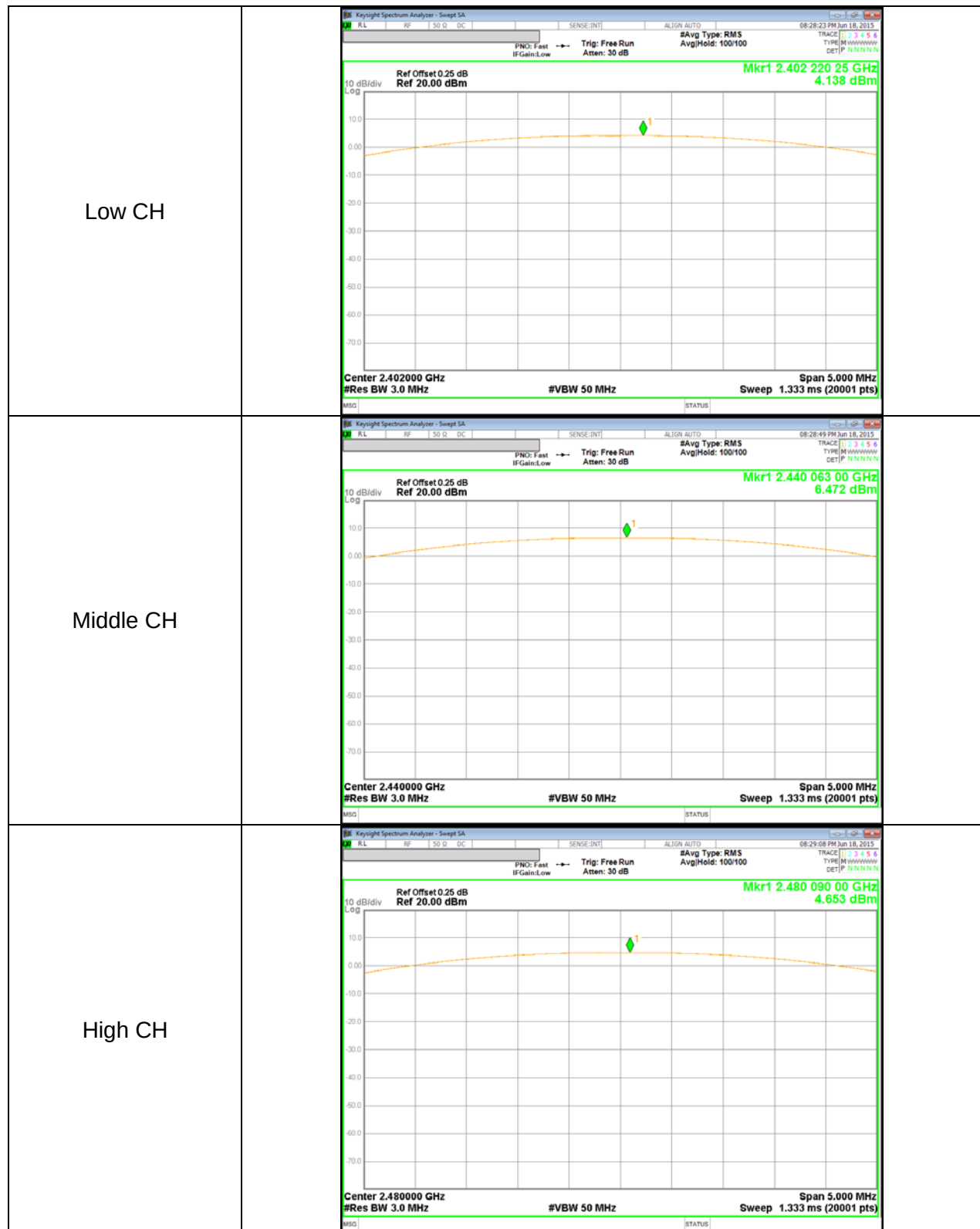
TEST PROCEDURE

Peak power is measured using KDB558074 D01 DTS Meas Guidance v03r03 under section 9.1.1 utilizing spectrum analyzer.

RESULTS

Channel	Frequency [MHz]	Peak Power Reading [dBm]	Limit [dBm]	Margin [dB]
Low	2402	4.138	30.000	-25.862
Mid	2440	6.472	30.000	-23.528
High	2480	4.653	30.000	-25.347
Worst		6.472		-23.528

OUTPUT POWER PLOTS



10.4. 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 of 10.1 dB (including 10 dB pad and 0.1 dB cable) 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	3.95	2.48
Middle	2440	6.22	4.19
High	2480	4.40	2.75

10.5. 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.

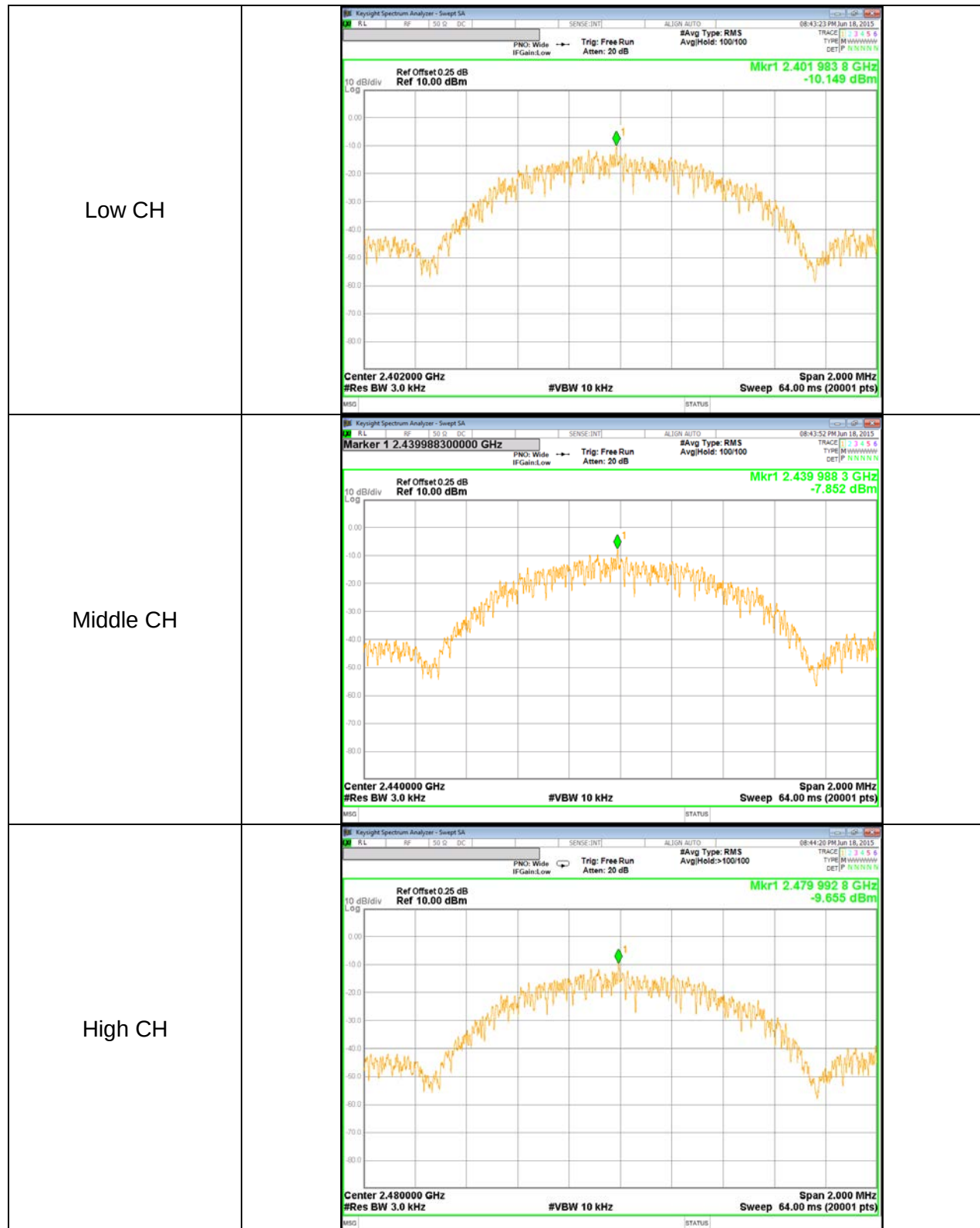
TEST PROCEDURE

Power Spectral Density was performed utilizing the "Method PKPSD (Peak PSD)" under KDB558074 D01 DTS Meas Guidance v03r03

RESULTS

Channel	Frequency [MHz]	PSD [dBm]	Limit [dBm]	Margin [dB]
Low	2402	-10.15	8.00	-18.15
Mid	2440	-7.85	8.00	-15.85
High	2480	-9.66	8.00	-17.66

POWER SPECTRAL DENSITY PLOTS



10.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

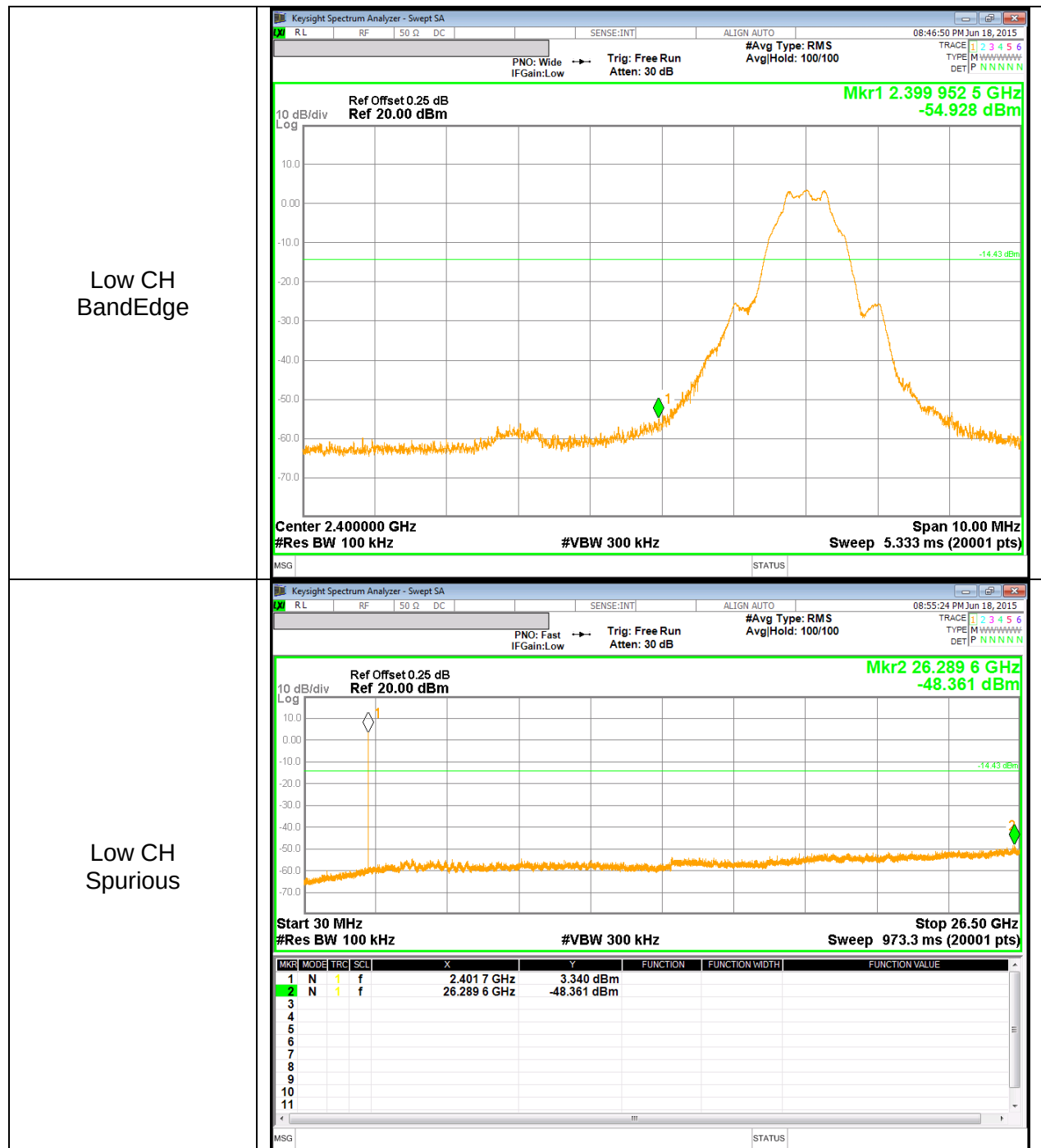
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

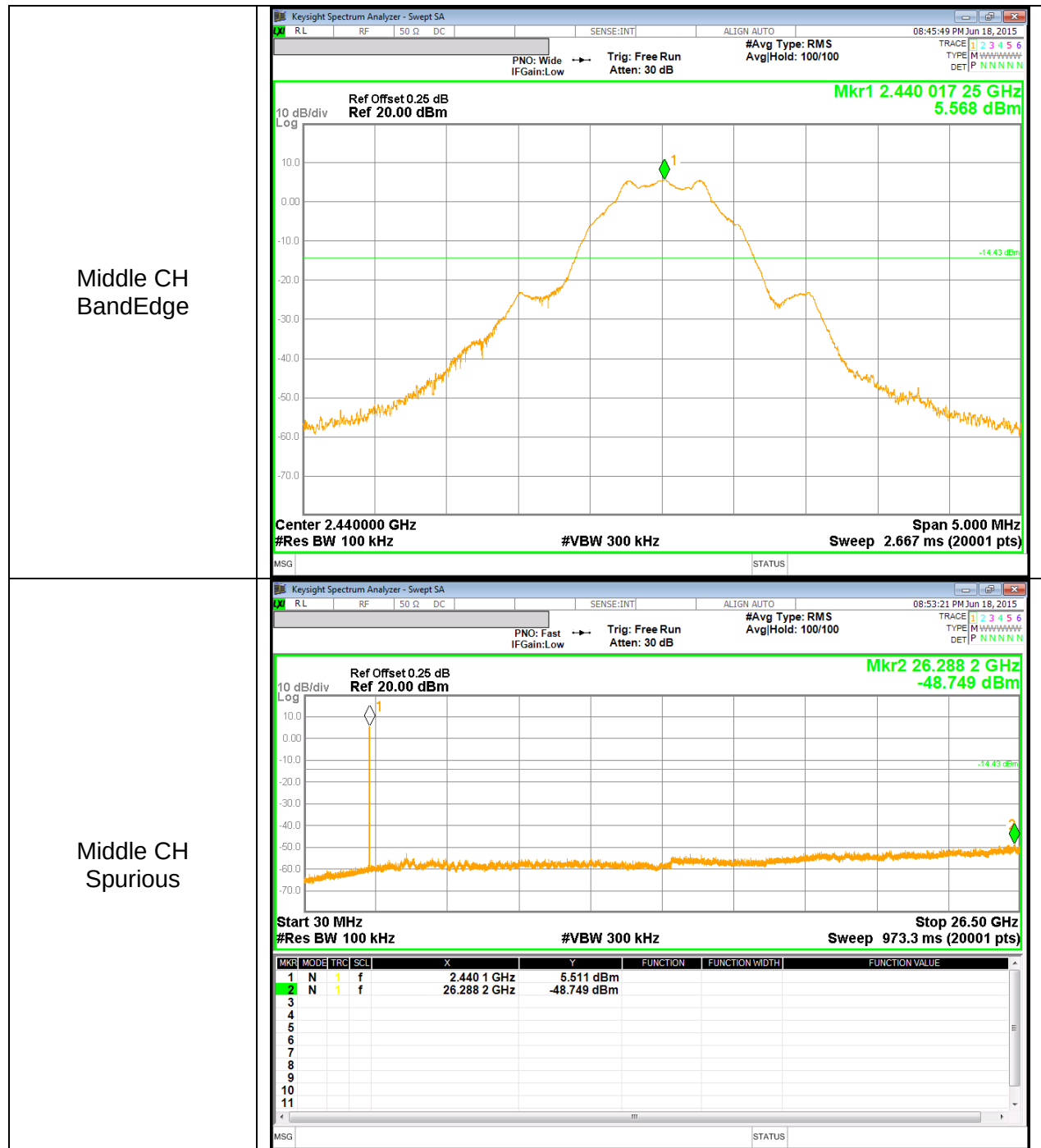
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

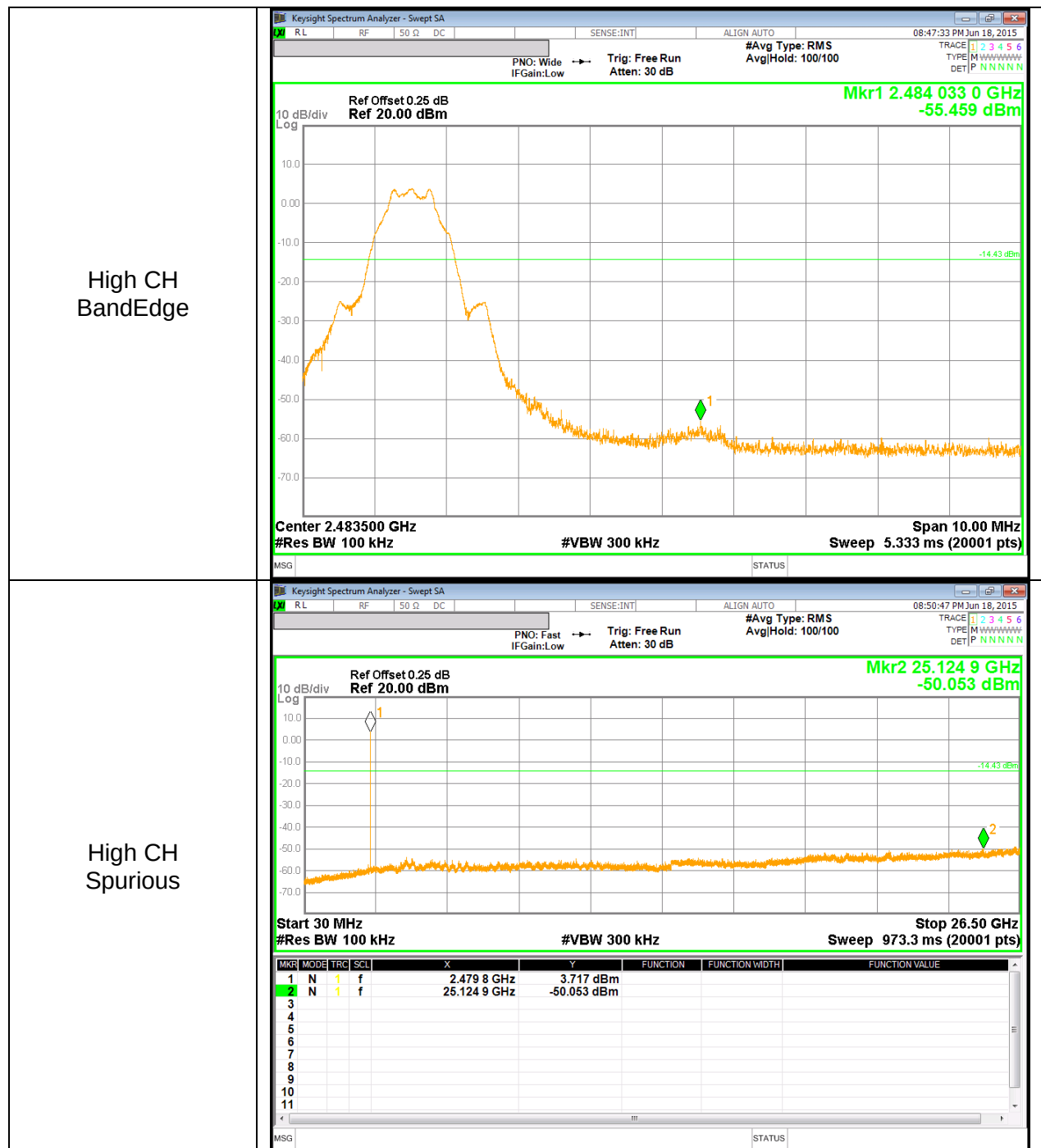
BANDEDGE & SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



11. RADIATED TEST RESULTS

11.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4 - 2009. 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.

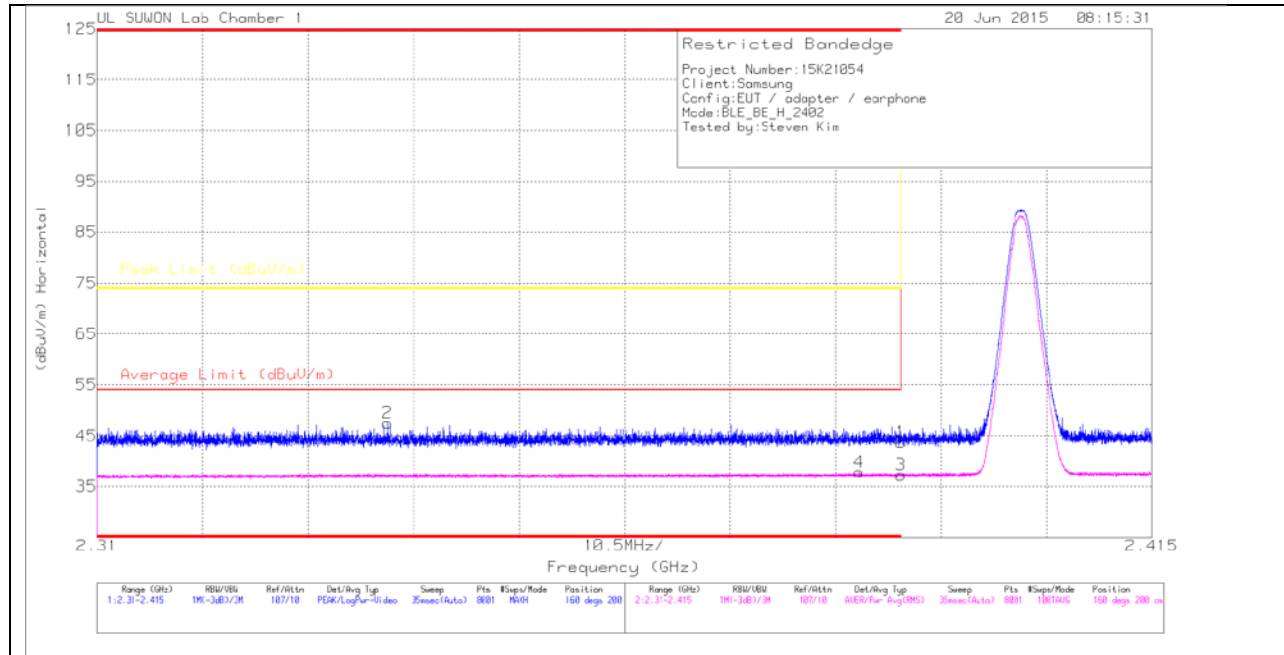
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and add duty cycle factor for average measurements. Duty cycle factor = $10 \log(1/x)$. For this sample: DCF = $10\log(1/0.625)=2.06\text{dB}$ (Spectrum Analyzer round it up to 2.06dB)

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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.

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

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

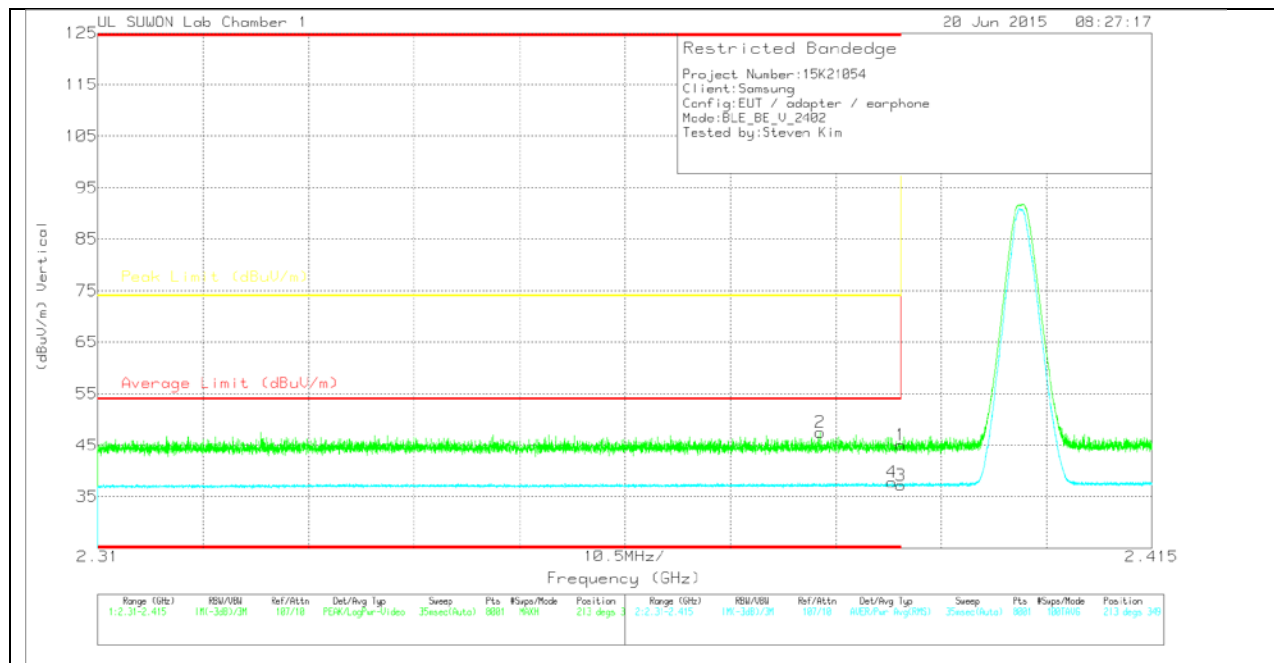
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3115D Factor	Path_2_10d B	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	38.61	Pk	27.9	-22.8	0	43.71	-	-	74	-30.29	160	200	H
2	* 2.339	42.54	Pk	27.8	-22.9	0	47.44	-	-	74	-26.56	160	200	H
3	* 2.39	30.12	RMS	27.9	-22.8	2.06	37.28	54	-16.72	-	-	160	200	H
4	* 2.386	30.66	RMS	27.9	-22.8	2.06	37.82	54	-16.18	-	-	160	200	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3115D Factor	Path_2_10dB	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	39.93	Pk	27.9	-22.8	0	45.03	-	-	74	-28.97	213	349	V
2	* 2.382	42.38	Pk	27.9	-22.8	0	47.48	-	-	74	-26.52	213	349	V
3	* 2.39	30.07	RMS	27.9	-22.8	2.06	37.23	54	-16.77	-	-	213	349	V
4	* 2.389	30.63	RMS	27.9	-22.8	2.06	37.79	54	-16.21	-	-	213	349	V

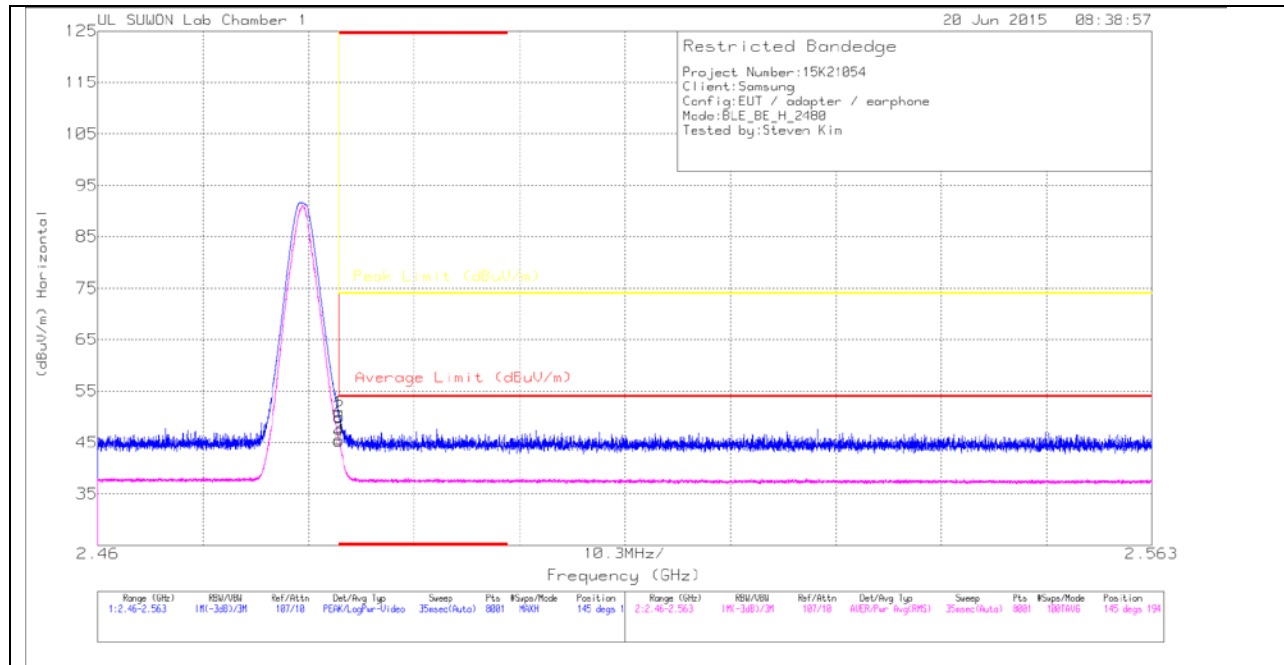
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

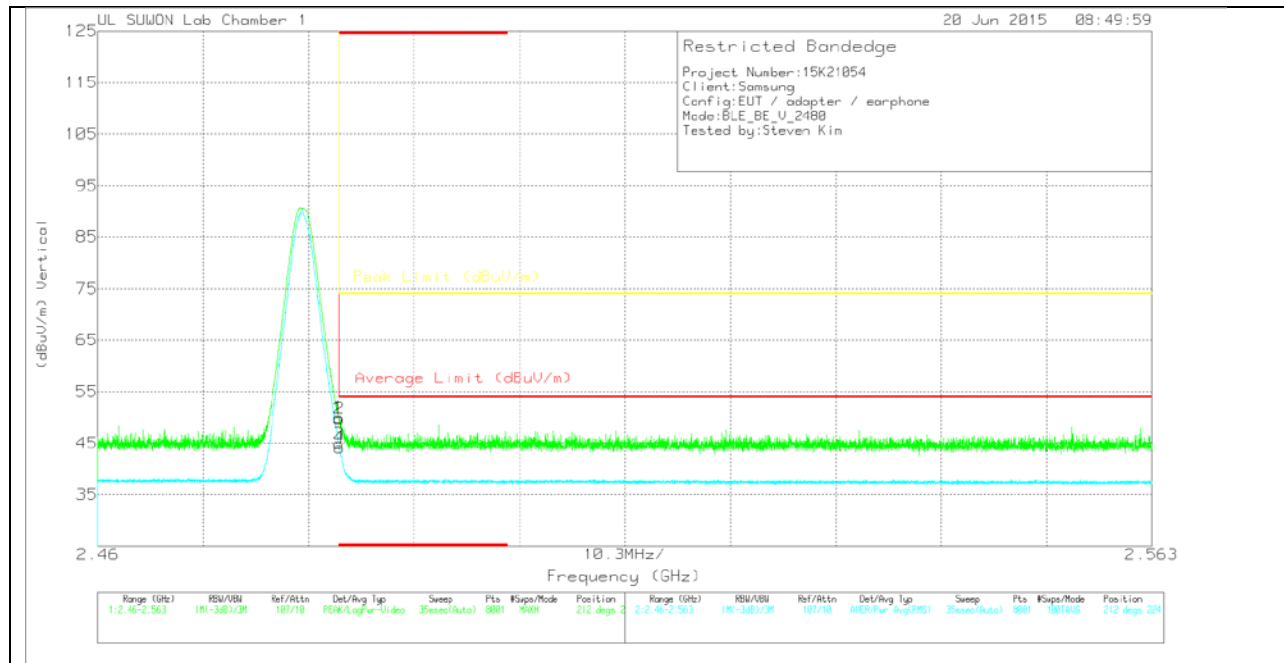
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3115D Factor	Path_2_10d B	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	45.59	Pk	27.9	-22.6	0	50.89	-	-	74	-23.11	145	194	H
2	* 2.484	44.68	Pk	27.9	-22.6	0	49.98	-	-	74	-24.02	145	194	H
3	* 2.484	38.28	RMS	27.9	-22.6	2.06	45.64	54	-8.36	-	-	145	194	H
4	* 2.484	37.94	RMS	27.9	-22.6	2.06	45.3	54	-8.7	-	-	145	194	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3115D Factor	Path_2_10d B	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	44.65	Pk	27.9	-22.6	0	49.95	-	-	74	-24.05	212	224	V
2	* 2.484	44.44	Pk	27.9	-22.6	0	49.74	-	-	74	-24.26	212	224	V
3	* 2.484	37.54	RMS	27.9	-22.6	2.06	44.9	54	-9.1	-	-	212	224	V
4	* 2.484	36.77	RMS	27.9	-22.6	2.06	44.13	54	-9.87	-	-	212	224	V

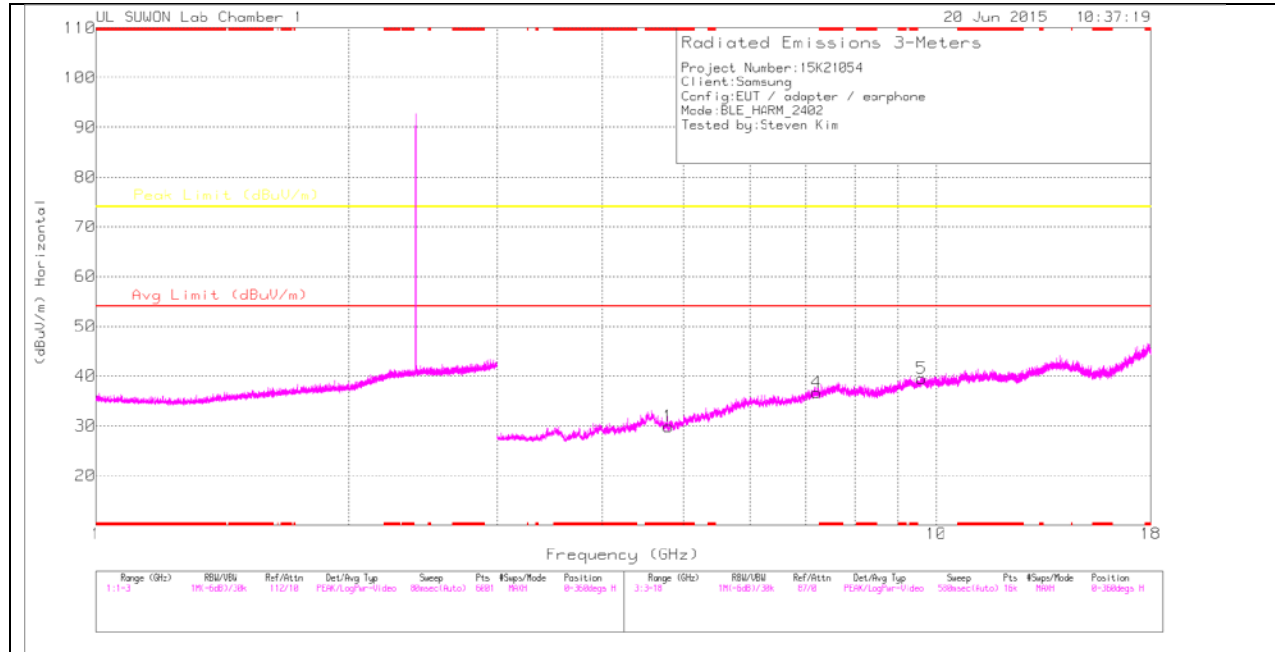
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

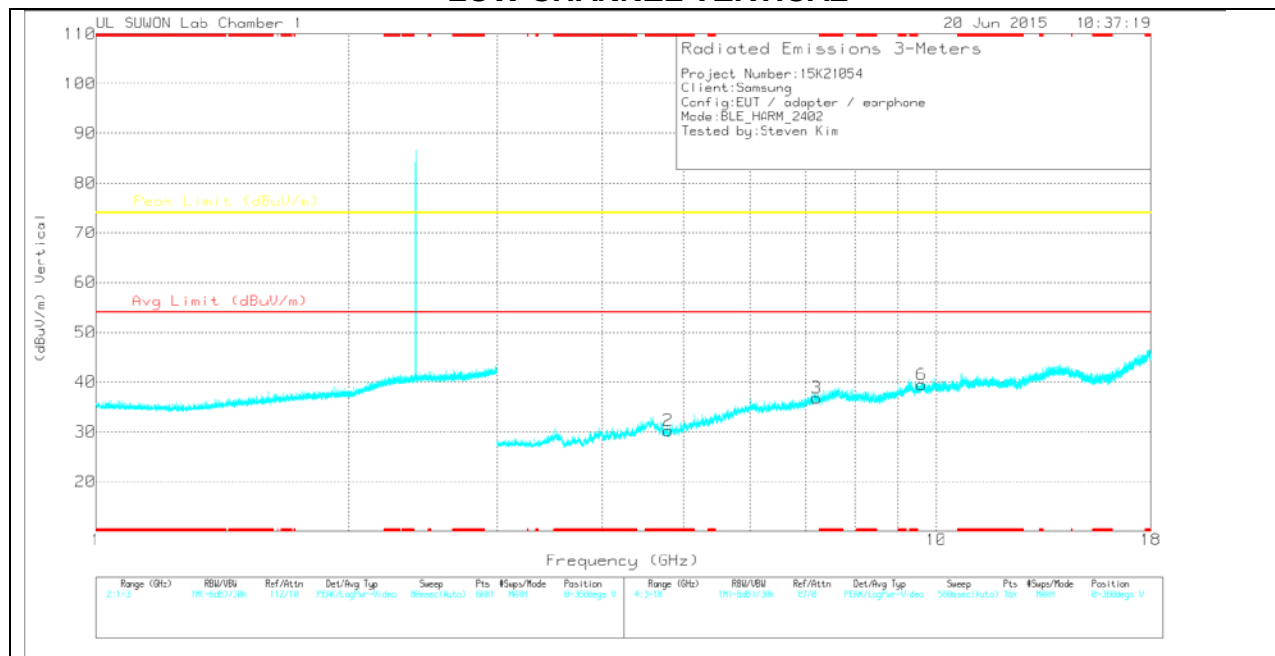
RMS - RMS detection

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

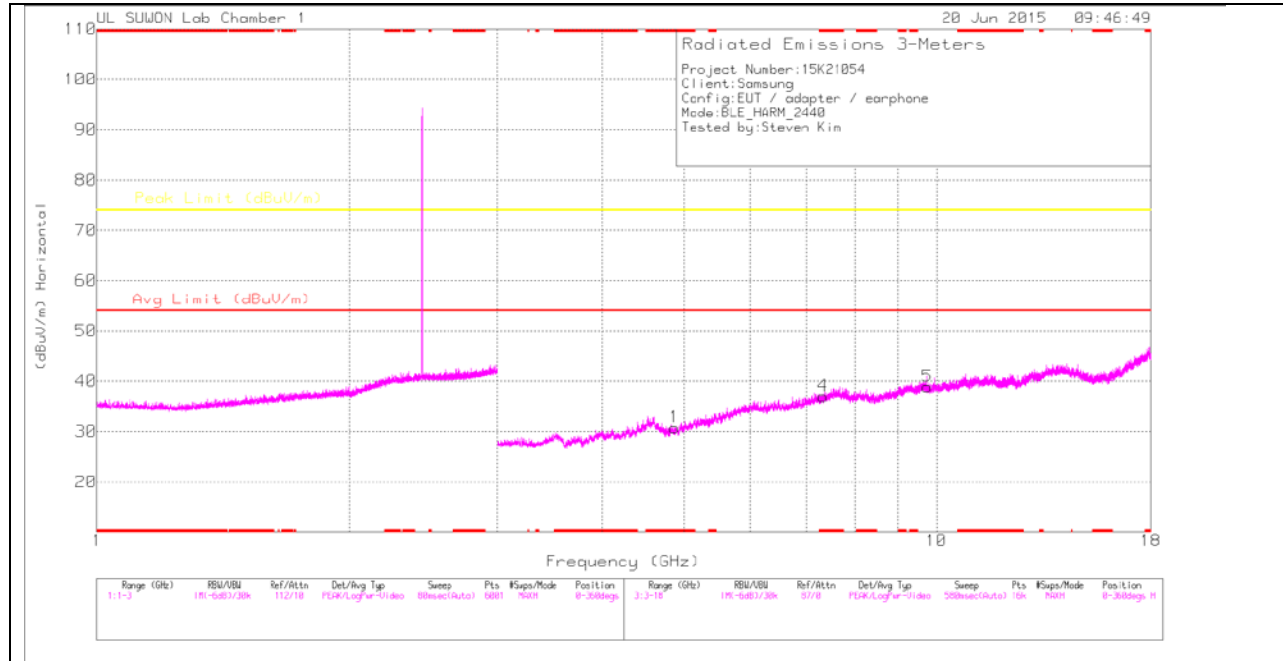
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3115D Factor	Path_3_3GHP	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	* 4.801	27.84	PK	31.9	-29.9	0	29.84	-	-	74	-44.16	0-360	200	H
4	7.203	25.22	PK	36.9	-25.4	0	36.72	-	-	-	-	0-360	200	H
5	9.609	22.84	PK	37.7	-21	0	39.54	-	-	-	-	0-360	100	H
2	* 4.798	28.21	PK	31.9	-29.9	0	30.21	-	-	74	-43.79	0-360	200	V
3	7.205	25.24	PK	37	-25.4	0	36.84	-	-	-	-	0-360	200	V
6	9.607	22.78	PK	37.7	-21	0	39.48	-	-	-	-	0-360	200	V

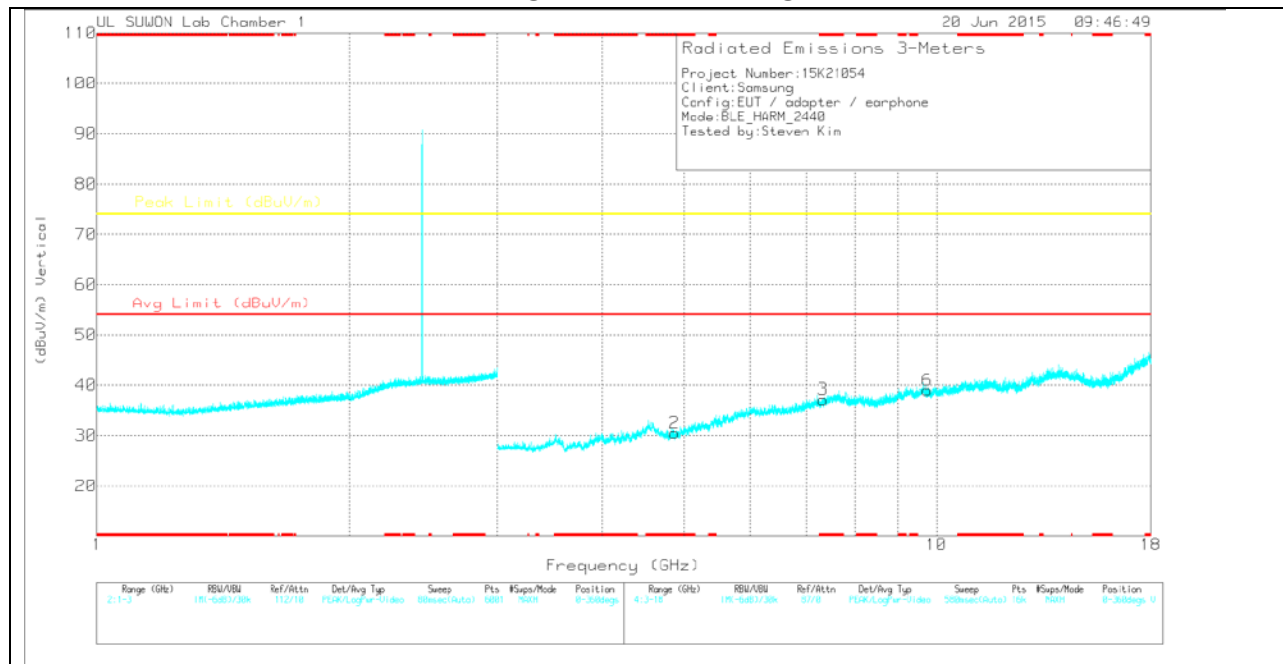
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak detector

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

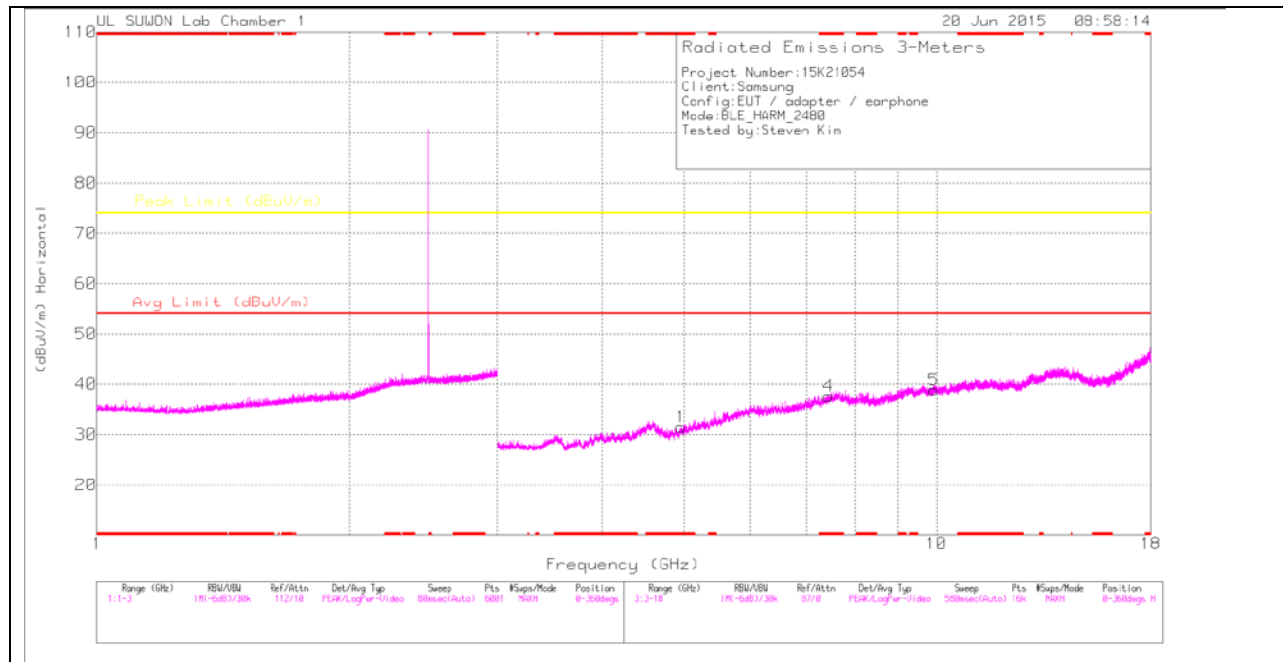
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3115D Factor	Path_3_3GHP	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	* 4.878	27.91	PK	32	-29.1	0	30.81	-	-	74	-43.19	0-360	200	H
4	* 7.32	25.55	PK	37.1	-25.6	0	37.05	-	-	74	-36.95	0-360	100	H
5	9.758	23.33	PK	37.6	-22	0	38.93	-	-	-	-	0-360	100	H
2	* 4.875	27.72	PK	32	-29.2	0	30.52	-	-	74	-43.48	0-360	100	V
3	* 7.322	25.57	PK	37.2	-25.6	0	37.17	-	-	74	-36.83	0-360	200	V
6	9.756	23.42	PK	37.6	-22	0	39.02	-	-	-	-	0-360	200	V

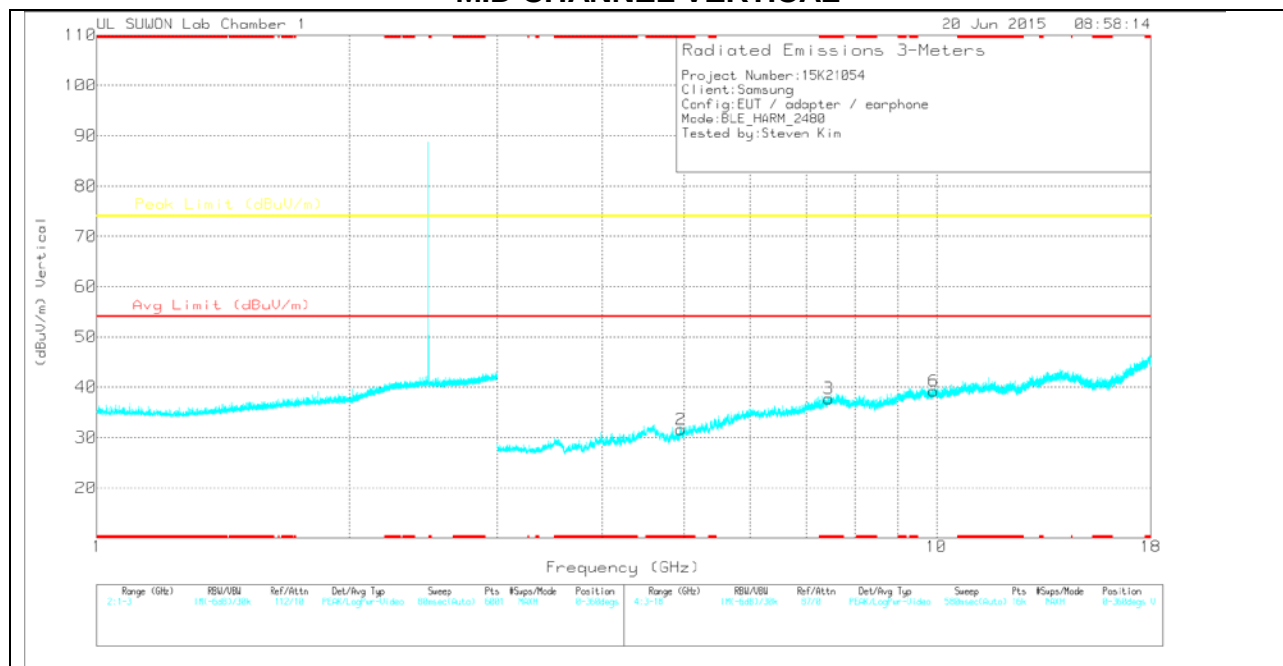
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak detector

HIGH 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	3115D Factor	Path_3_3GHP	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	* 4.958	28.28	PK	32.1	-28.9	0	31.48	-	-	74	-42.52	0-360	200	H
4	* 7.432	25.12	PK	37.3	-24.8	0	37.62	-	-	74	-36.38	0-360	100	H
5	9.922	21.35	PK	37.9	-20.4	0	38.85	-	-	-	-	0-360	100	H
2	* 4.958	28.42	PK	32.1	-28.9	0	31.62	-	-	74	-42.38	0-360	200	V
3	* 7.436	25.26	PK	37.3	-24.8	0	37.76	-	-	74	-36.24	0-360	200	V
6	9.92	21.71	PK	37.9	-20.4	0	39.21	-	-	-	-	0-360	100	V

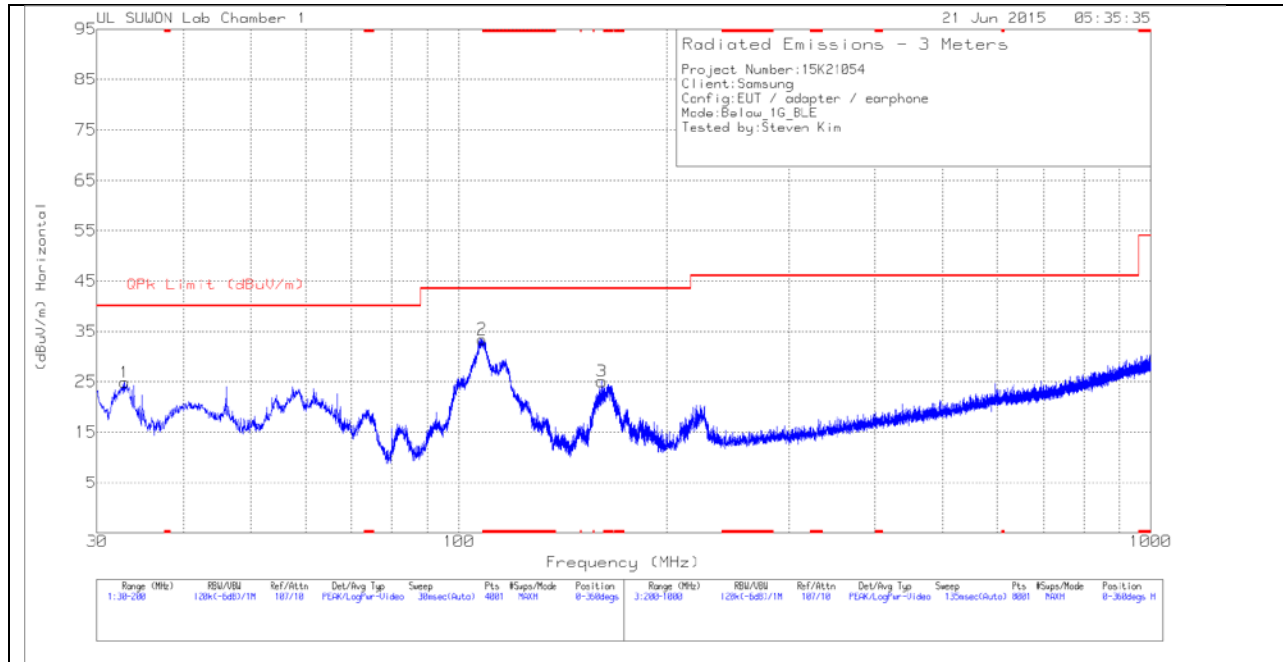
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – PK detector

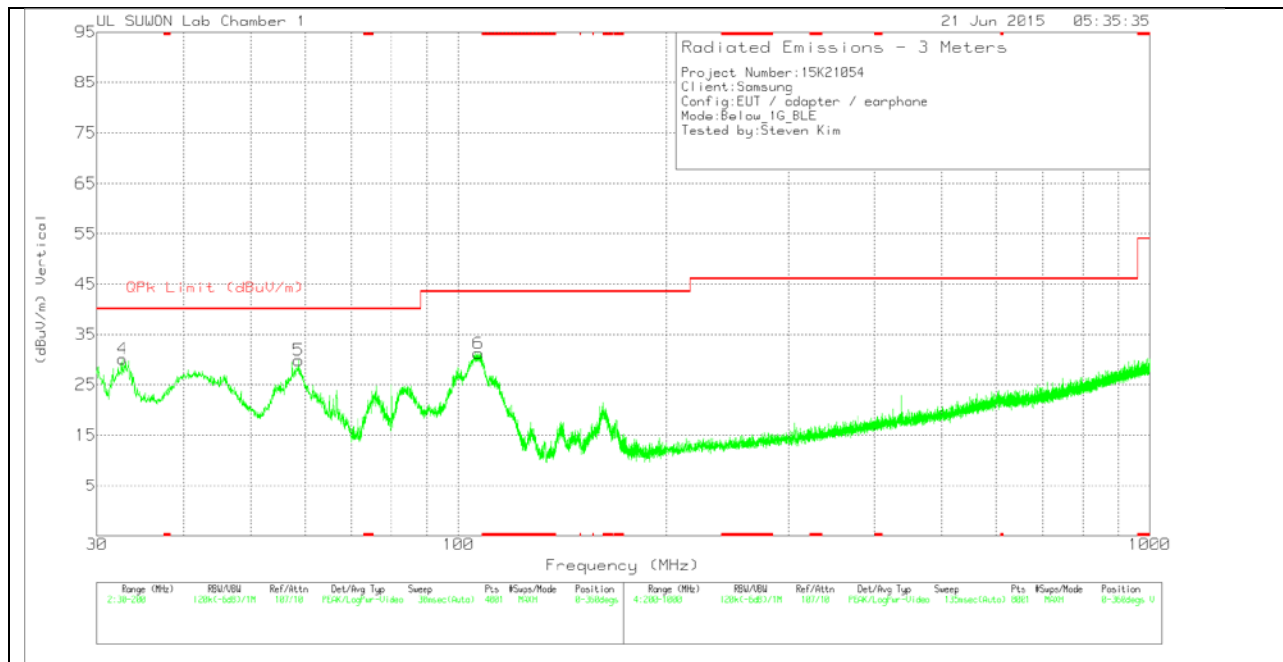
11.3. WORST-CASE BELOW 1 GHz

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	VULB9163-750	Bi-Log	DC Corr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	32.8475	44.96	Pk	10.4	-30.5	0	24.86	40	-15.14	0-360	400	H
2	* 108.1575	51.72	Pk	10.9	-29.2	0	33.42	43.52	-10.1	0-360	300	H
3	160.985	45.17	Pk	8.5	-28.6	0	25.07	43.52	-18.45	0-360	100	H
4	32.635	50.23	Pk	10.4	-30.5	0	30.13	40	-9.87	0-360	100	V
5	58.73	46.93	Pk	12.8	-29.9	0	29.83	40	-10.17	0-360	100	V
6	106.84	49.43	Pk	11	-29.2	0	31.23	43.52	-12.29	0-360	100	V

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

Pk - Peak detector

12. 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.

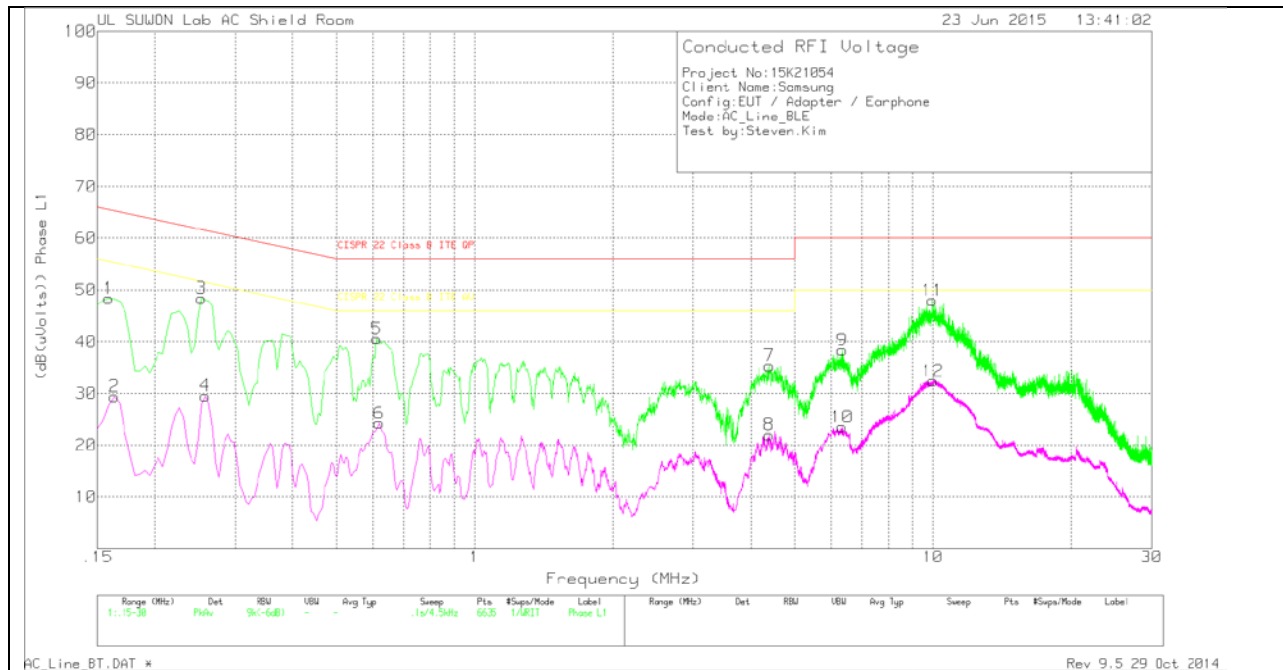
TEST PROCEDURE

ANSI C63.4 - 2009

RESULTS

6 WORST EMISSIONS

LINE 1 PLOT



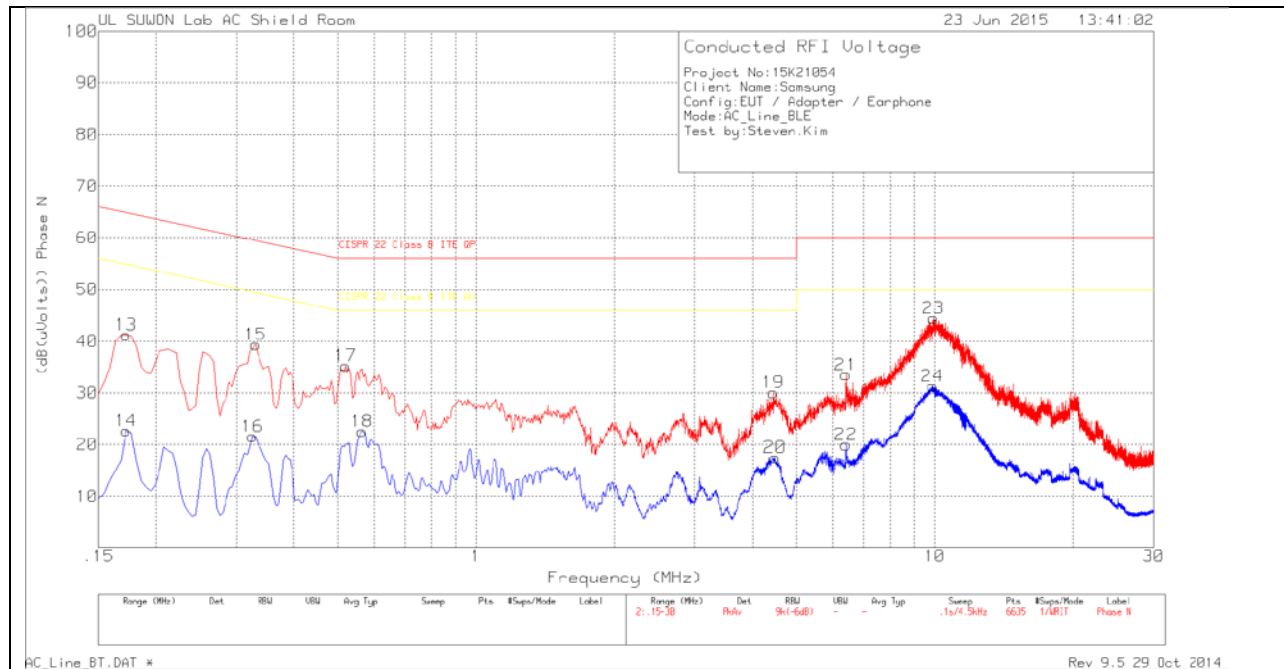
LINE 1 RESULTS

Phase L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_w ith ex-cord_L1	CE Shield Room	Corrected Reading (dBuV)	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
1	.159	38.38	Pk	10	0	48.38	65.52	-17.14	-	-
2	.1635	19.3	Av	10.1	0	29.4	-	-	55.28	-25.88
3	.2535	38.71	Pk	9.7	0	48.41	61.64	-13.23	-	-
4	.258	19.84	Av	9.7	0	29.54	-	-	51.5	-21.96
5	.61125	30.47	Pk	10.1	0	40.57	56	-15.43	-	-
6	.618	14.16	Av	10.1	0	24.26	-	-	46	-21.74
7	4.398	25.47	Pk	9.8	.1	35.37	56	-20.63	-	-
8	4.389	12.09	Av	9.8	.1	21.99	-	-	46	-24.01
9	6.342	28.48	Pk	9.8	.1	38.38	60	-21.62	-	-
10	6.3375	13.64	Av	9.8	.1	23.54	-	-	50	-26.46
11	9.969	37.88	Pk	9.9	.2	47.98	60	-12.02	-	-
12	10.005	22.21	Av	10	.2	32.41	-	-	50	-17.59

Pk - Peak detector

Av - Average detection

LINE 2 PLOT



LINE 2 RESULTS

Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_w ith ex-cord_N	CE Shield Room	Corrected Reading (dBuV)	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
13	.1725	31.01	Pk	10.2	0	41.21	64.84	-23.63	-	-
14	.1725	12.48	Av	10.2	0	22.68	-	-	54.84	-32.16
15	.33	29.35	Pk	10	0	39.35	59.45	-20.1	-	-
16	.3255	11.69	Av	9.9	0	21.59	-	-	49.57	-27.98
17	.519	25.16	Pk	10.1	0	35.26	56	-20.74	-	-
18	.564	12.43	Av	10.1	0	22.53	-	-	46	-23.47
19	4.443	20.17	Pk	9.8	.1	30.07	56	-25.93	-	-
20	4.4835	7.59	Av	9.8	.1	17.49	-	-	46	-28.51
21	6.4005	23.49	Pk	9.9	.1	33.49	60	-26.51	-	-
22	6.4005	9.97	Av	9.9	.1	19.97	-	-	50	-30.03
23	9.942	34.24	Pk	10	.2	44.44	60	-15.56	-	-
24	9.8925	21.12	Av	10	.2	31.32	-	-	50	-18.68

Pk - Peak detector

Av - Average detection