



**FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-247 ISSUE 1**

Bluetooth Low Energy

CERTIFICATION TEST REPORT

FOR

Bluetooth/BLE and DTS b/g/n Watch

MODEL NUMBER : SM-R770

FCC ID: A3LSMR770

IC ID : 649E-SMR770

REPORT NUMBER: 16K23804-E2V3

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Prepared for

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Revision History

Rev.	Issue Date	Revisions	Revised By
V1	08/31/16	Initial issue	Junwhan Lee
V2	09/01/16	Revised section 5.4, 11.1	Junwhan Lee
V3	09/02/16	Revised section 6, 11.1	Junwhan Lee

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: Bluetooth/BLE and DTS b/g/n Watch
MODEL NUMBER: SM-R770
SERIAL NUMBER: R3AH700KETK, R3AH700LQWF (RADIATED);
R3AH8001S8R (CONDUCTED)
DATE TESTED: AUG 26, 2016 - AUG 31, 2016

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-247 Issue 1	Pass
INDUSTRY CANADA RSS-GEN Issue 4	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
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CY Choi
Suwon Lab Engineer
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Tested By:



Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, KDB 558074 D01 v03r05, ANSI C63.10-2013 for FCC and ANSI C63.10-2013, RSS-GEN Issue 4, RSS-247 Issue 1 for IC.

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 and DTS b/g/n Watch.
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	5.97	3.96
		Average	5.61	3.64

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of -4.5 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 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
Adapter	SAMSUNG	ETA0U60JBE	DK1G826HS17-E	N/A
Data Cable	SAMSUNG	ECB-DU2EBE	N/A	N/A
Wireless Charger	SAMSUNG	EP-YO760	N/A	A3LEPYO760

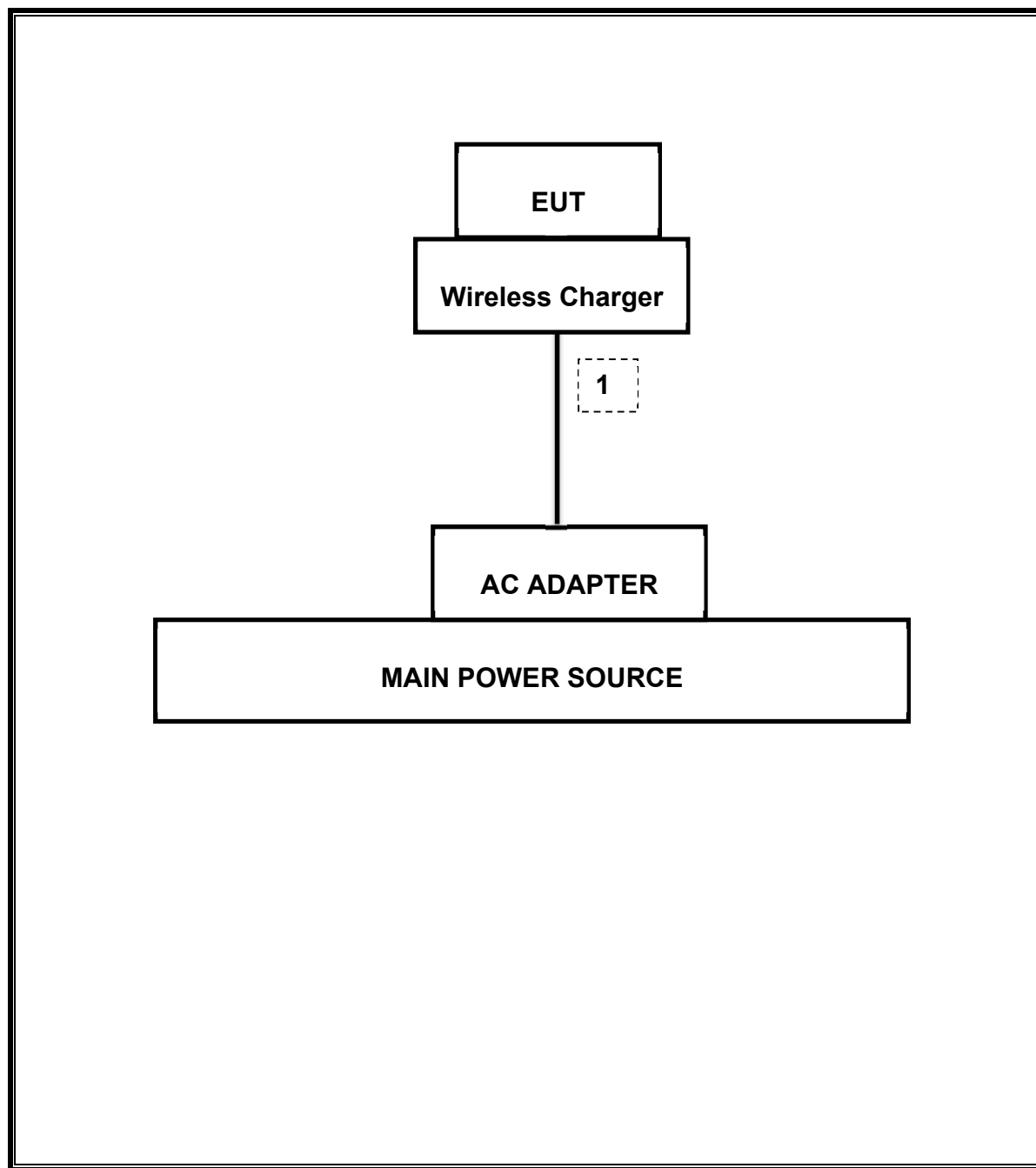
I/O CABLES

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

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	11-17-16
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	04-25-17
Antenna, Horn, 18 GHz	ETS	3115	00167211	09-20-16
Antenna, Horn, 18 GHz	ETS	3115	00161451	05-17-17
Antenna, Horn, 18 GHz	ETS	3117	00168724	06-17-17
Antenna, Horn, 18 GHz	ETS	3117	00168717	06-17-17
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	08-16-17
Average Power Sensor	R&S	NRZ-Z91	102681	08-16-17
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
Attenuator / Switch driver	HP	11713A	3748A04272	N/A
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
LISN	R&S	ENV-216	101836	08-16-17
LISN	R&S	ENV-216	101837	08-16-17
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	11-25-17

9. SUMMARY TABLE

FCC Part Section	IC Section	Test Description	Test Limit	Test Condition	Test Result	Worst Case
15.247 (a)(2)	RSS-247 5.2(1)	Occupied Band width (6dB)	>500KHz	Conducted	Pass	709.2 kHz
2.1051, 15.247 (d)	RSS-247 5.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-55.526 dBm
15.247	RSS-247 5.4(4)	TX conducted output power	<30dBm		Pass	5.972 dBm (Peak)
15.247	RSS-247 5.2(2)	PSD	<8dBm		Pass	-9.91 dBm (Peak)
15.207 (a)	RSS-GEN Clause 8.8	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass	44.41 dBuV (Pk)
15.205, 15.209	RSS-GEN Clause 7 & 8.9	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass	42.55 dBuV/m (Av)

10. ANTENNA PORT TEST RESULTS

10.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)
IC RSS-247 §5.2 (1)

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

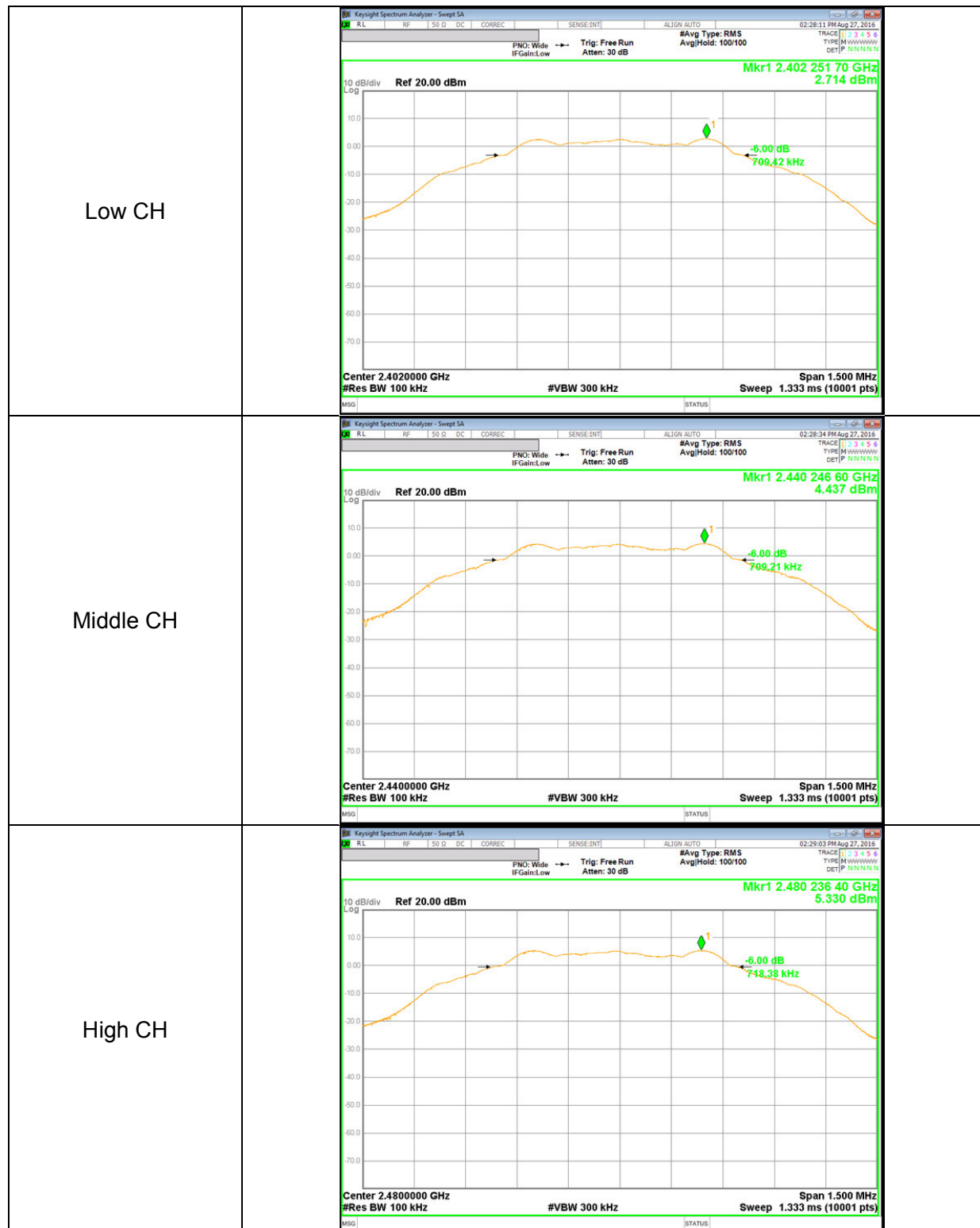
TEST PROCEDURE

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	709.4	500.0
Mid	2440	709.2	500.0
High	2480	718.4	500.0
Worst		709.2	500.0

6 dB BANDWIDTH PLOTS



10.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

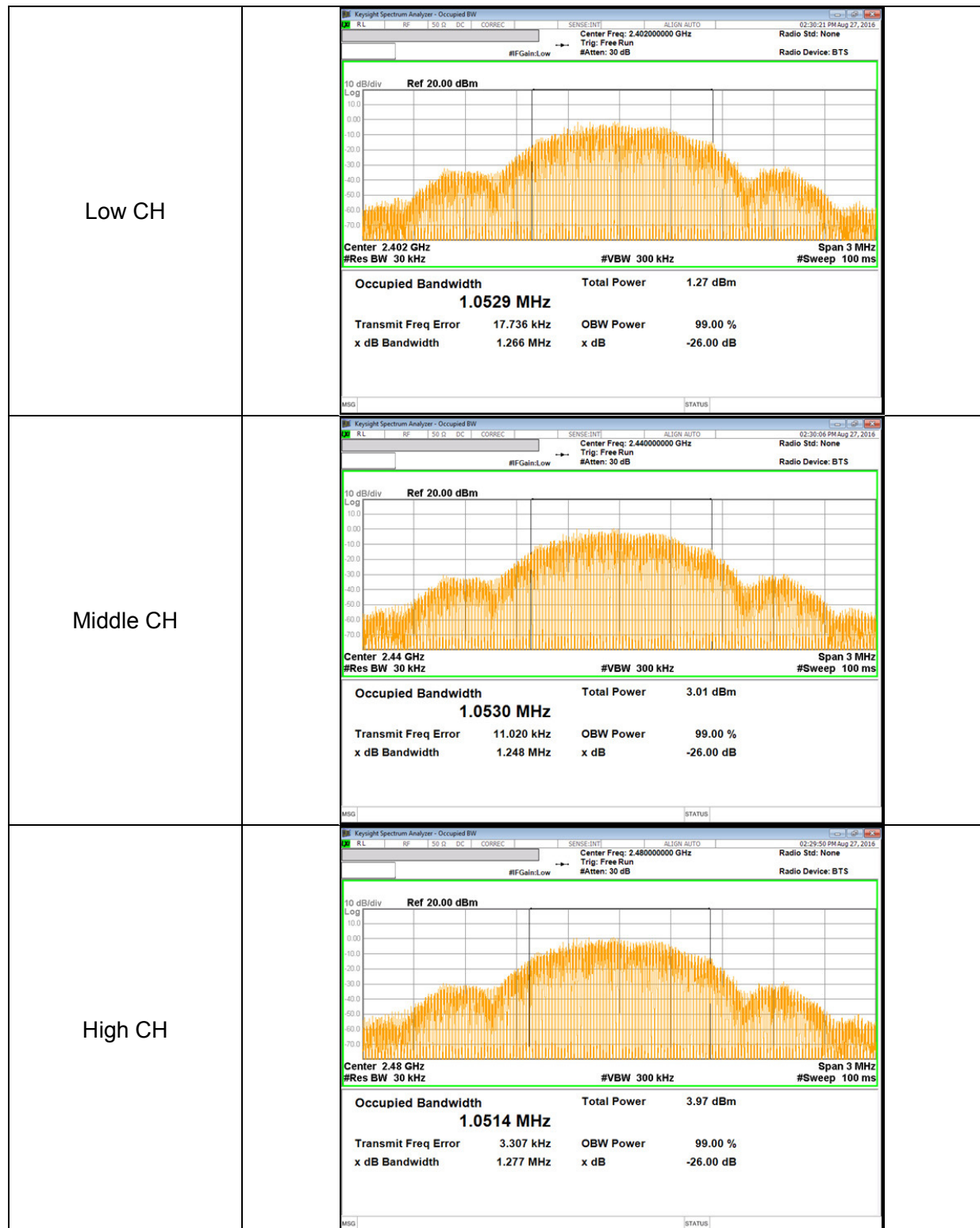
TEST PROCEDURE

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	1.053
Mid	2440	1.053
High	2480	1.051
Worst		1.053

99% BANDWIDTH PLOTS



10.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)
IC RSS-247 §5.4 (4)

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

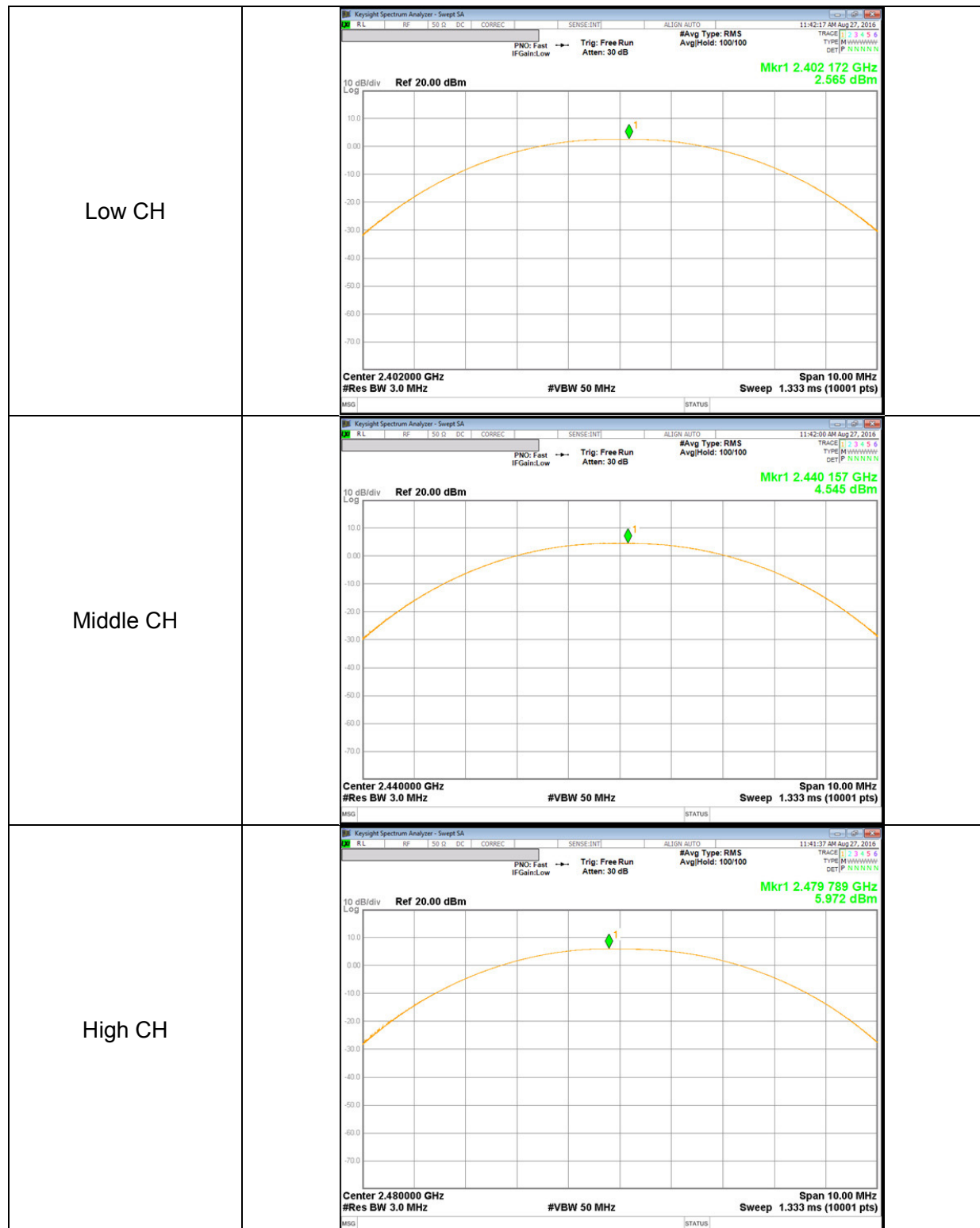
TEST PROCEDURE

Peak power is measured using KDB558074 D01 DTS Meas Guidance v03r05 under section 9.1.1 utilizing spectrum analyzer.

RESULTS

Channel	Frequency [MHz]	Peak Power Reading [dBm]	Limit [dBm]	Margin [dB]
Low	2402	2.565	30.000	-27.435
Mid	2440	4.545	30.000	-25.455
High	2480	5.972	30.000	-24.028
Worst		5.972		-24.028

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	2.14	1.63
Middle	2440	4.04	2.54
High	2480	5.61	3.64

10.5. PSD

LIMITS

FCC §15.247
IC RSS-247 §5.2 (2)

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.

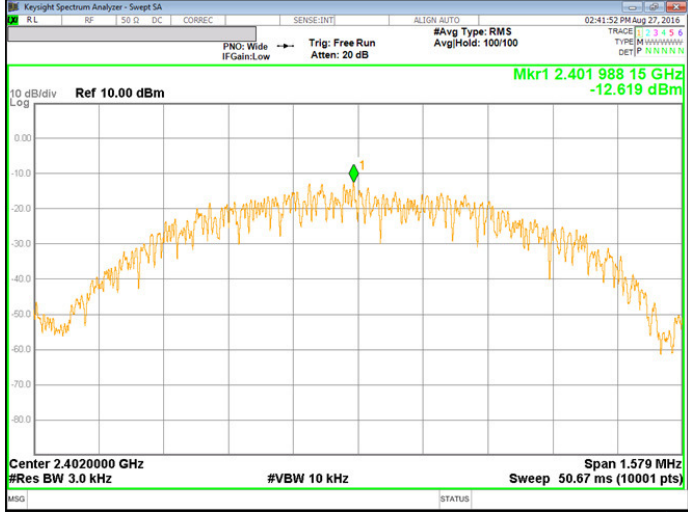
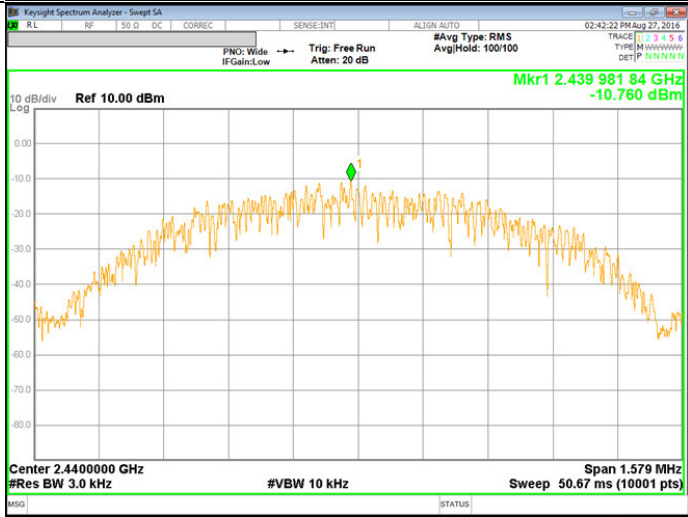
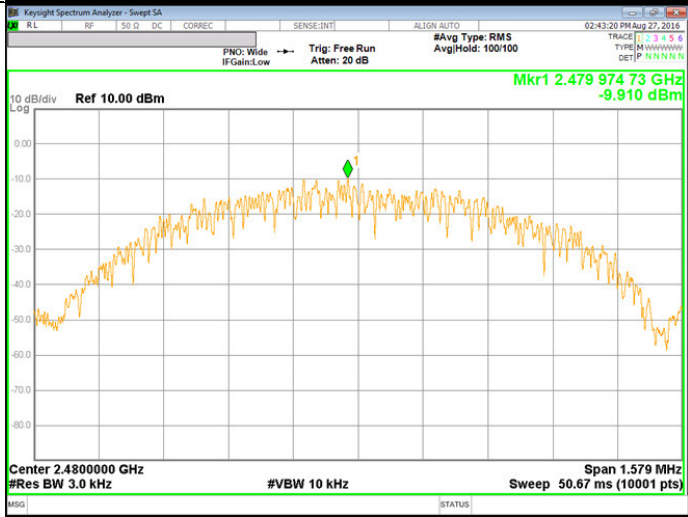
TEST PROCEDURE

Power Spectral Density was performed utilizing the "Method PKPSD (Peak PSD)" under KDB558074 D01 DTS Meas Guidance v03r05

RESULTS

Channel	Frequency [MHz]	PSD [dBm]	Limit [dBm]	Margin [dB]
Low	2402	-12.62	8.00	-20.62
Mid	2440	-10.76	8.00	-18.76
High	2480	-9.91	8.00	-17.91

POWER SPECTRAL DENSITY PLOTS

Low CH	 KeySight Spectrum Analyzer - Swept SA RL RF 50 Ω DC CORREC SENSE:INT1 ALIGN: AUTO 02:41:52 PM Aug 27, 2016 PN0: Wide IF Gain: Low Trig: Free Run Atten: 20 dB #Avg Type: RMS AvgHold: 100/100 10 dB/div Log Ref 10.00 dBm Mkr1 2.401 988 15 GHz -12.619 dBm Center 2.4020000 GHz Span 1.579 MHz #Res BW 3.0 kHz #VBW 10 kHz Sweep 50.67 ms (10001 pts)
Middle CH	 KeySight Spectrum Analyzer - Swept SA RL RF 50 Ω DC CORREC SENSE:INT1 ALIGN: AUTO 02:42:22 PM Aug 27, 2016 PN0: Wide IF Gain: Low Trig: Free Run Atten: 20 dB #Avg Type: RMS AvgHold: 100/100 10 dB/div Log Ref 10.00 dBm Mkr1 2.439 981 84 GHz -10.760 dBm Center 2.4400000 GHz Span 1.579 MHz #Res BW 3.0 kHz #VBW 10 kHz Sweep 50.67 ms (10001 pts)
High CH	 KeySight Spectrum Analyzer - Swept SA RL RF 50 Ω DC CORREC SENSE:INT1 ALIGN: AUTO 02:43:20 PM Aug 27, 2016 PN0: Wide IF Gain: Low Trig: Free Run Atten: 20 dB #Avg Type: RMS AvgHold: 100/100 10 dB/div Log Ref 10.00 dBm Mkr1 2.479 974 73 GHz -9.910 dBm Center 2.4800000 GHz Span 1.579 MHz #Res BW 3.0 kHz #VBW 10 kHz Sweep 50.67 ms (10001 pts)

10.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)
IC RSS-247 §5.5

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

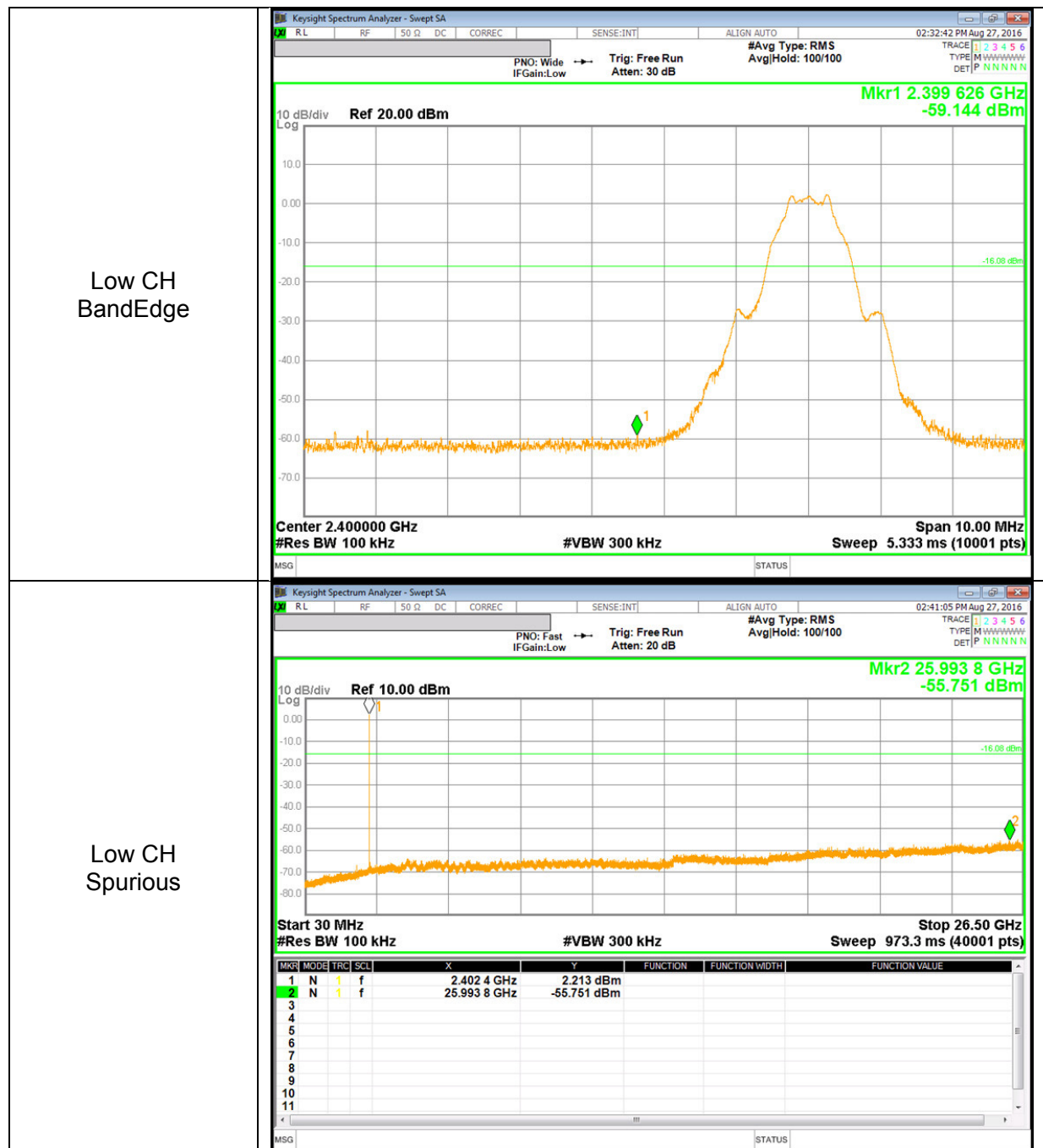
TEST PROCEDURE

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.

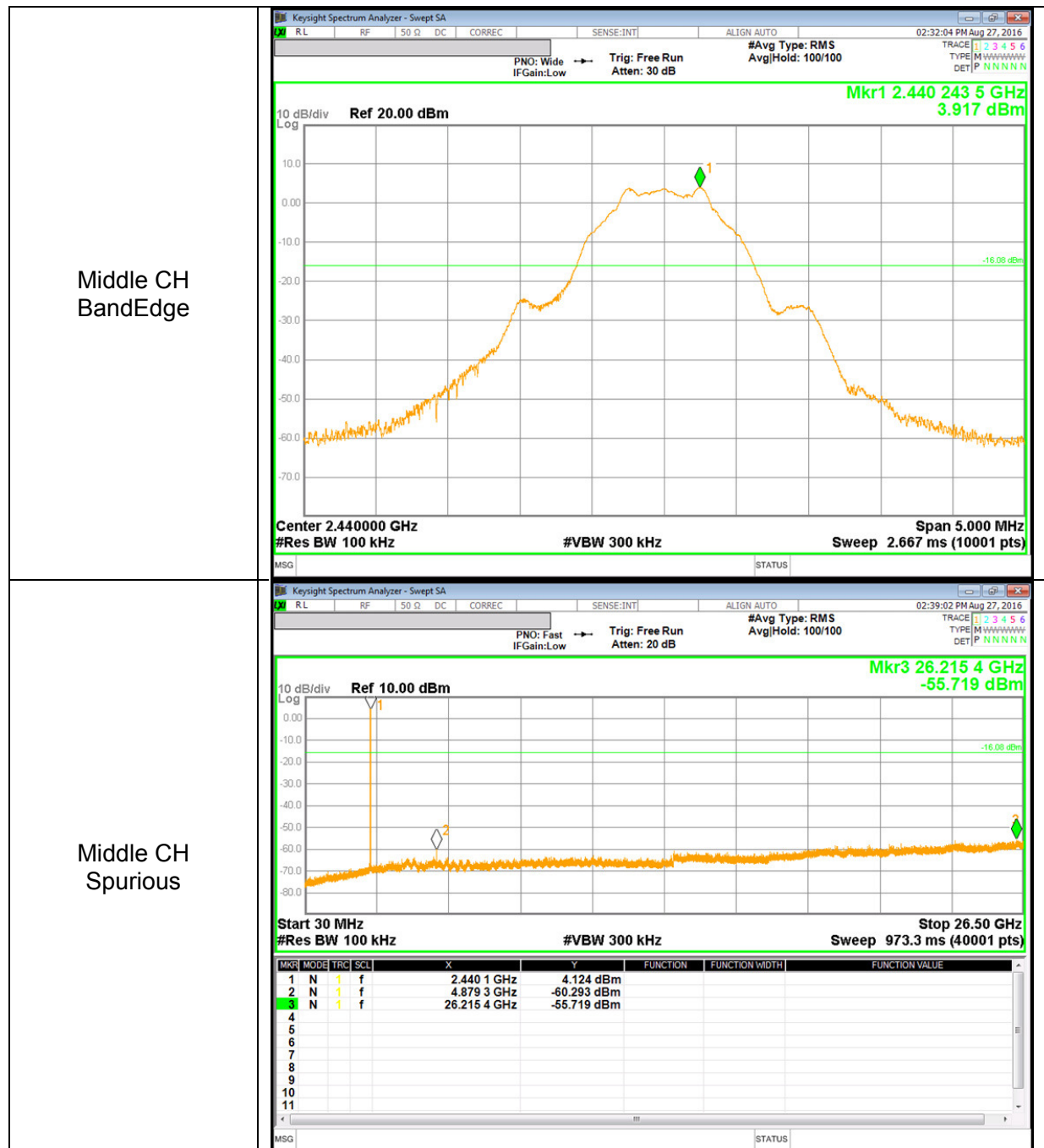
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

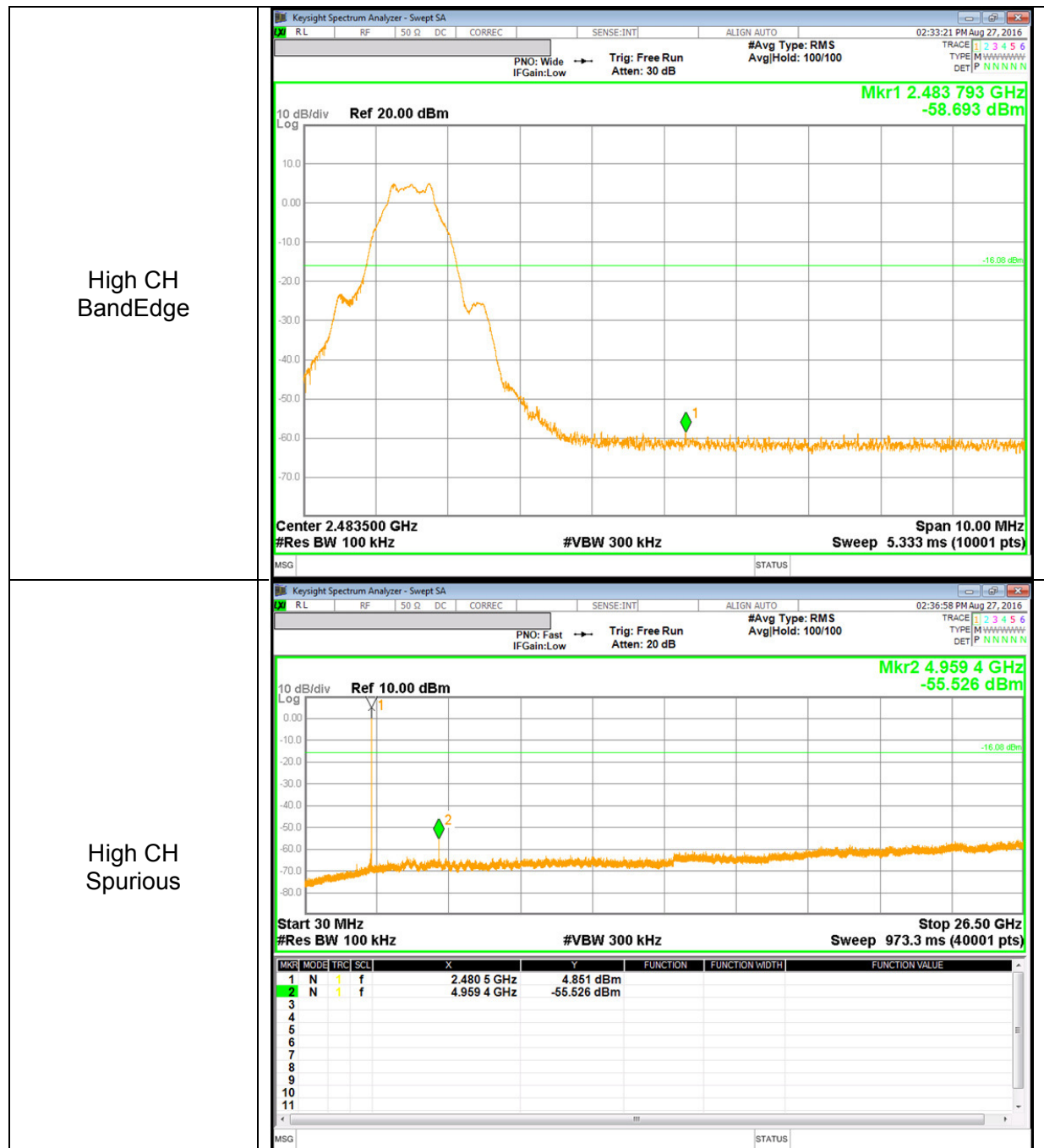
BANDEDGE & SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



11. RADIATED TEST RESULTS

11.1. LIMITS AND PROCEDURE

LIMITS

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

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: $DCF = 10 \log(1/0.603) = 2.19 \text{ dB}$
(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)

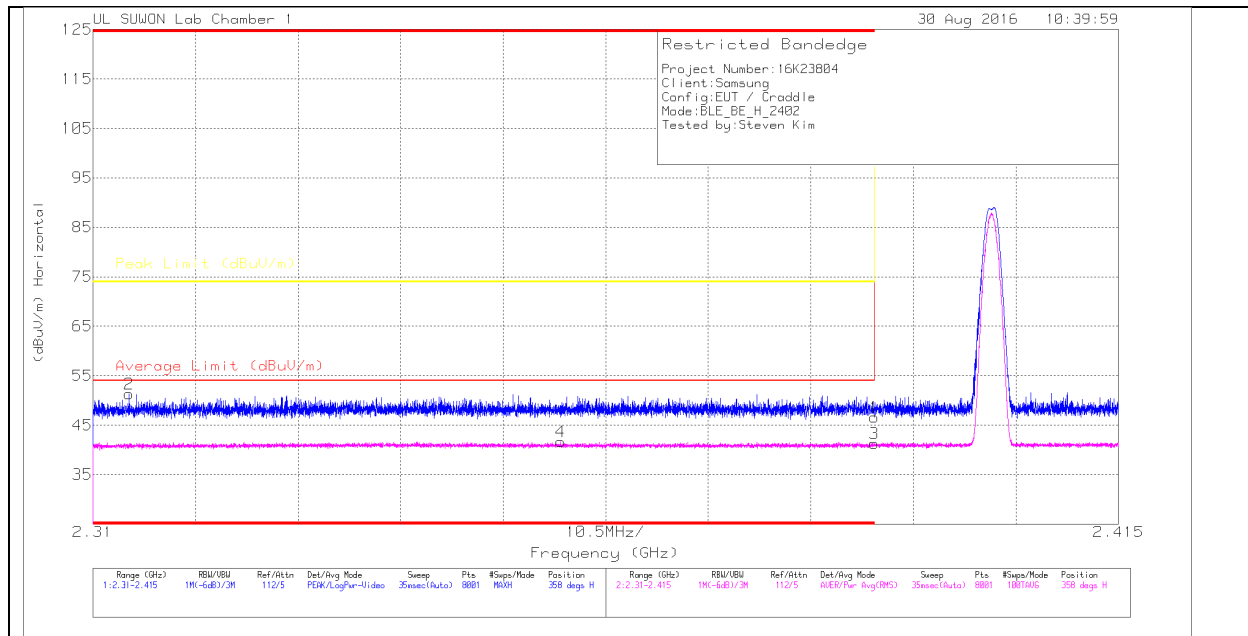
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

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.

Formula for converting the filed strength from uV/m to dBuV/m is:
 $\text{Limit (dBuV/m)} = 20 \log \text{limit (uV/m)}$

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

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

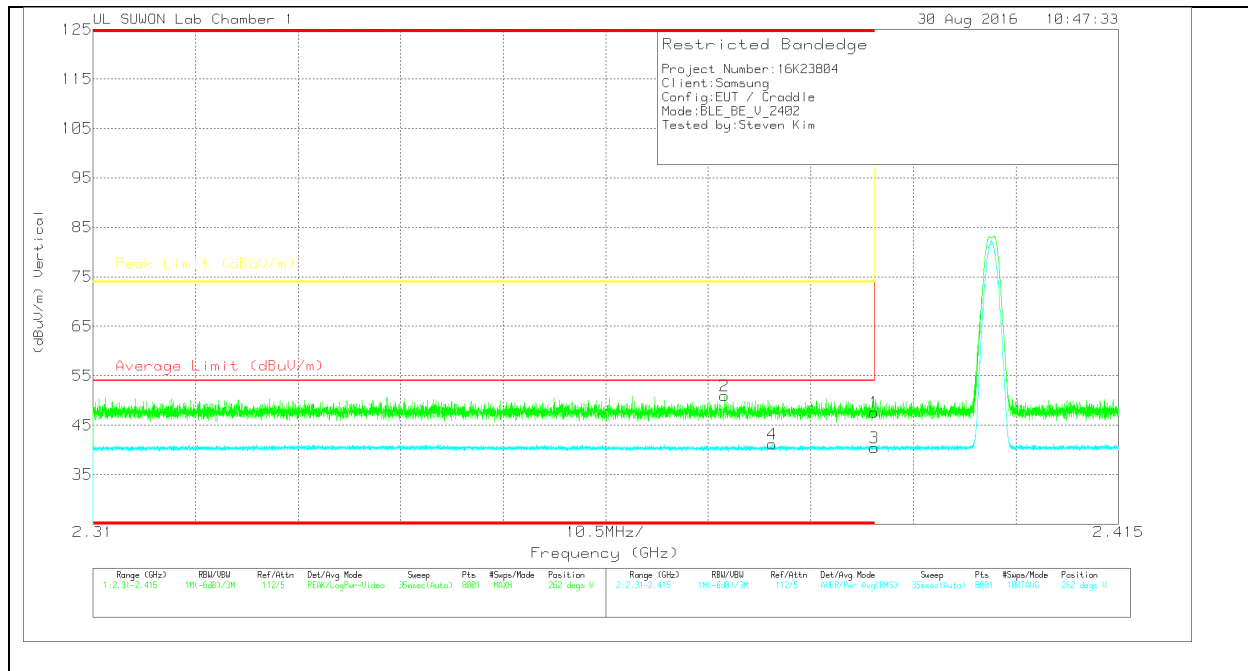
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 17)_150619	Path_2	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	43.81	Pk	31.8	-29	0	46.61	-	-	74	-27.39	358	400	H
2	* 2.314	48.7	Pk	31.7	-29.1	0	51.3	-	-	74	-22.7	358	400	H
3	* 2.39	36.28	RMS	31.8	-29	2.19	41.27	54	-12.73	-	-	358	400	H
4	* 2.358	36.8	RMS	31.7	-29	2.19	41.69	54	-12.31	-	-	358	400	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	3117(001687 17)_150619	Path_2	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	44.77	Pk	31.8	-29	0	47.57	-	-	74	-26.43	262	246	V
2	* 2.375	48.17	Pk	31.8	-29	0	50.97	-	-	74	-23.03	262	246	V
3	* 2.39	35.43	RMS	31.8	-29	2.19	40.42	54	-13.58	-	-	262	246	V
4	* 2.38	36.13	RMS	31.8	-29	2.19	41.12	54	-12.88	-	-	262	246	V

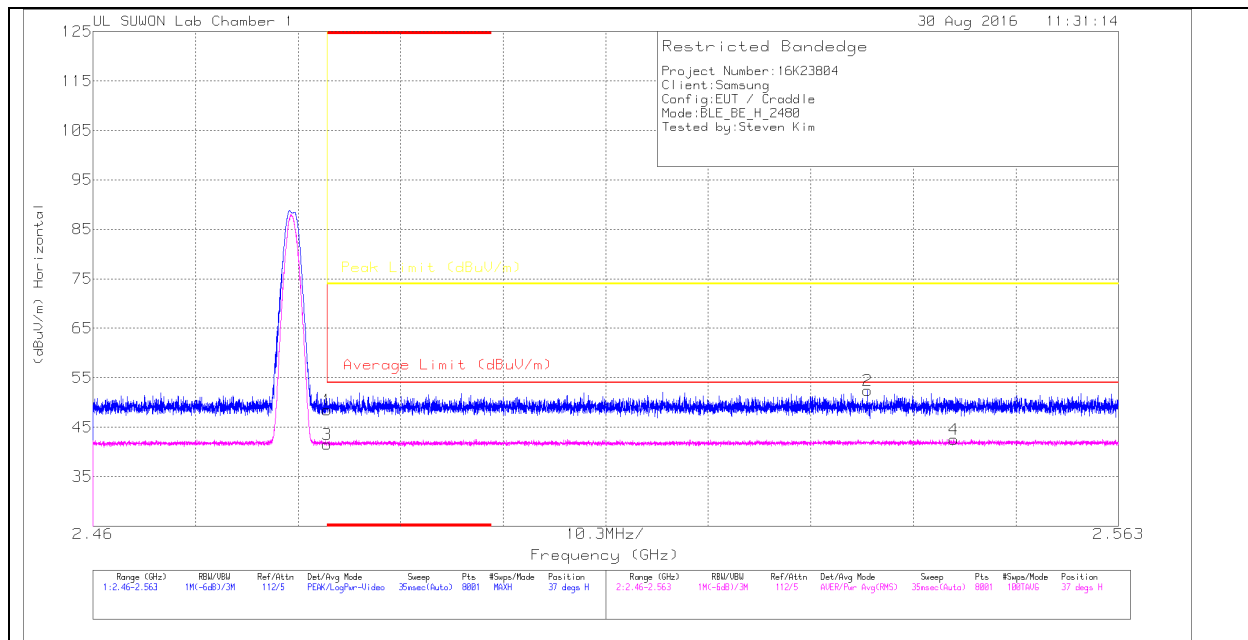
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

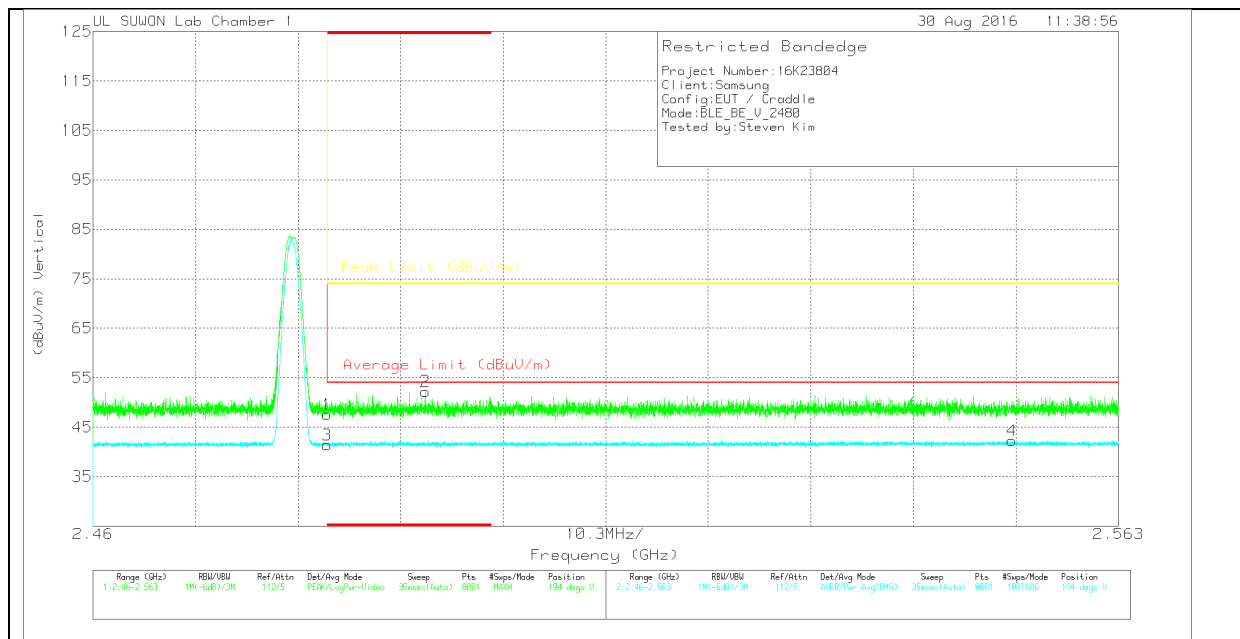
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117/001687 17_150619	Path_2	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	* 2.484	44.77	Pk	32	-28.3	0	48.47	-	-	74	-25.53	37	306	H
2	2.538	48.72	Pk	32	-28.3	0	52.42	-	-	74	-21.58	37	306	H
3	* 2.484	35.66	RMS	32	-28.3	2.19	41.55	54	-12.45	-	-	37	306	H
4	2.546	36.56	RMS	32	-28.2	2.19	42.55	54	-11.45	-	-	37	306	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	3117(001687 17)_150619	Path_2	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	43.92	Pk	32	-28.3	0	47.62	-	-	74	-26.38	194	174	V
2	* 2.493	48.54	Pk	32	-28.3	0	52.24	-	-	74	-21.76	194	174	V
3	* 2.484	35.55	RMS	32	-28.3	2.19	41.44	54	-12.56	-	-	194	174	V
4	2.552	36.34	RMS	32	-28.2	2.19	42.33	54	-11.67	-	-	194	174	V

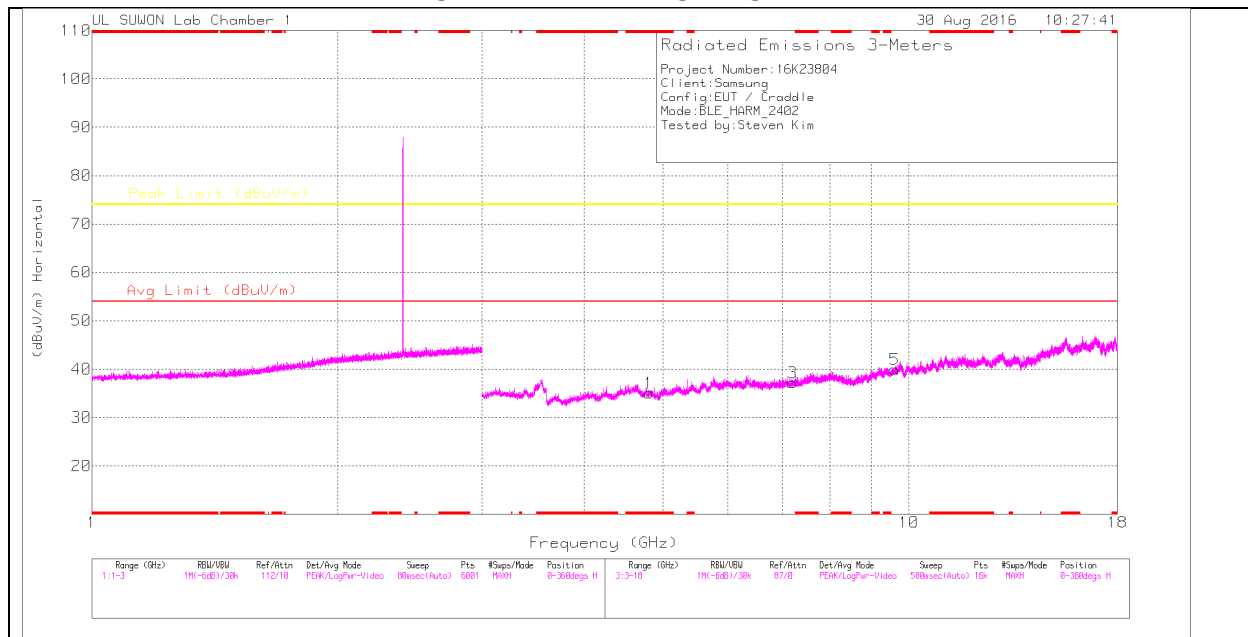
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

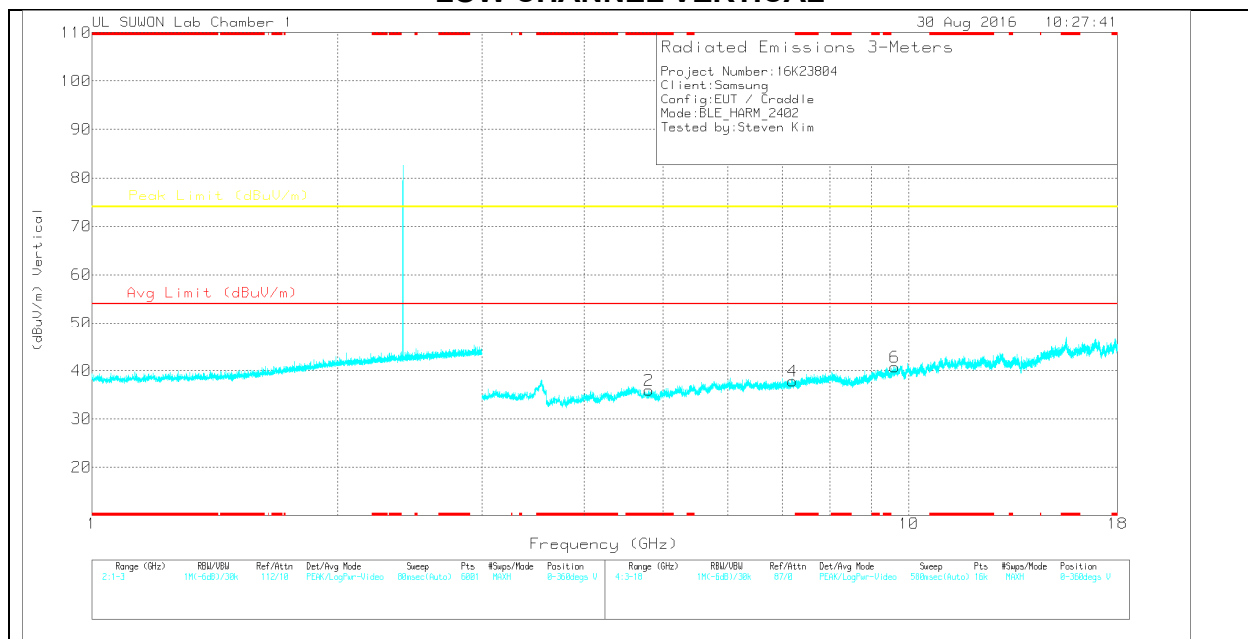
RMS - RMS detection

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

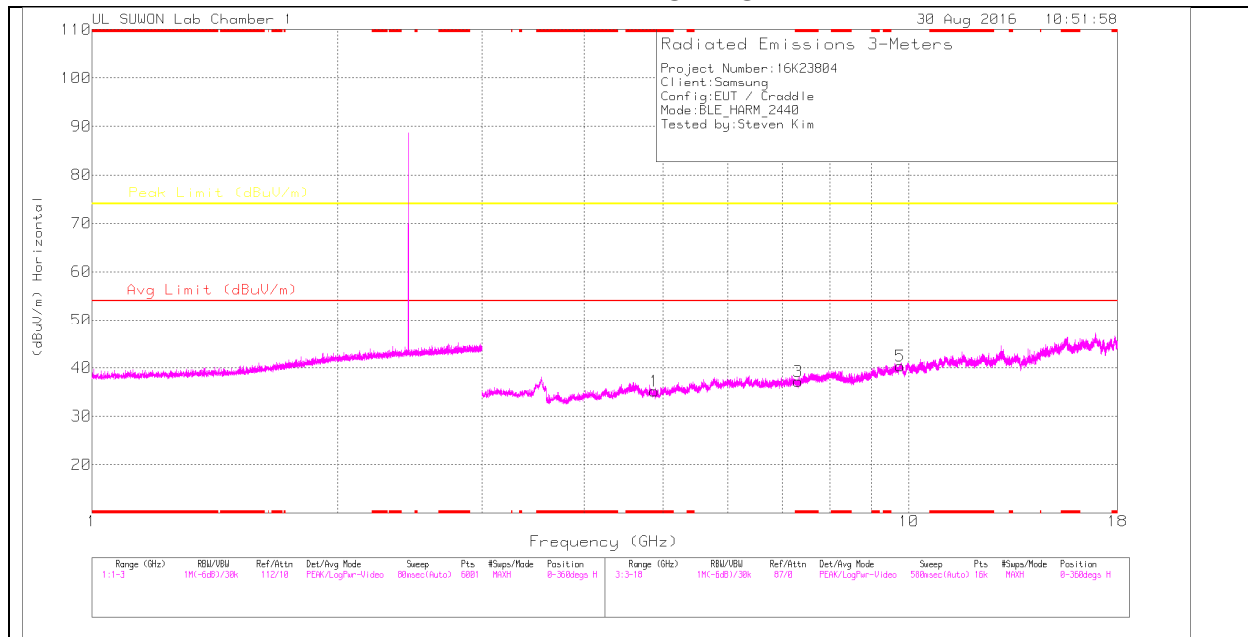
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 17)_150619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.803	34.82	PK	34	-33.8	0	35.02	-	-	74	-38.98	0-360	250	H
3	7.207	32.25	PK	35.7	-30.8	0	37.15	-	-	74	-36.85	0-360	250	H
5	9.608	30.31	PK	37	-27.3	0	40.01	-	-	74	-33.99	0-360	150	H
2	* 4.802	35.76	PK	34	-33.8	0	35.96	-	-	74	-38.04	0-360	250	V
4	7.204	32.92	PK	35.7	-30.8	0	37.82	-	-	74	-36.18	0-360	150	V
6	9.61	31.05	PK	37	-27.3	0	40.75	-	-	74	-33.25	0-360	150	V

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

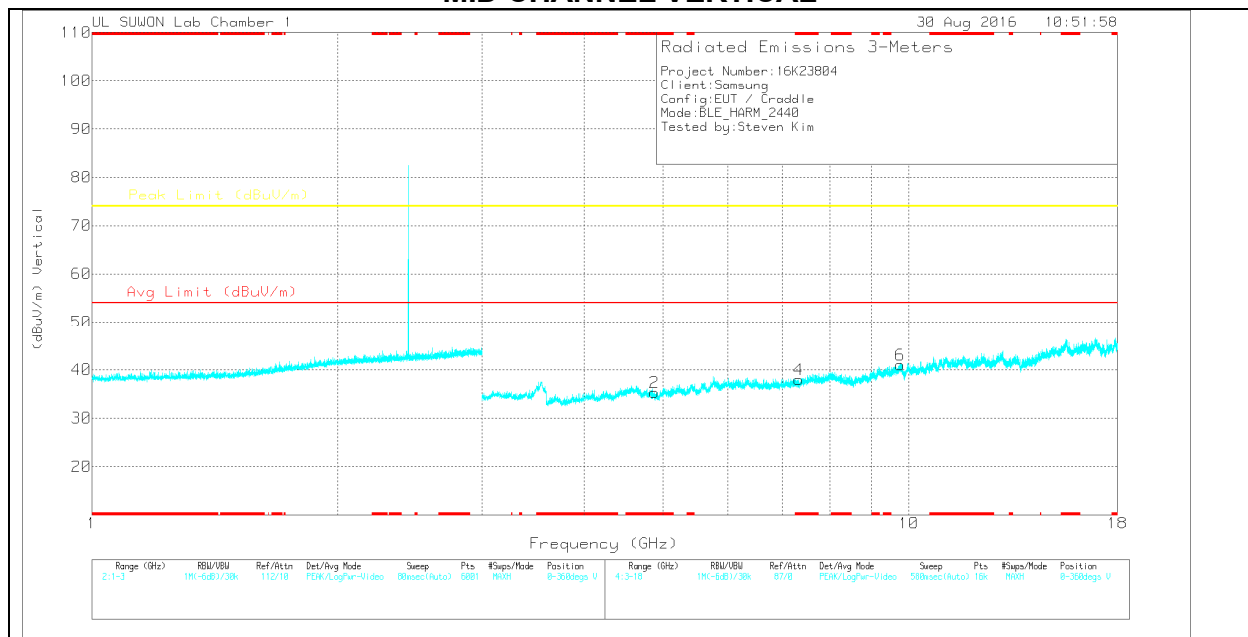
PK – Peak Detector

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

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

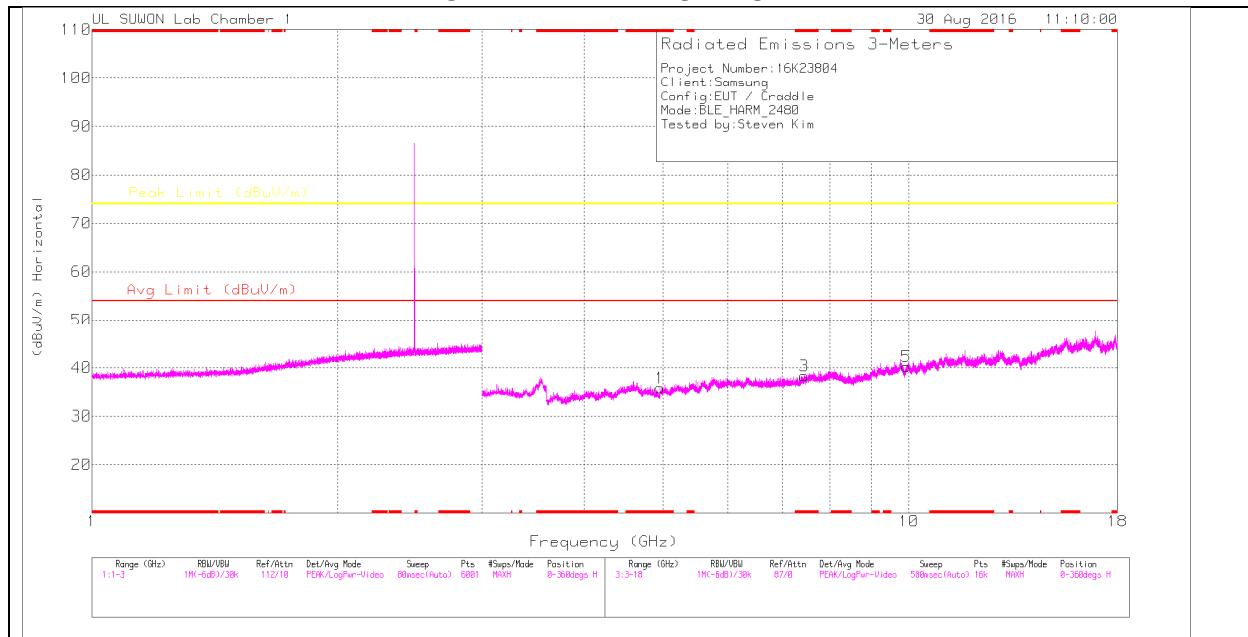
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 17)_150619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.88	35.15	PK	34	-34	0	35.15	-	-	74	-38.85	0-360	250	H
3	* 7.32	32.28	PK	35.8	-30.9	0	37.18	-	-	74	-36.82	0-360	150	H
5	9.758	29.9	PK	37.2	-26.7	0	40.4	-	-	74	-33.6	0-360	150	H
2	* 4.881	35.36	PK	34	-34	0	35.36	-	-	74	-38.64	0-360	250	V
4	* 7.323	33.08	PK	35.8	-30.9	0	37.98	-	-	74	-36.02	0-360	250	V
6	9.753	30.52	PK	37.2	-26.7	0	41.02	-	-	74	-32.98	0-360	250	V

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

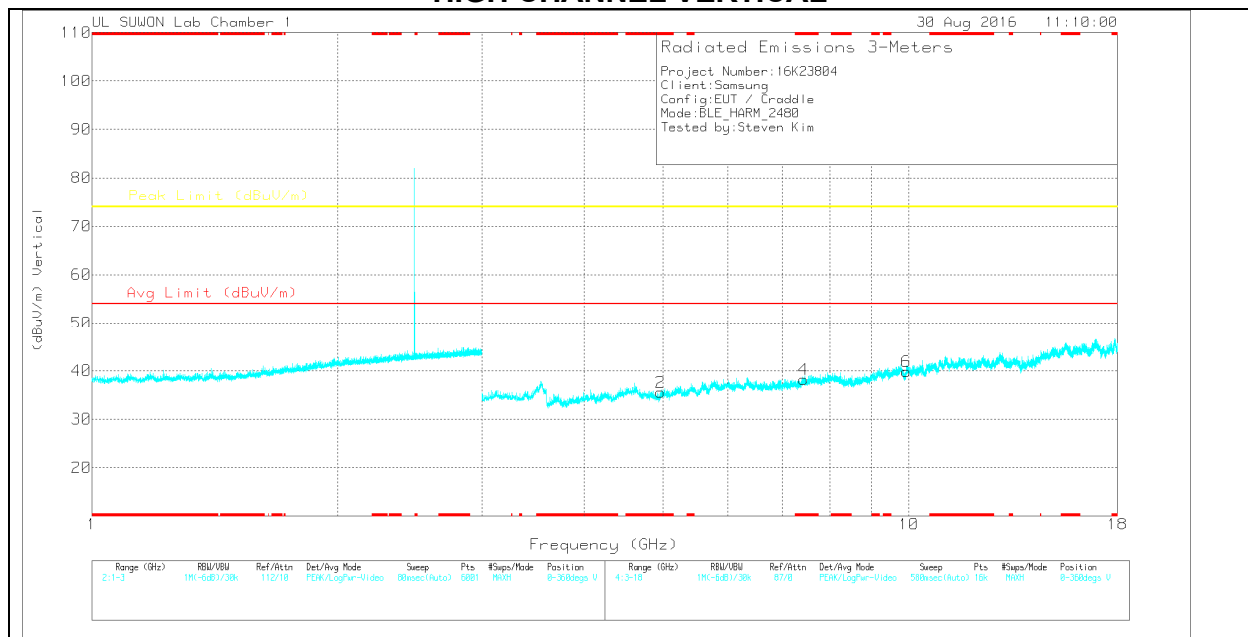
PK – Peak Detector

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

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(001687 17)_150619	Path_3	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	* 4.96	35.86	PK	34	-34	0	35.86	-	-	74	-38.14	0-360	150	H
3	* 7.44	33.2	PK	35.8	-30.7	0	38.3	-	-	74	-35.7	0-360	250	H
5	9.922	30.02	PK	37.4	-27.2	0	40.22	-	-	74	-33.78	0-360	250	H
2	* 4.964	35.51	PK	34	-34	0	35.51	-	-	74	-38.49	0-360	150	V
4	* 7.436	33.08	PK	35.8	-30.7	0	38.18	-	-	74	-35.82	0-360	250	V
6	9.919	29.71	PK	37.4	-27.2	0	39.91	-	-	74	-34.09	0-360	250	V

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

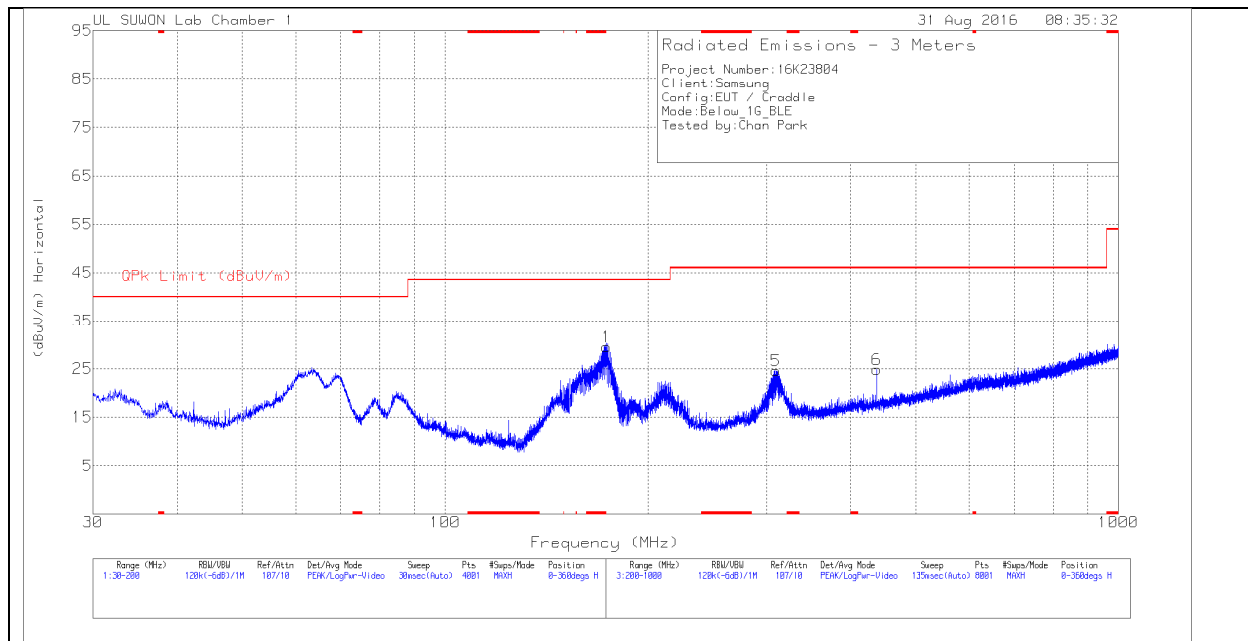
PK – Peak Detector

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

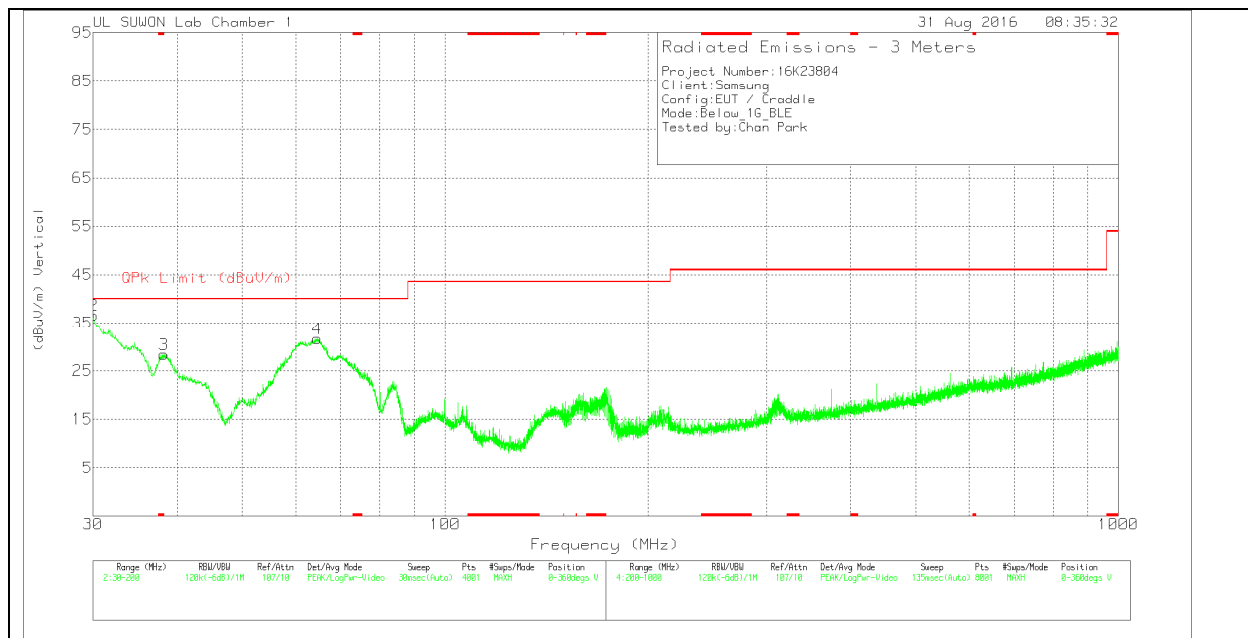
11.3. WORST-CASE BELOW 1 GHz

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	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	173.82	48.86	Pk	9.1	-28.4	29.56	43.52	-13.96	0-360	200	H
2	30.0425	56.84	Pk	10.3	-30.5	36.64	40	-3.36	0-360	100	V
3	* 38.2025	47.15	Pk	11.7	-30.4	28.45	40	-11.55	0-360	100	V
4	64.595	50.28	Pk	11.3	-29.9	31.68	40	-8.32	0-360	100	V
5	310	38.45	Pk	13.6	-27.4	24.65	46.02	-21.37	0-360	100	H
6	437.5	35.4	Pk	16.1	-26.6	24.9	46.02	-21.12	0-360	100	H

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

Pk - Peak detector

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163-750	Bi-Log	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
30.0324	53.11	Qp	10.3	-30.5	32.91	40	-7.09	199	100	V

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

Qp - Quasi-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.

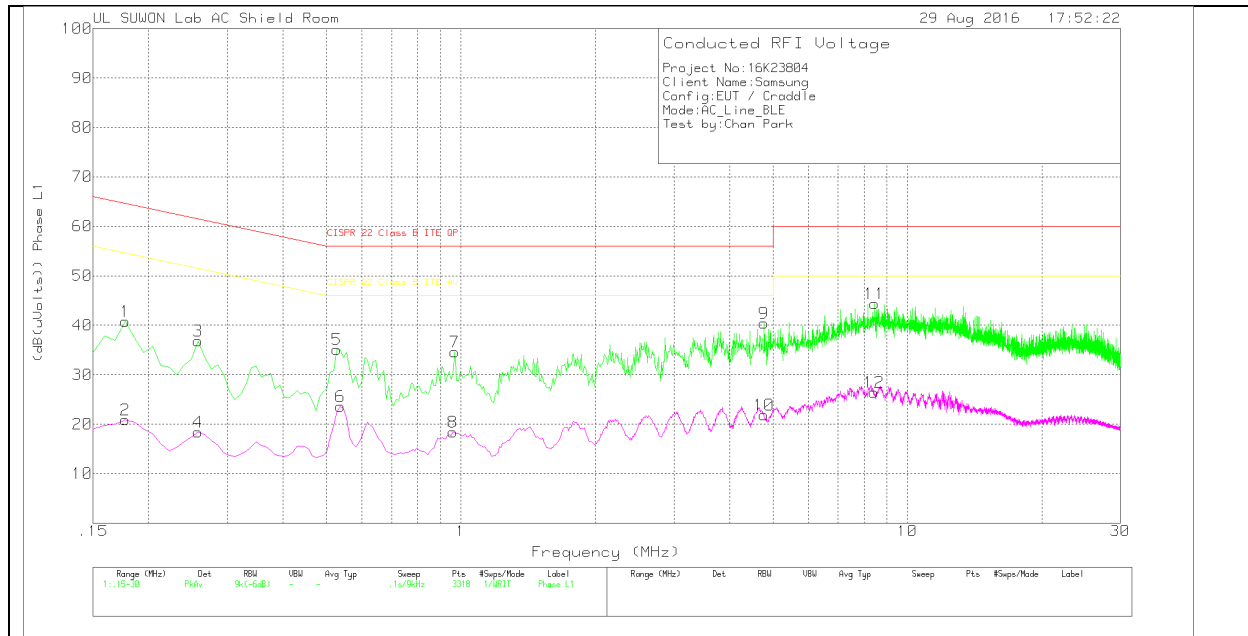
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

6 WORST EMISSIONS

LINE 1 PLOT



LINE 1 RESULTS

Trace Markers

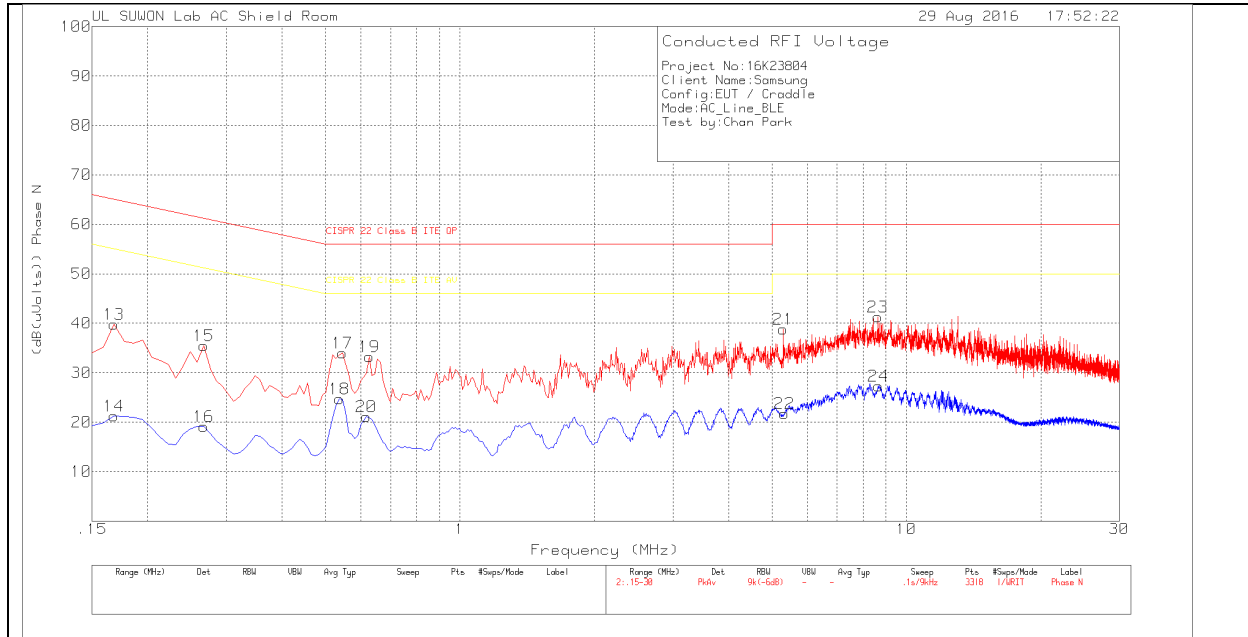
Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_w ith ex- cord_L1	CE Shield Room	Corrected Reading (dB(uVolts)	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
1	.177	30.64	Pk	10.2	0	40.84	64.63	-23.79	-	-
2	.177	10.72	Av	10.2	0	20.92	-	-	54.63	-33.71
3	.258	27.04	Pk	9.8	0	36.84	61.5	-24.66	-	-
4	.258	8.6	Av	9.8	0	18.4	-	-	51.5	-33.1
5	.528	24.97	Pk	10.1	0	35.07	56	-20.93	-	-
6	.537	13.48	Av	10.1	0	23.58	-	-	46	-22.42
7	.969	24.73	Pk	9.9	0	34.63	56	-21.37	-	-
8	.96	8.45	Av	9.9	0	18.35	-	-	46	-27.65
9	4.776	30.5	Pk	9.8	.1	40.4	56	-15.6	-	-
10	4.767	11.94	Av	9.8	.1	21.84	-	-	46	-24.16
11	8.457	34.41	Pk	9.9	.1	44.41	60	-15.59	-	-
12	8.43	16.39	Av	9.9	.1	26.39	-	-	50	-23.61

Pk - Peak detector

Av - Average detection

LINE 2 PLOT



LINE 2 RESULTS

Trace Markers

Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_w ith ex- cord_N	CE Shield Room	Corrected Reading (dB(uVolts)	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
13	.168	29.61	Pk	10.2	0	39.81	65.06	-25.25	-	-
14	.168	10.99	Av	10.2	0	21.19	-	-	55.06	-33.87
15	.267	25.65	Pk	9.8	0	35.45	61.21	-25.76	-	-
16	.267	9.38	Av	9.8	0	19.18	-	-	51.21	-32.03
17	.546	23.94	Pk	10.1	0	34.04	56	-21.96	-	-
18	.537	14.63	Av	10.1	0	24.73	-	-	46	-21.27
19	.627	23.15	Pk	10.1	0	33.25	56	-22.75	-	-
20	.618	11.03	Av	10.1	0	21.13	-	-	46	-24.87
21	5.298	28.9	Pk	9.8	.1	38.8	60	-21.2	-	-
22	5.325	11.88	Av	9.8	.1	21.78	-	-	50	-28.22
23	8.628	31.16	Pk	10	.1	41.26	60	-18.74	-	-
24	8.655	17.16	Av	10	.1	27.26	-	-	50	-22.74

Pk - Peak detector

Av - Average detection