



FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE PHONE + BLUETOOTH and WLAN 2.4GHz b/g/n

MODEL NUMBER: SM-J110M, SM-J110M/DS

FCC ID: A3LSMJ110M

REPORT NUMBER: 15I21298-E3

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Prepared for
SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
GYEONGGI-DO, 443-742, KOREA

Prepared by
UL Korea, Ltd. Suwon Laboratory
218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 443-823, Korea
TEL: (031) 337-9902
FAX: (031) 213-5433



Revision History

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--	08/03/15	Initial issue	Junwhan Lee

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: GSM/WCDMA/LTE Phone + Bluetooth and WLAN 2.4GHz b/g/n
MODEL NUMBER: SM-J110M, SM-J110M/DS
SERIAL NUMBER: R38G60H2Y5Y (RADIATED); R38G60H3A7H (CONDUCTED)
DATE TESTED: JUL 30 - AUG 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:



Junwhan Lee
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 + Bluetooth and WLAN 2.4GHz b/g/n.
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	0.15	1.03
		Average	-0.05	0.99

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of 1.28 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 X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	ETA0U10JBS	N/A	N/A
Data Cable	SAMSUNG	ECB-DU28BE	N/A	N/A
Earphone	SAMSUNG	EHS61ASFWE	N/A	N/A

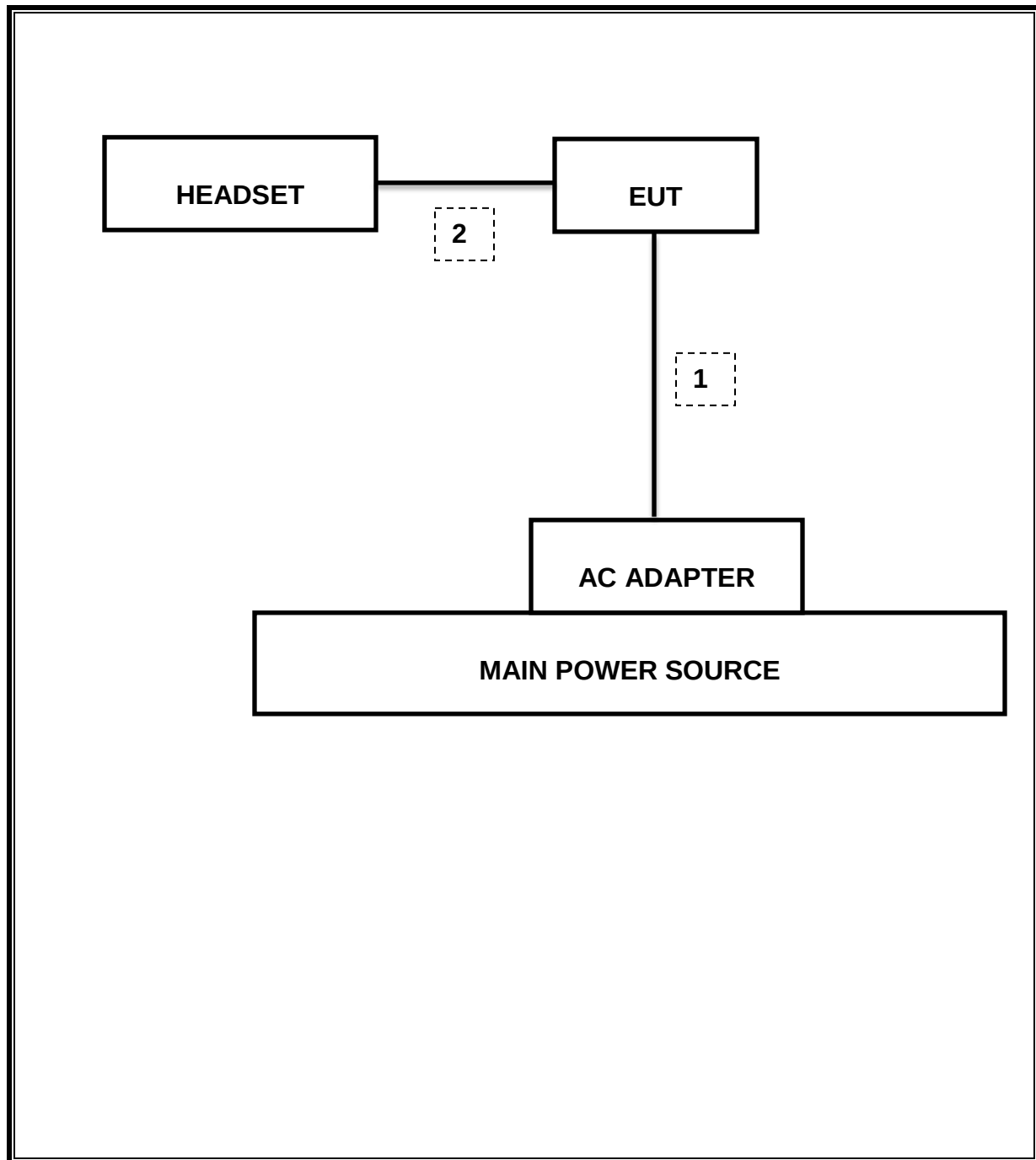
I/O CABLES

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	0.379	0.625	0.607	60.7%	2.17	2.637



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	745.7 kHz
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-46.028 dBm
15.247	TX conducted output power	<30dBm		Pass	0.146 dBm (Peak)
15.247	PSD	<8dBm		Pass	-15.19 dBm (Peak)
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass	46.08 dBuV (QP)
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass	50.46 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.

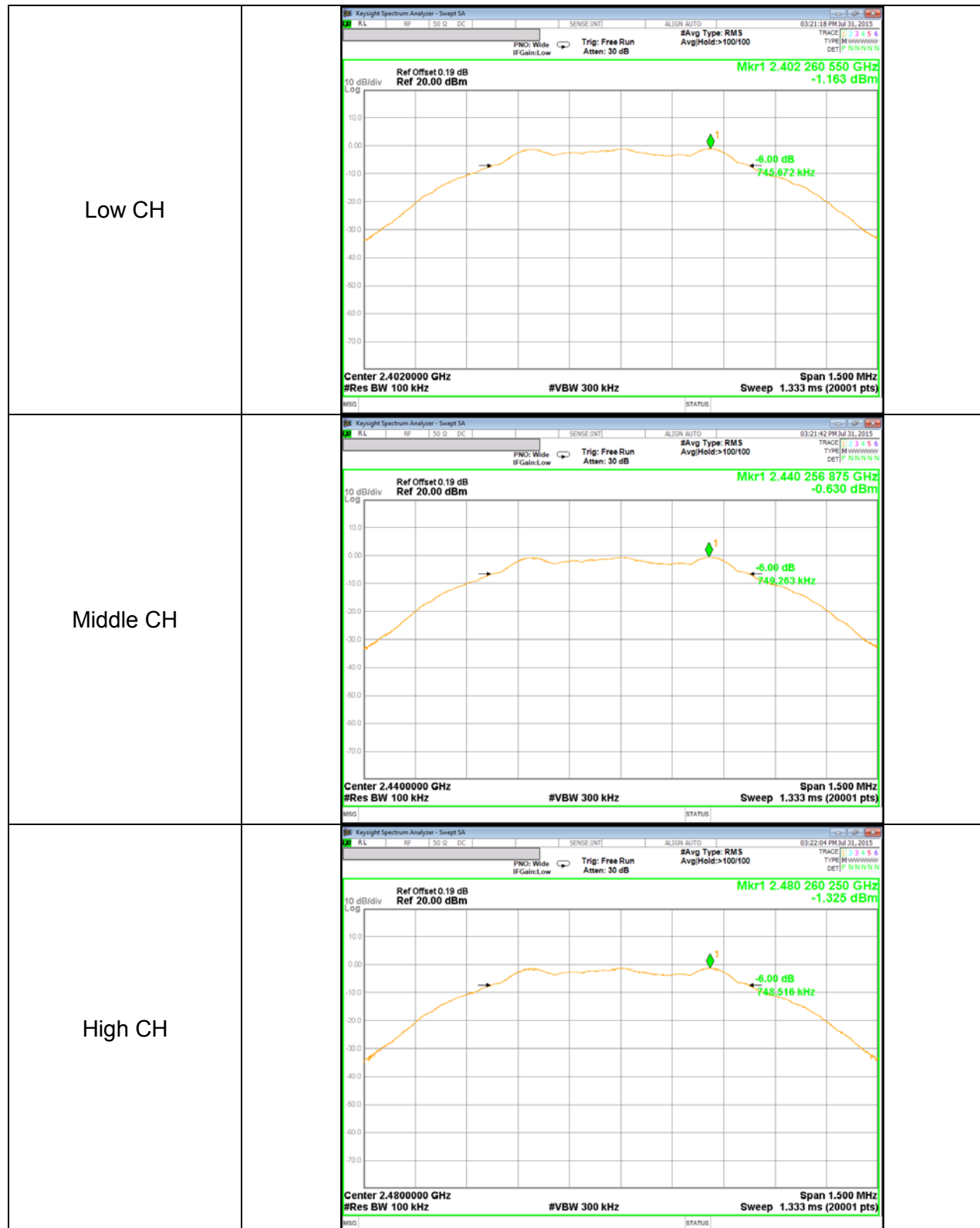
TEST PROCEDURE

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	745.7	500.0
Mid	2440	749.3	500.0
High	2480	748.5	500.0
Worst		745.7	500.0

6 dB BANDWIDTH PLOTS



10.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

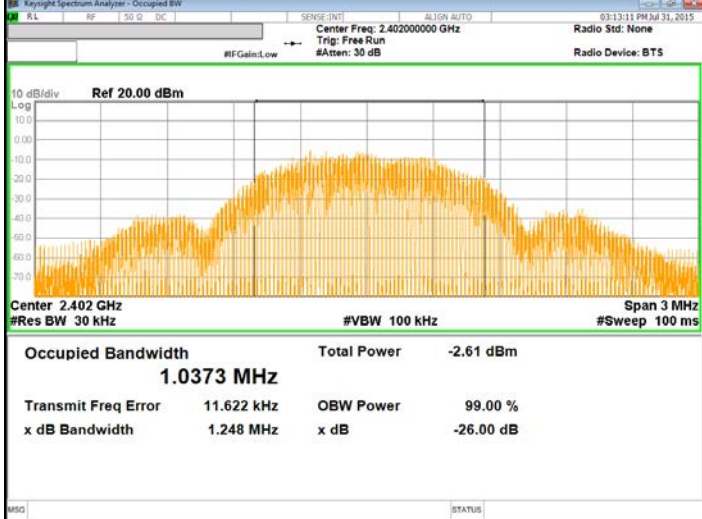
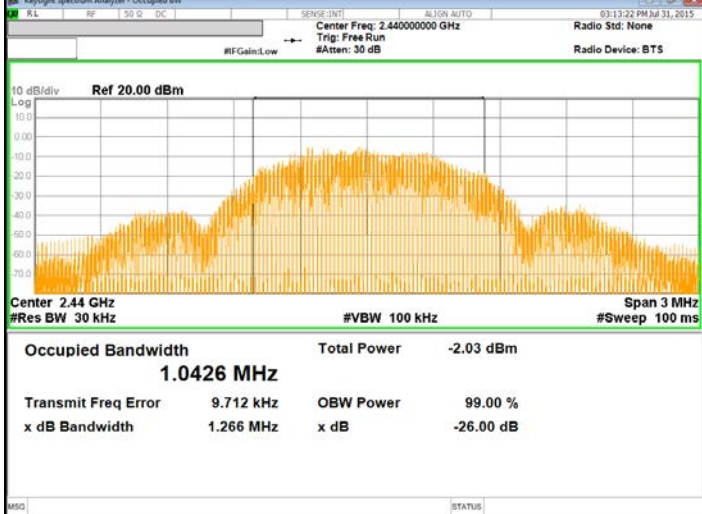
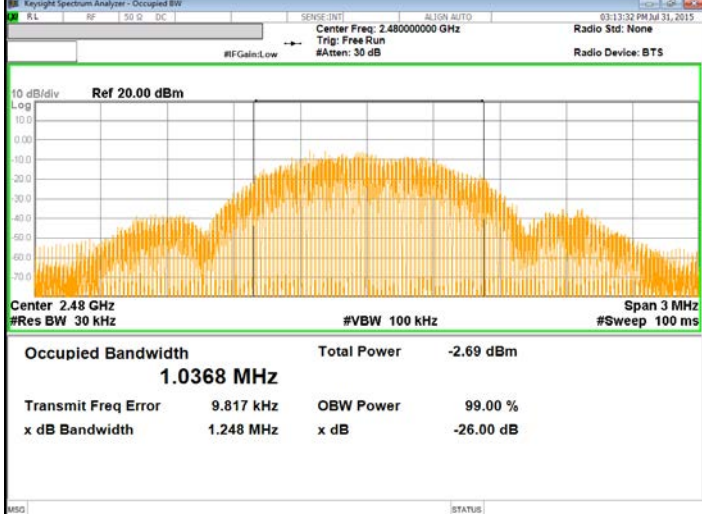
TEST PROCEDURE

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	1.037
Mid	2440	1.043
High	2480	1.037
Worst		1.043

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 #Res BW 30 kHz #VBW 100 kHz #Sweep 100 ms <table><tr><td>Occupied Bandwidth</td><td>Total Power</td><td>-2.61 dBm</td></tr><tr><td>1.0373 MHz</td><td></td><td></td></tr><tr><td>Transmit Freq Error</td><td>11.622 kHz</td><td>OBW Power</td></tr><tr><td>x dB Bandwidth</td><td>1.248 MHz</td><td>x dB</td></tr><tr><td></td><td></td><td>99.00 %</td></tr><tr><td></td><td></td><td>-26.00 dB</td></tr></table>	Occupied Bandwidth	Total Power	-2.61 dBm	1.0373 MHz			Transmit Freq Error	11.622 kHz	OBW Power	x dB Bandwidth	1.248 MHz	x dB			99.00 %			-26.00 dB
Occupied Bandwidth	Total Power	-2.61 dBm																	
1.0373 MHz																			
Transmit Freq Error	11.622 kHz	OBW Power																	
x dB Bandwidth	1.248 MHz	x dB																	
		99.00 %																	
		-26.00 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 #Res BW 30 kHz #VBW 100 kHz #Sweep 100 ms <table><tr><td>Occupied Bandwidth</td><td>Total Power</td><td>-2.03 dBm</td></tr><tr><td>1.0426 MHz</td><td></td><td></td></tr><tr><td>Transmit Freq Error</td><td>9.712 kHz</td><td>OBW Power</td></tr><tr><td>x dB Bandwidth</td><td>1.266 MHz</td><td>x dB</td></tr><tr><td></td><td></td><td>99.00 %</td></tr><tr><td></td><td></td><td>-26.00 dB</td></tr></table>	Occupied Bandwidth	Total Power	-2.03 dBm	1.0426 MHz			Transmit Freq Error	9.712 kHz	OBW Power	x dB Bandwidth	1.266 MHz	x dB			99.00 %			-26.00 dB
Occupied Bandwidth	Total Power	-2.03 dBm																	
1.0426 MHz																			
Transmit Freq Error	9.712 kHz	OBW Power																	
x dB Bandwidth	1.266 MHz	x dB																	
		99.00 %																	
		-26.00 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 #Res BW 30 kHz #VBW 100 kHz #Sweep 100 ms <table><tr><td>Occupied Bandwidth</td><td>Total Power</td><td>-2.69 dBm</td></tr><tr><td>1.0368 MHz</td><td></td><td></td></tr><tr><td>Transmit Freq Error</td><td>9.817 kHz</td><td>OBW Power</td></tr><tr><td>x dB Bandwidth</td><td>1.248 MHz</td><td>x dB</td></tr><tr><td></td><td></td><td>99.00 %</td></tr><tr><td></td><td></td><td>-26.00 dB</td></tr></table>	Occupied Bandwidth	Total Power	-2.69 dBm	1.0368 MHz			Transmit Freq Error	9.817 kHz	OBW Power	x dB Bandwidth	1.248 MHz	x dB			99.00 %			-26.00 dB
Occupied Bandwidth	Total Power	-2.69 dBm																	
1.0368 MHz																			
Transmit Freq Error	9.817 kHz	OBW Power																	
x dB Bandwidth	1.248 MHz	x dB																	
		99.00 %																	
		-26.00 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.

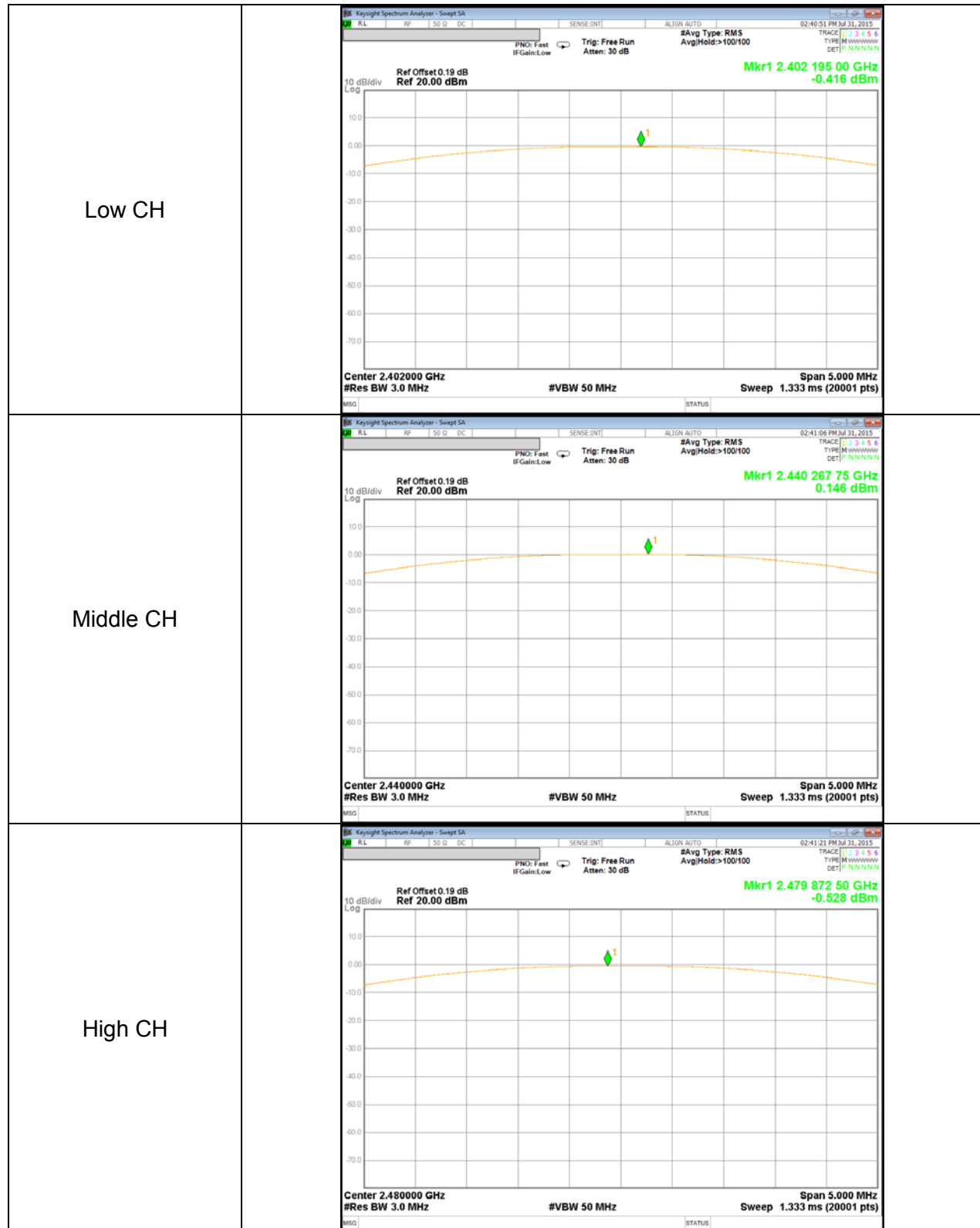
TEST PROCEDURE

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	-0.416	30.000	-30.416
Mid	2440	0.146	30.000	-29.854
High	2480	-0.528	30.000	-30.528
Worst		0.146		-29.854

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	-0.63	0.87
Middle	2440	-0.05	0.99
High	2480	-0.72	0.85

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.

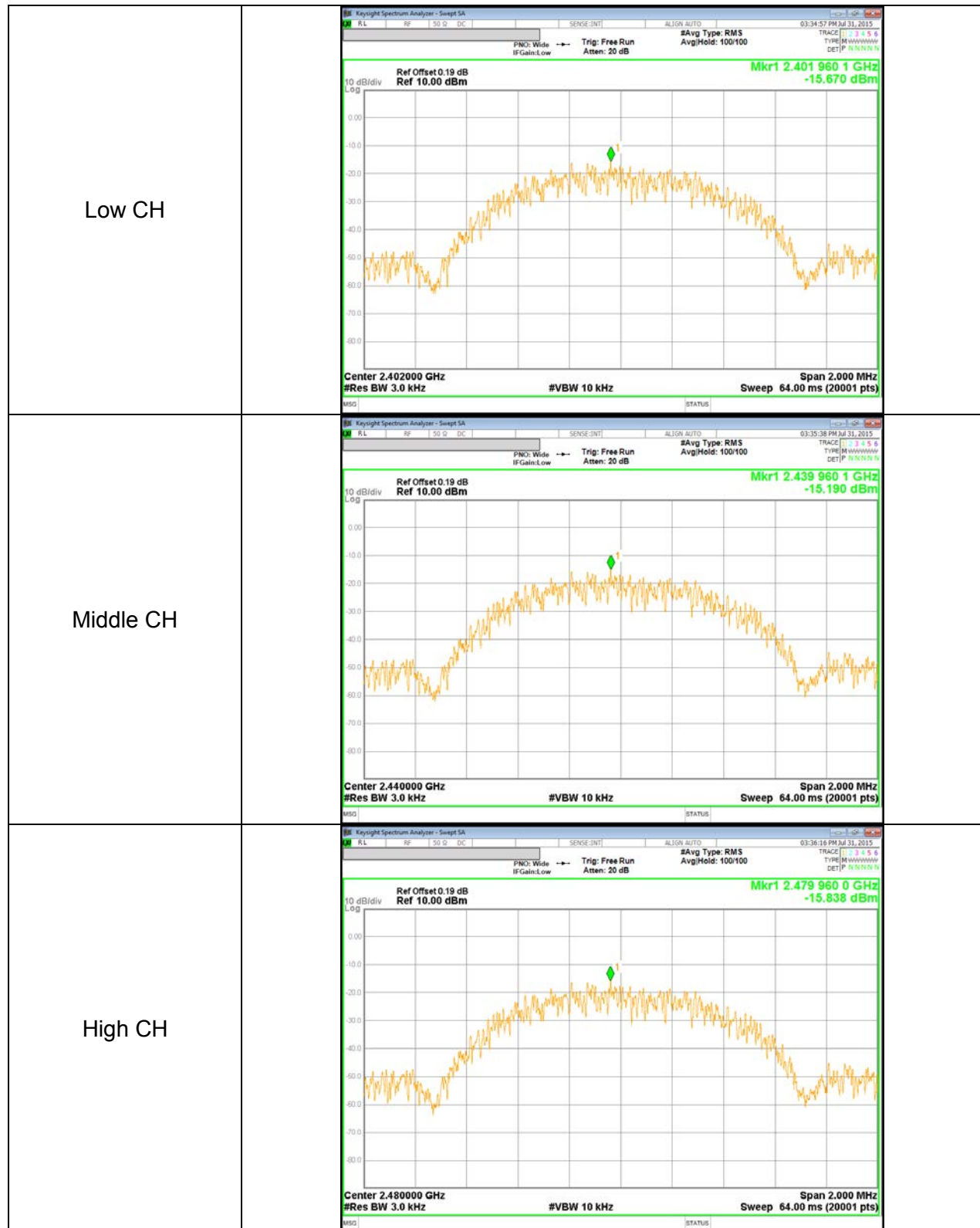
TEST PROCEDURE

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	-15.67	8.00	-23.67
Mid	2440	-15.19	8.00	-23.19
High	2480	-15.84	8.00	-23.84

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.

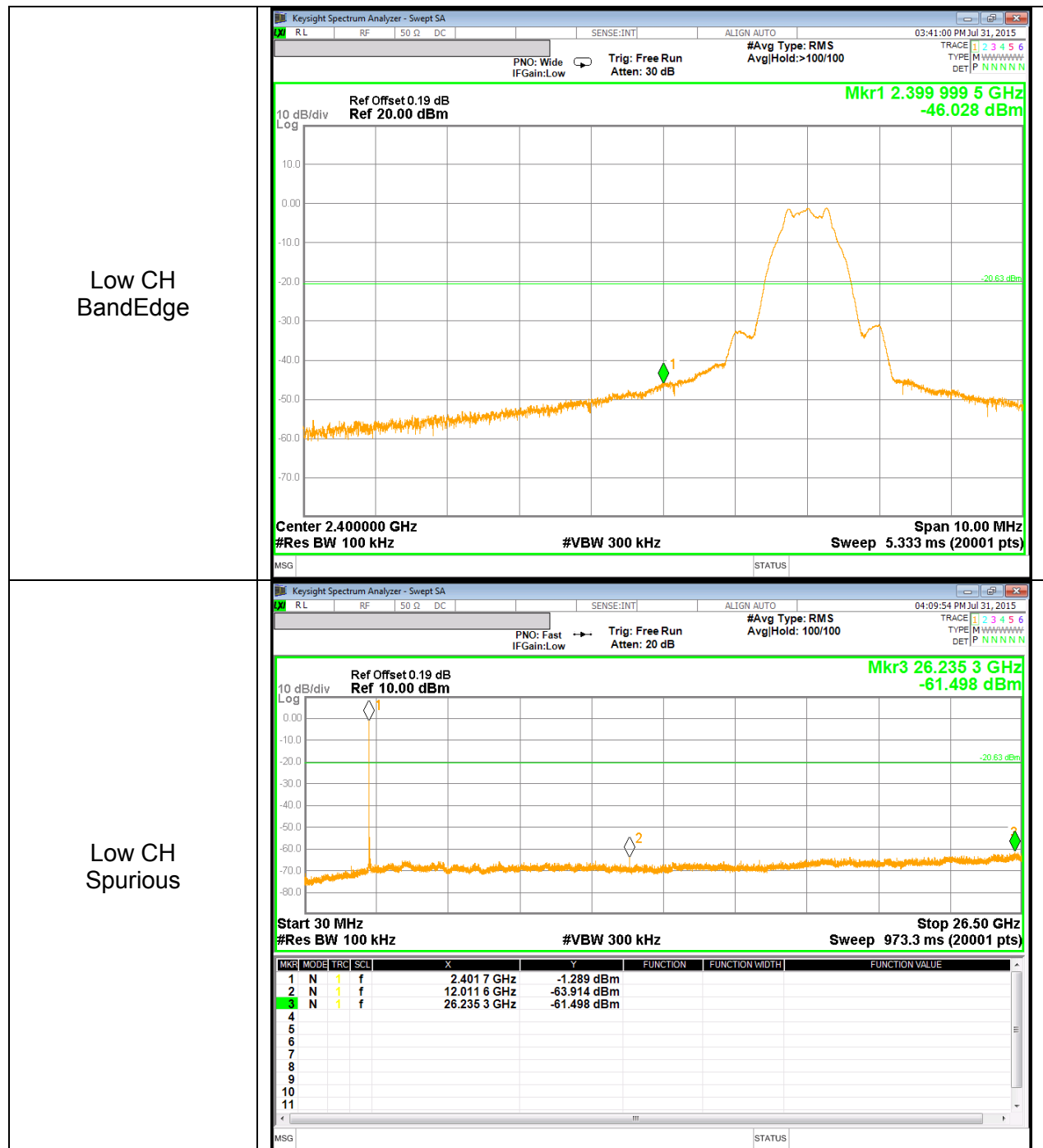
TEST PROCEDURE

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.

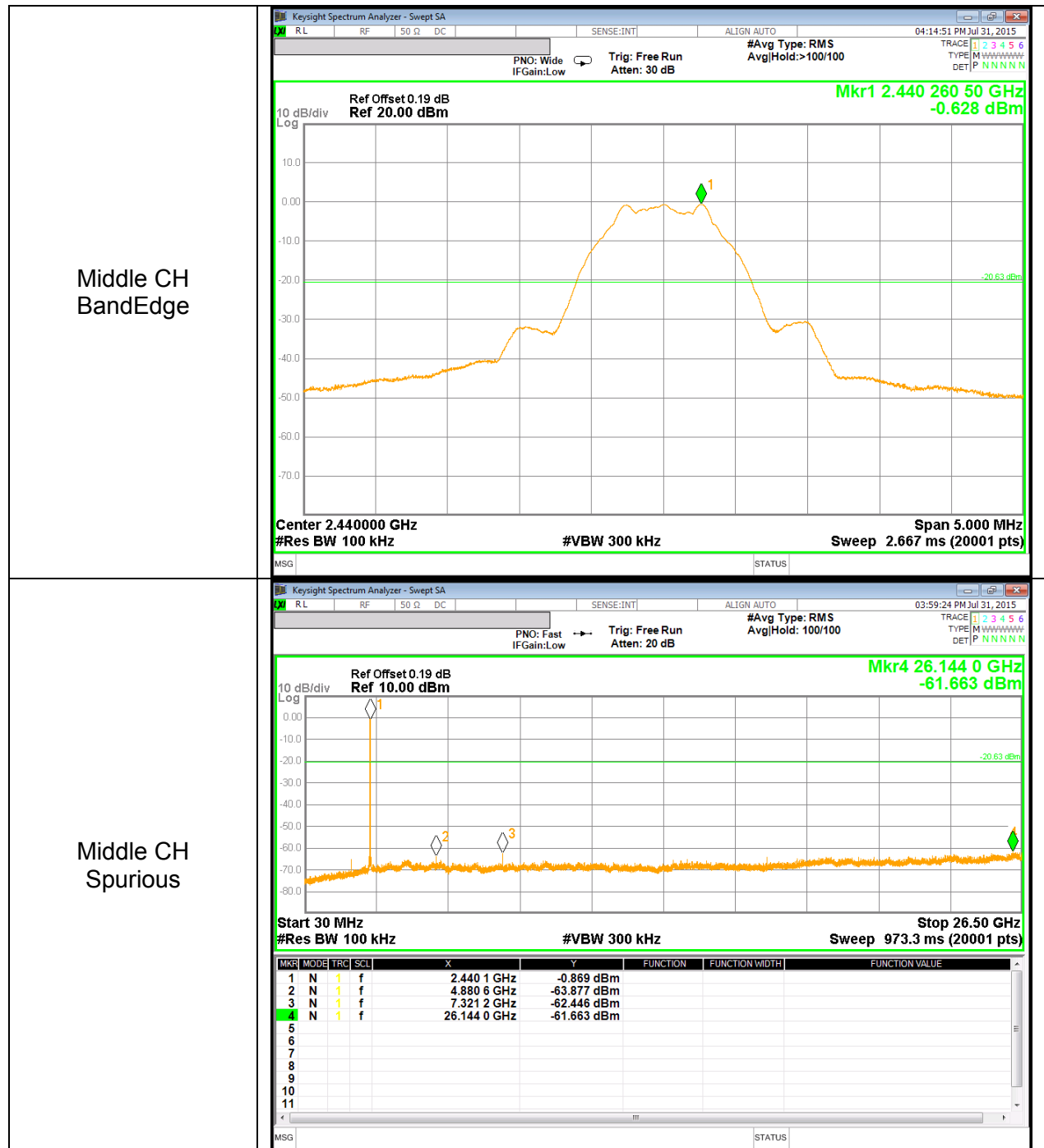
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

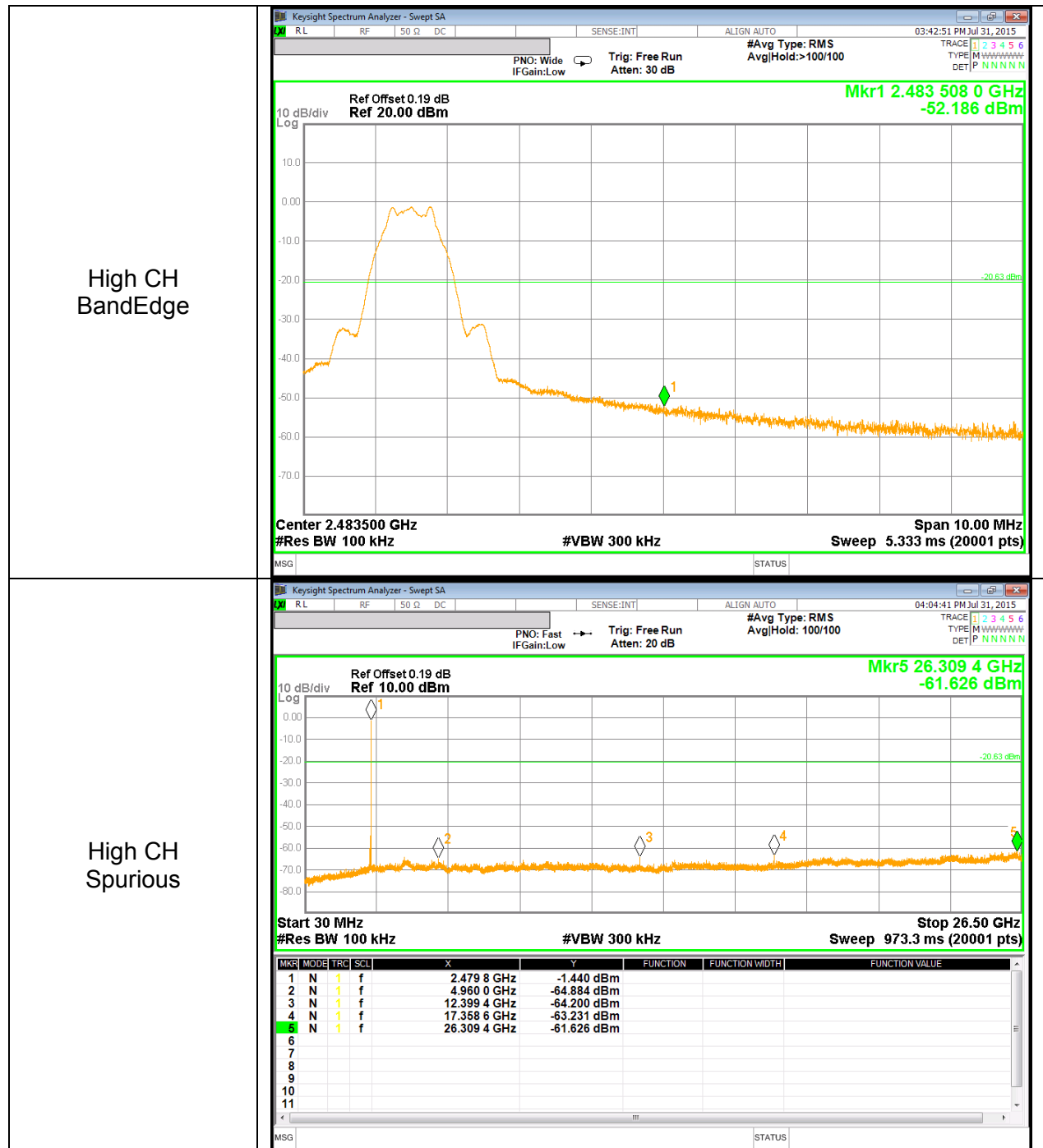
BANDEDGE & SPURIOUS EMISSIONS, LOW CHANNEL



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.

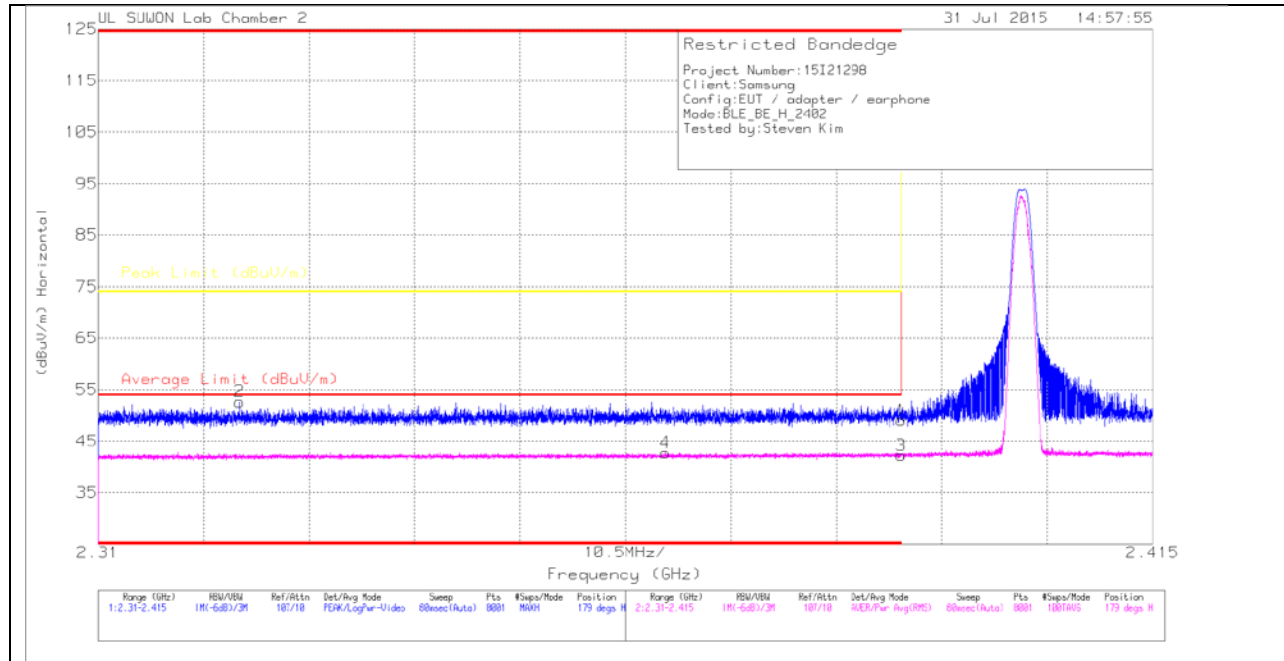
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and add duty cycle factor for average measurements. Duty cycle factor = $10 \log(1/x)$. For this sample: DCF = $10\log(1/0.622)=2.06\text{dB}$ (Spectrum Analyzer round 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

TRACE MARKERS

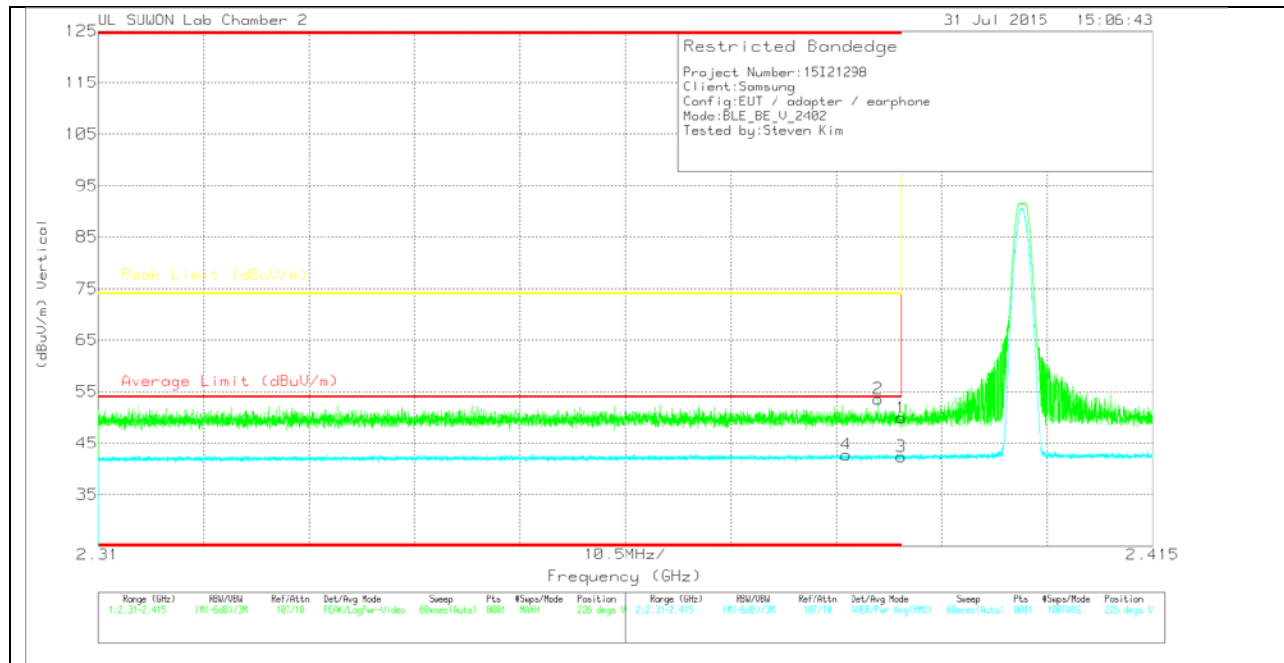
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 24)_150619	Path_2_10dB	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	36.89	PK	31.7	-19.5	0	49.09	-	-	74	-24.91	179	251	H
2	* 2.324	40.78	PK	31.6	-19.7	0	52.68	-	-	74	-21.32	179	251	H
3	* 2.39	27.95	RMS	31.7	-19.5	2.17	42.32	54	-11.68	-	-	179	251	H
4	* 2.366	28.59	RMS	31.7	-19.6	2.17	42.86	54	-11.14	-	-	179	251	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 24)_150619	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	37.71	PK	31.7	-19.5	0	49.91	-	-	74	-24.09	226	309	V
2	* 2.388	41.4	PK	31.7	-19.5	0	53.6	-	-	74	-20.4	226	309	V
3	* 2.39	28.12	RMS	31.7	-19.5	2.17	42.49	54	-11.51	-	-	226	309	V
4	* 2.384	28.51	RMS	31.7	-19.5	2.17	42.88	54	-11.12	-	-	226	309	V

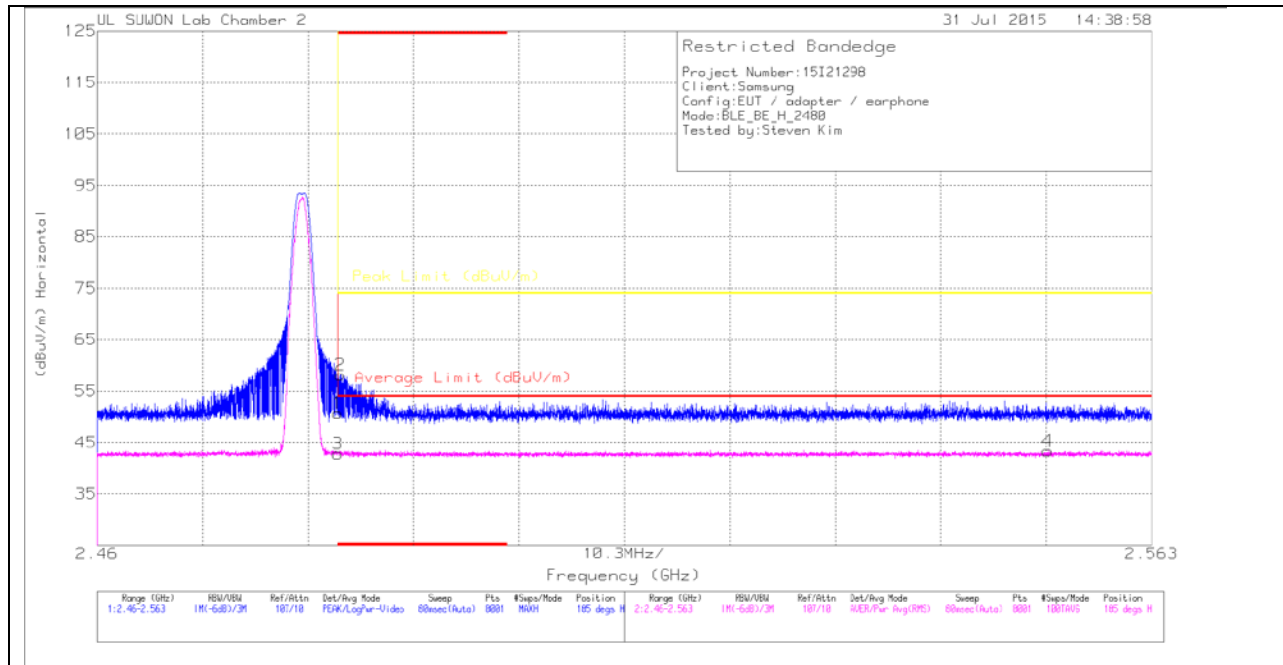
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

TRACE MARKERS

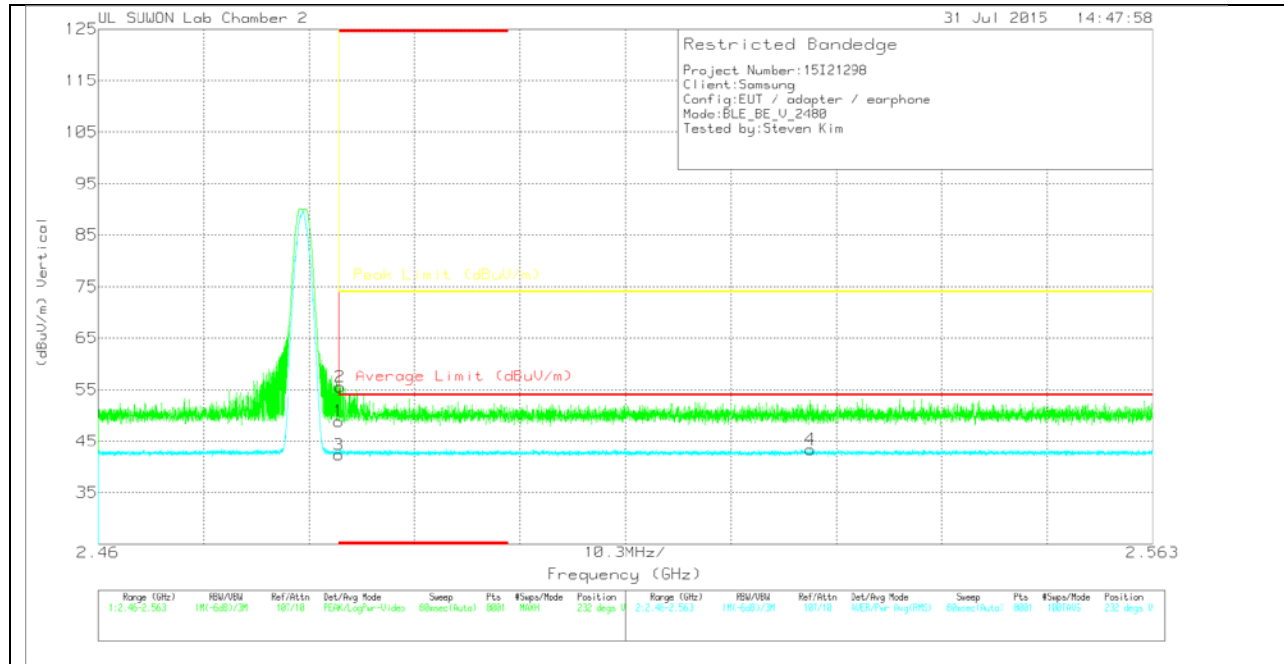
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 24)_150619	Path_2_10dB	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	38.29	Pk	31.8	-19.4	0	50.69	-	-	74	-23.31	185	288	H
2	* 2.484	45.74	Pk	31.8	-19.4	0	58.14	-	-	74	-15.86	185	288	H
3	* 2.484	28.33	RMS	31.8	-19.4	2.17	42.9	54	-11.1	-	-	185	288	H
4	2.553	28.69	RMS	31.9	-19.3	2.17	43.46	54	-10.54	-	-	185	288	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 24)_150619	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	* 2.484	36.46	Pk	31.8	-19.4	0	48.86	-	-	74	-25.14	232	361	V
2	* 2.484	43.13	Pk	31.8	-19.4	0	55.53	-	-	74	-18.47	232	361	V
3	* 2.484	27.86	RMS	31.8	-19.4	2.17	42.43	54	-11.57	-	-	232	361	V
4	2.53	28.72	RMS	31.9	-19.3	2.17	43.49	54	-10.51	-	-	232	361	V

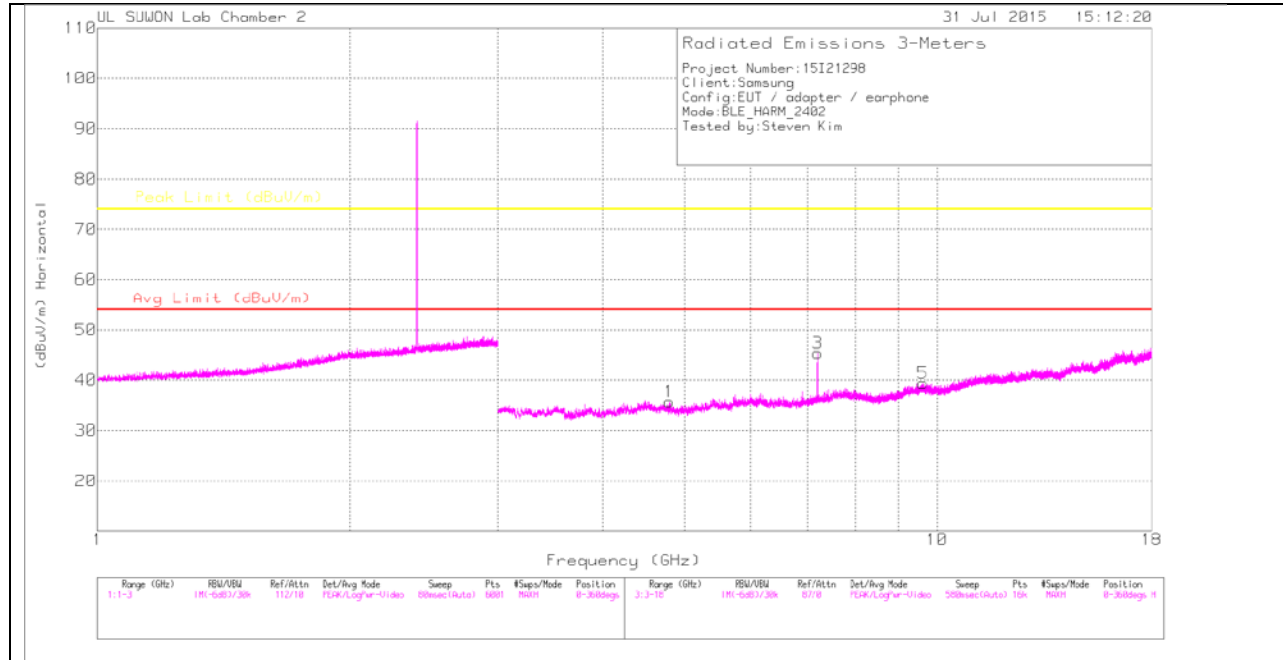
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

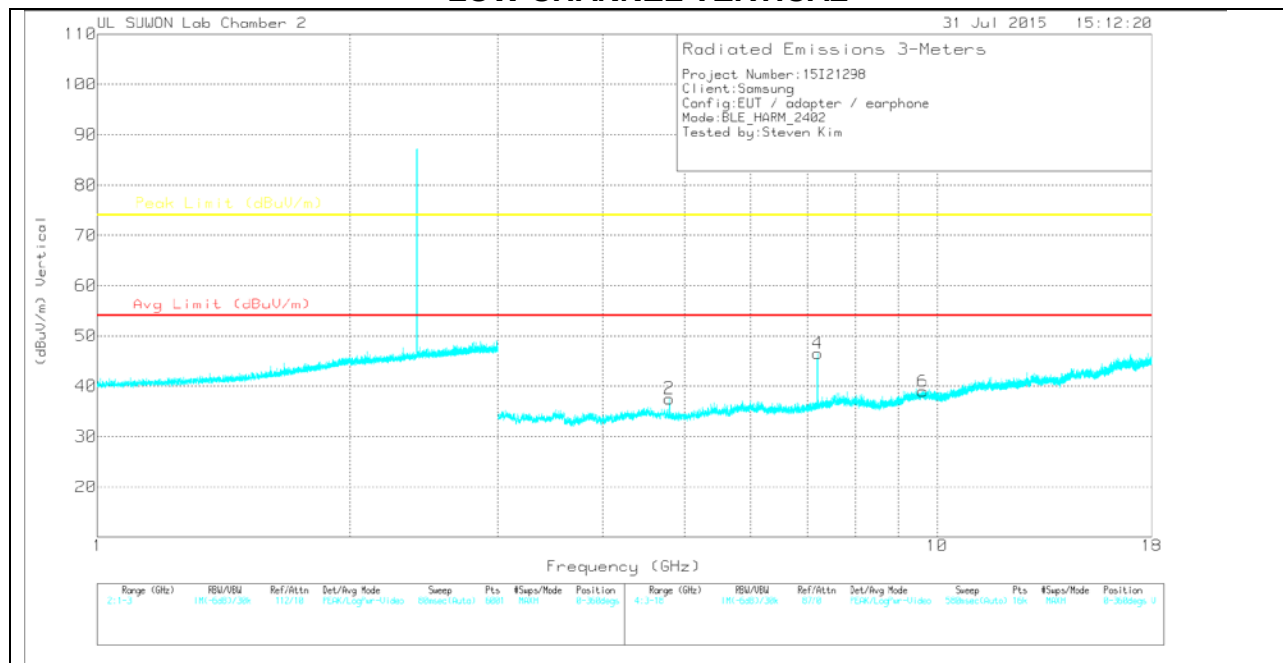
RMS - RMS detection

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(00168724)_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	* 4.804	27.16	PK	33.9	-25.3	0	35.76	-	-	74	-38.24	0-360	200	H
3	7.205	32.43	PK	35.8	-22.9	0	45.33	-	-	74	-28.67	0-360	200	H
5	9.611	21.6	PK	36.9	-19.1	0	39.4	-	-	74	-34.6	0-360	100	H
2	* 4.803	28.95	PK	33.9	-25.3	0	37.55	-	-	74	-36.45	0-360	99	V
4	7.206	33.73	PK	35.8	-23	0	46.53	-	-	74	-27.47	0-360	200	V
6	9.609	21.19	PK	36.9	-19.1	0	38.99	-	-	74	-35.01	0-360	200	V

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

PK – Peak Detector

Radiated Emissions

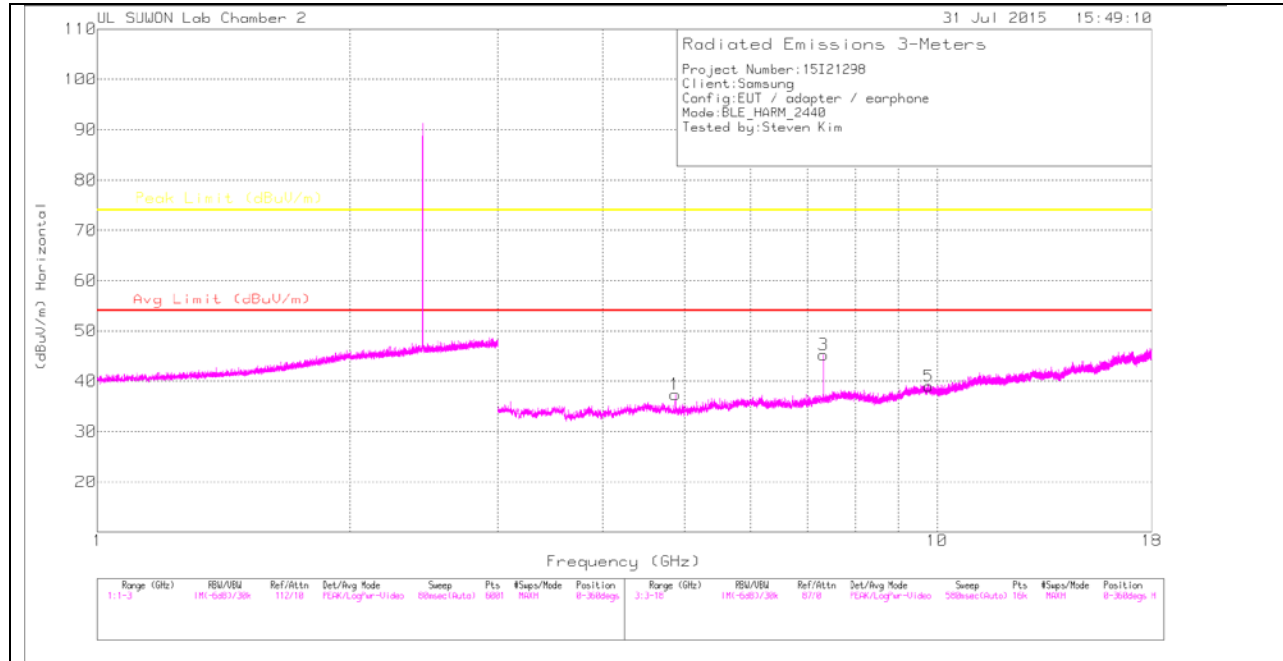
Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.804	38.51	PK2	33.9	-25.3	0	47.11	-	-	74	-26.89	2	385	H
* 4.804	28.02	MAv1	33.9	-25.3	2.17	38.79	54	-15.21	-	-	2	385	H
* 4.805	40.32	PK2	33.9	-25.3	0	48.92	-	-	74	-25.08	351	306	V
* 4.804	27.31	MAv1	33.9	-25.3	2.17	38.08	54	-15.92	-	-	351	306	V
7.206	39.8	PK2	35.8	-22.9	0	52.7	-	-	74	-21.3	307	100	H
7.206	39.13	PK2	35.8	-22.9	0	52.03	-	-	74	-21.97	0	100	V

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

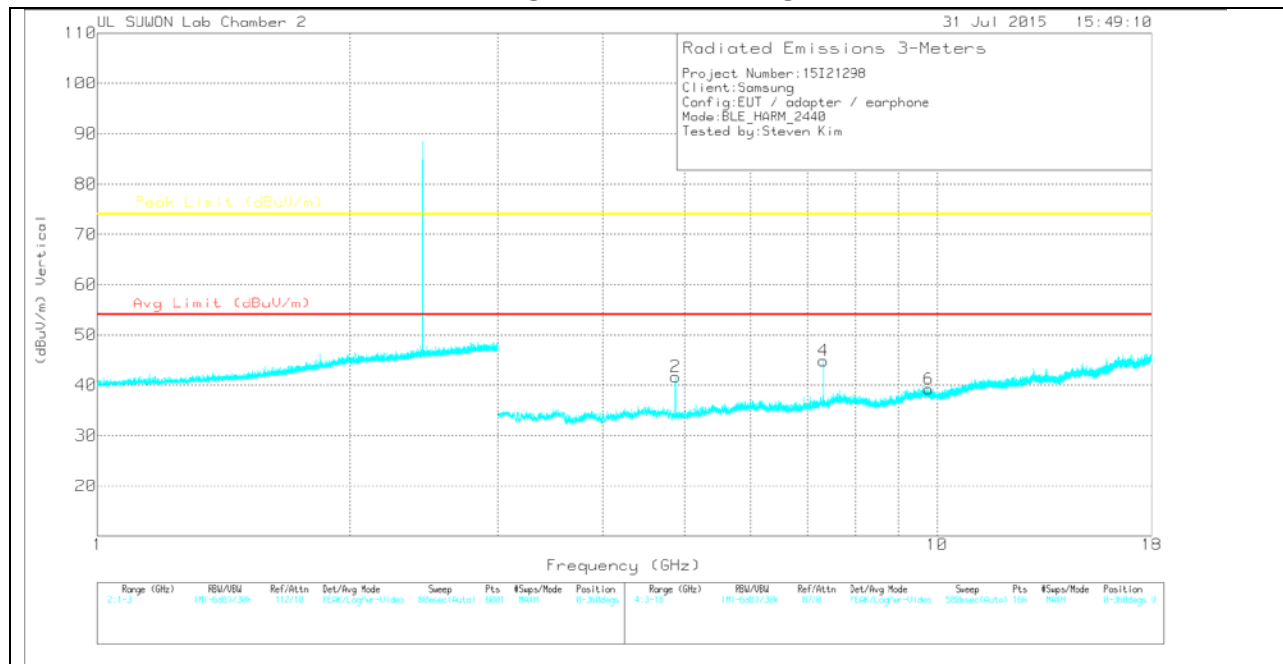
PK2 - KDB558074 Method: Maximum Peak

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	3117(0016872 4)_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	28.68	PK	33.9	-25.2	0	37.38	-	-	74	-36.62	0-360	200	H
3	* 7.321	31.85	PK	35.9	-22.5	0	45.25	-	-	74	-28.75	0-360	100	H
5	9.766	21.31	PK	37	-19.3	0	39.01	-	-	74	-34.99	0-360	200	H
2	* 4.881	32.99	PK	33.9	-25.2	0	41.69	-	-	74	-32.31	0-360	100	V
4	* 7.321	31.45	PK	35.9	-22.5	0	44.85	-	-	74	-29.15	0-360	200	V
6	9.766	21.56	PK	37	-19.3	0	39.26	-	-	74	-34.74	0-360	200	V

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

PK – Peak Detector

Radiated Emissions

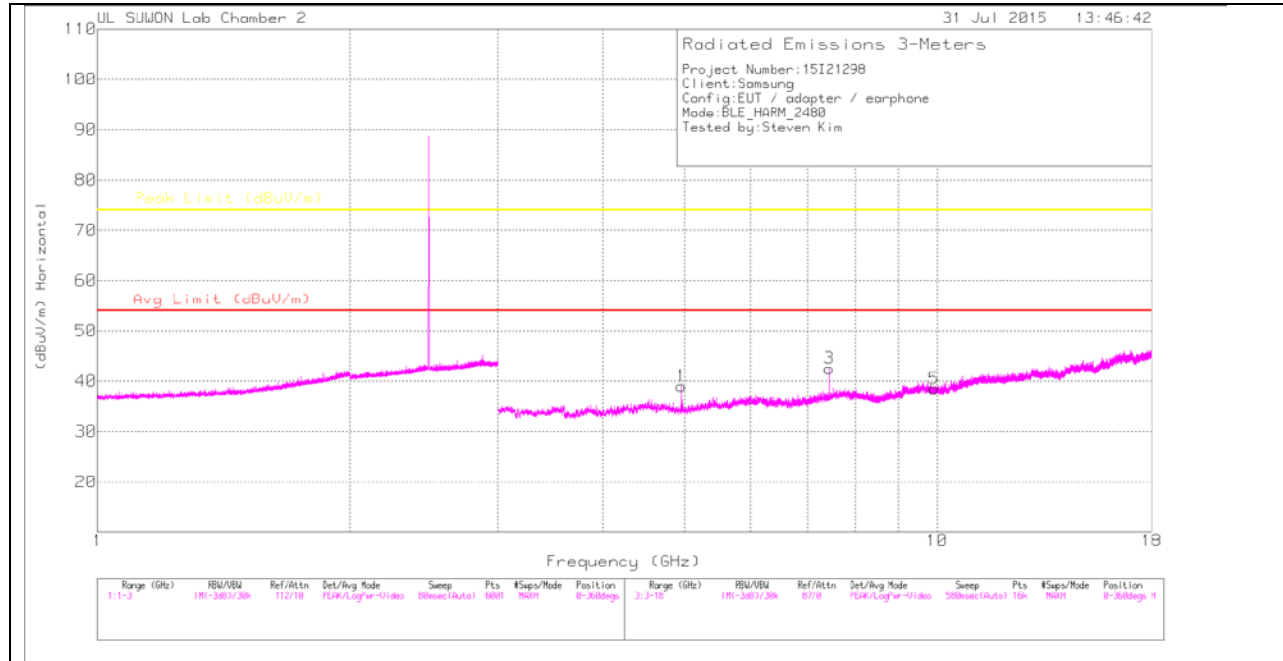
Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8724)_150 619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.88	39.69	PK2	33.9	-25.2	0	48.39	-	-	74	-25.61	356	370	H
* 4.88	28.4	MAv1	33.9	-25.2	2.17	39.27	54	-14.73	-	-	356	370	H
* 4.879	41.15	PK2	33.9	-25.2	0	49.85	-	-	74	-24.15	359	330	V
* 4.88	33.87	MAv1	33.9	-25.2	2.17	44.74	54	-9.26	-	-	359	330	V
* 7.321	41.34	PK2	35.9	-22.5	0	54.74	-	-	74	-19.26	303	190	H
* 7.319	34.89	MAv1	35.9	-22.5	2.17	50.46	54	-3.54	-	-	303	190	H
* 7.319	39.77	PK2	35.9	-22.5	0	53.17	-	-	74	-20.83	241	159	V
* 7.319	27.31	MAv1	35.9	-22.5	2.17	42.88	54	-11.12	-	-	241	159	V

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

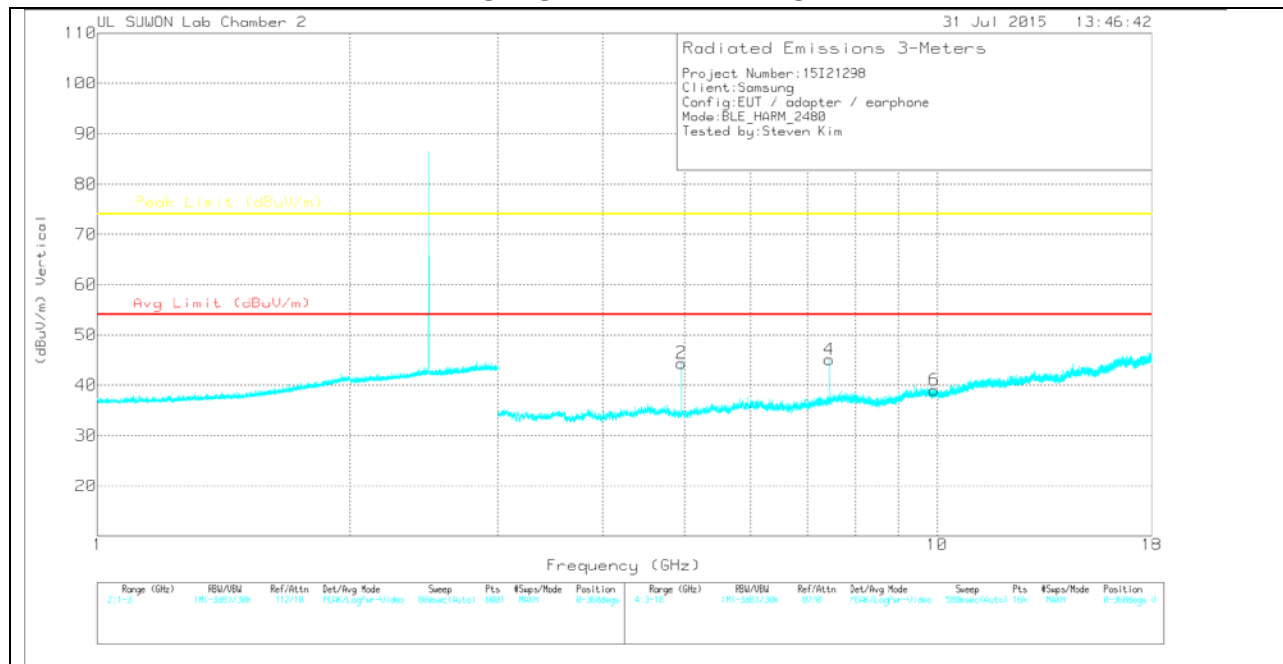
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL DATA

TRACE MARKERS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016872 4)_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	* 4.959	30.13	PK	33.9	-25	0	39.03	-	-	74	-34.97	0-360	200	H
3	* 7.44	28.66	PK	36	-22.1	0	42.56	-	-	74	-31.44	0-360	100	H
5	9.918	20.38	PK	37.1	-19	0	38.48	-	-	74	-35.52	0-360	100	H
2	* 4.96	35.52	PK	33.9	-25	0	44.42	-	-	74	-29.58	0-360	100	V
4	* 7.439	31.22	PK	36	-22.1	0	45.12	-	-	74	-28.88	0-360	200	V
6	9.919	20.95	PK	37.1	-19	0	39.05	-	-	74	-34.95	0-360	200	V

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

PK – Peak Detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8724)_150 619	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
* 4.96	38.48	PK2	33.9	-25	0	47.38	-	-	74	-26.62	211	100	H
* 4.96	25.1	MAV1	33.9	-25	2.17	36.17	54	-17.83	-	-	211	100	H
* 7.44	38.36	PK2	36	-22.1	0	52.26	-	-	74	-21.74	304	150	H
* 7.44	28.41	MAV1	36	-22.1	2.17	44.48	54	-9.52	-	-	304	150	H
* 4.96	41.79	PK2	33.9	-25	0	50.69	-	-	74	-23.31	354	320	V
* 4.96	31.41	MAV1	33.9	-25	2.17	42.48	54	-11.52	-	-	354	320	V
* 7.439	37.57	PK2	36	-22.1	0	51.47	-	-	74	-22.53	358	112	V
* 7.439	29.74	MAV1	36	-22.1	2.17	45.81	54	-8.19	-	-	358	112	V

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

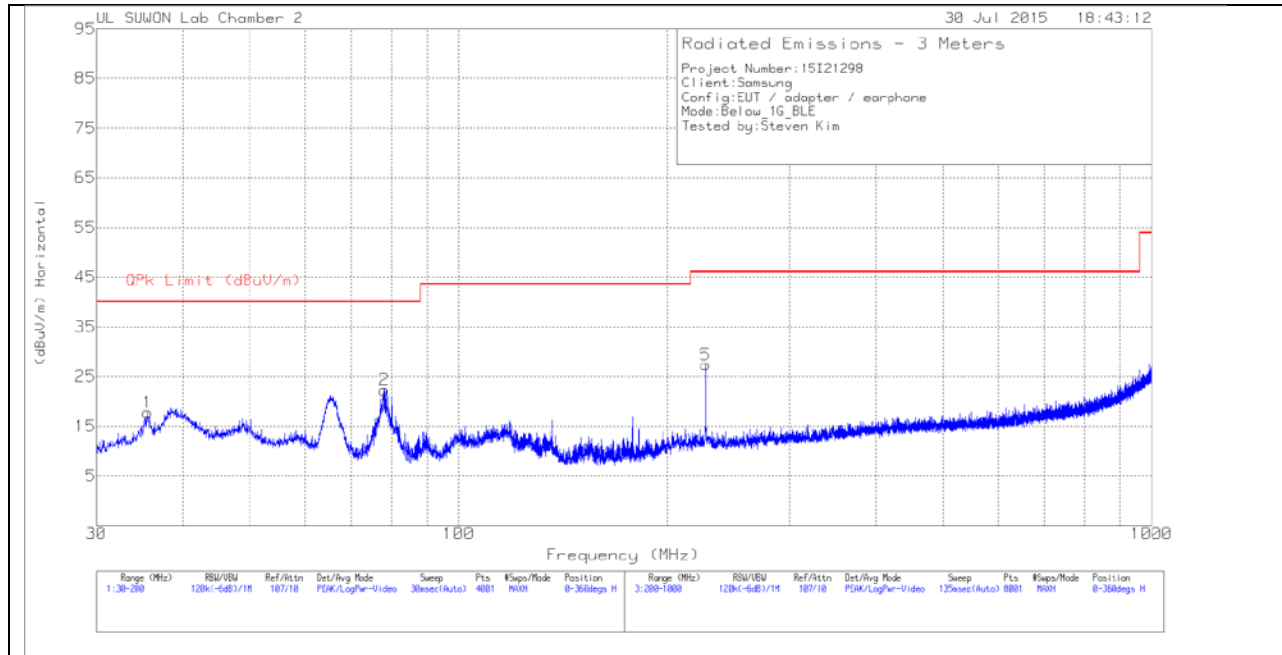
PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

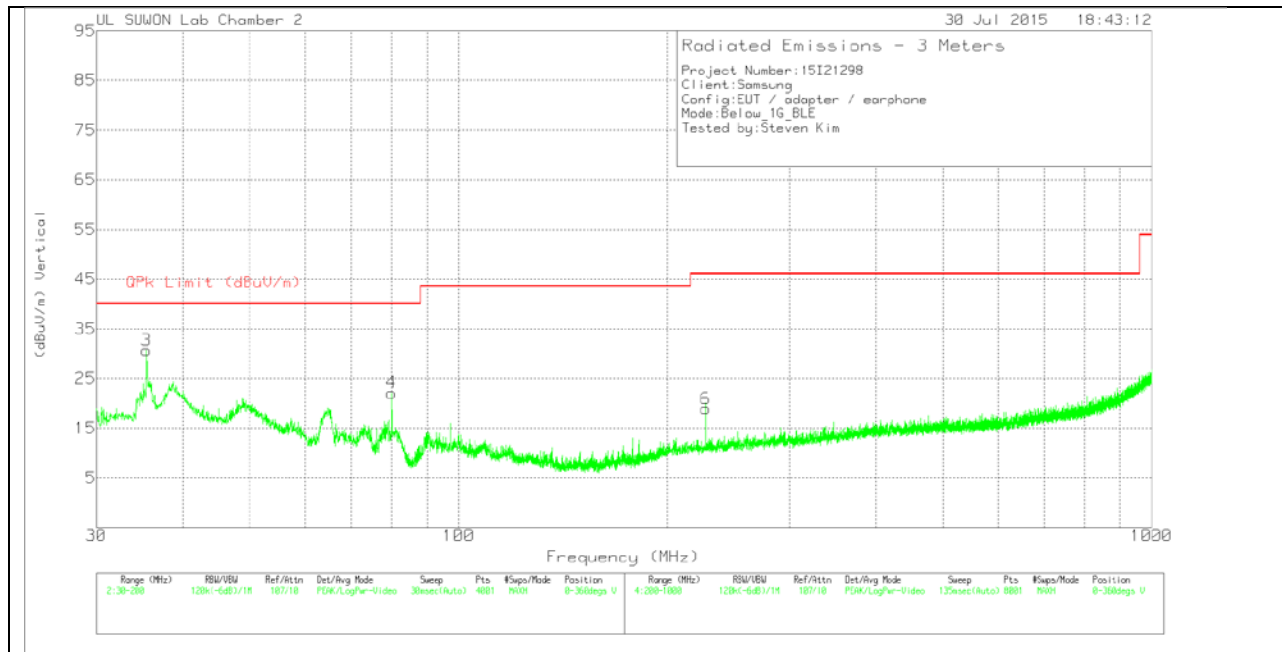
11.3. WORST-CASE BELOW 1 GHz

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	VULB9163-749	Below_1G	DC Corr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	35.61	37.5	Pk	11	-30.7	0	17.8	40	-22.2	0-360	300	H
2	78.195	45.37	Pk	7.5	-30.6	0	22.27	40	-17.73	0-360	200	H
3	35.4825	50.42	Pk	11	-30.7	0	30.72	40	-9.28	0-360	100	V
4	79.98	45.64	Pk	7.1	-30.6	0	22.14	40	-17.86	0-360	200	V
5	227.4	45.55	Pk	12	-30.2	0	27.35	46.02	-18.67	0-360	100	H
6	227.4	37.08	Pk	12	-30.2	0	18.88	46.02	-27.14	0-360	200	V

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.

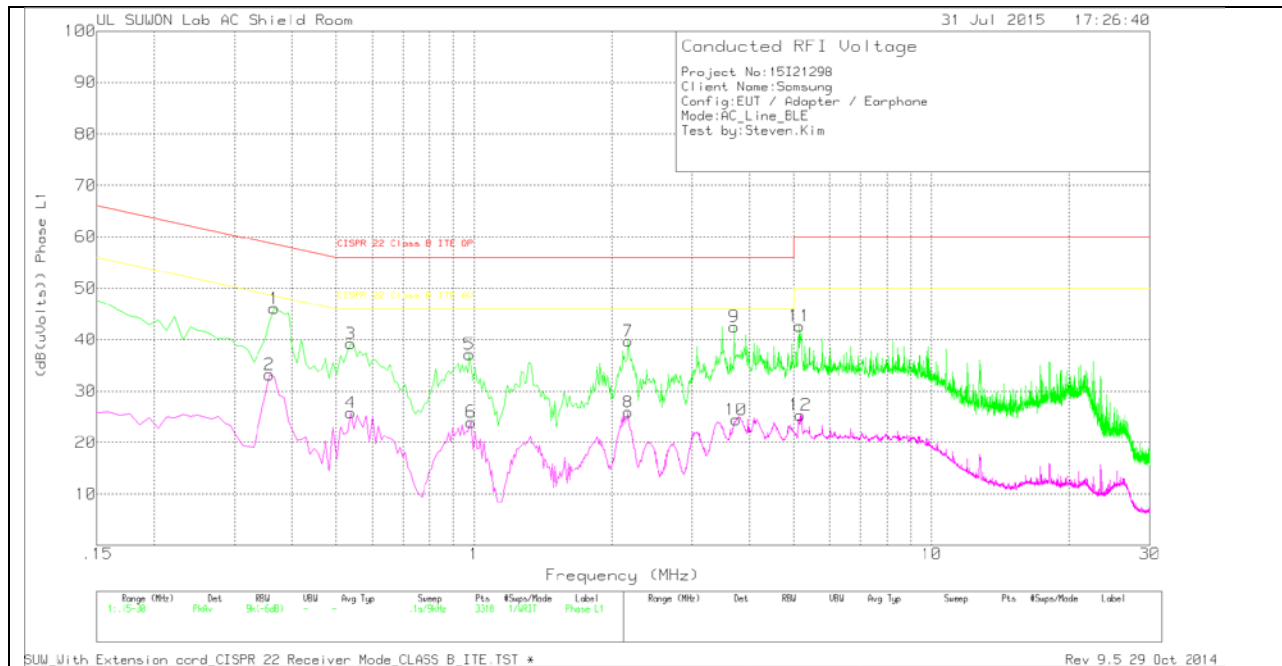
TEST PROCEDURE

ANSI C63.10 - 2009

RESULTS

6 WORST EMISSIONS

LINE 1 PLOT



LINE 1 RESULTS

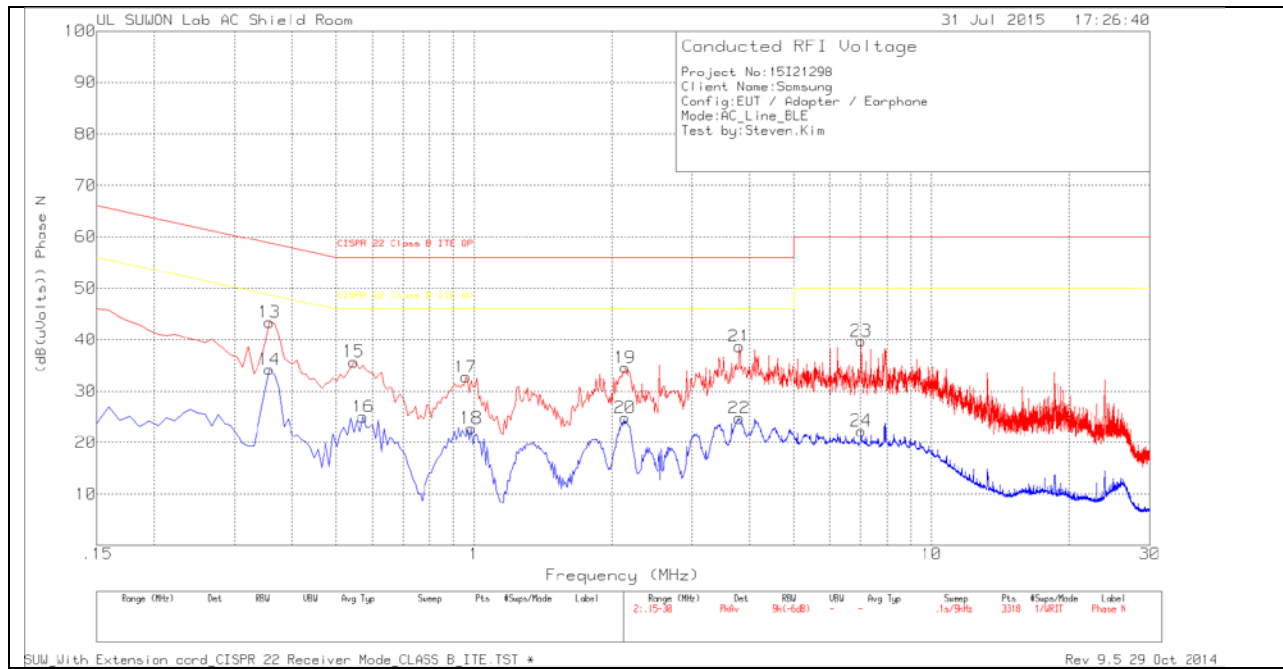
Phase L1 .15 - 30MHz

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	.366	35.98	Pk	10.1	0	46.08	58.59	-12.51	-	-
2	.357	23.18	Av	10	0	33.18	-	-	48.8	-15.62
3	.537	29.1	Pk	10.1	0	39.2	56	-16.8	-	-
4	.537	15.66	Av	10.1	0	25.76	-	-	46	-20.24
5	.978	27.22	Pk	9.9	0	37.12	56	-18.88	-	-
6	.987	14.08	Av	9.9	0	23.98	-	-	46	-22.02
7	2.175	29.79	Pk	9.8	.1	39.69	56	-16.31	-	-
8	2.175	16	Av	9.8	.1	25.9	-	-	46	-20.1
9	3.705	32.63	Pk	9.8	.1	42.53	56	-13.47	-	-
10	3.741	14.51	Av	9.8	.1	24.41	-	-	46	-21.59
11	5.154	32.71	Pk	9.8	.1	42.61	60	-17.39	-	-
12	5.172	15.43	Av	9.8	.1	25.33	-	-	50	-24.67

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	.357	33.37	Pk	10	0	43.37	58.8	-15.43	-	-
14	.357	24.18	Av	10	0	34.18	-	-	48.8	-14.62
15	.546	25.62	Pk	10.1	0	35.72	56	-20.28	-	-
16	.573	14.9	Av	10.1	0	25	-	-	46	-21
17	.96	22.83	Pk	9.9	0	32.73	56	-23.27	-	-
18	.987	12.86	Av	9.9	0	22.76	-	-	46	-23.24
19	2.139	24.7	Pk	9.8	.1	34.6	56	-21.4	-	-
20	2.139	14.95	Av	9.8	.1	24.85	-	-	46	-21.15
21	3.804	28.78	Pk	9.8	.1	38.68	56	-17.32	-	-
22	3.804	14.85	Av	9.8	.1	24.75	-	-	46	-21.25
23	7.026	29.75	Pk	9.9	.1	39.75	60	-20.25	-	-
24	7.026	12.27	Av	9.9	.1	22.27	-	-	50	-27.73

Pk - Peak detector

Av - Average detection