



FCC CFR47 PART 15 SUBPART C

DTS Wireless LAN

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Phone + Bluetooth/BLE and DTS b/g/n

MODEL NUMBER : SM-Z300F/DS

FCC ID: A3LSMZ300F

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--	09/22/15	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 + Bluetooth/BLE and DTS b/g/n
MODEL NUMBER: SM-Z300F/DS
SERIAL NUMBER: R38G80BH21F (RADIATED); R38G80BH2HT (CONDUCTED)
DATE TESTED: SEP 04, 2015 - SEP 19, 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
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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, 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

GSM/WCDMA/LTE Phone + Bluetooth/BLE and DTS b/g/n

This test report addresses the DTS (WLAN) operational mode.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum total conducted output power as follows:

Frequency Range [MHz]	Mode	Output Power [dBm]	Output Power [mW]
2412 - 2462	802.11b	16.42	43.85
	802.11g	14.02	25.23
	802.11n HT20	13.07	20.28

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antennas, with a antenna's maximum gain of 1.2 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.

Based on the baseline scan, the worst-case data rates were:

802.11b mode: 1 Mbps
802.11g mode: 6 Mbps
802.11n HT20 mode: MCS0

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	ETA0U83EWE	DW1G806US/A-E	N/A
Data Cable	SAMSUNG	ECB-DU68WE	N/A	N/A
Earphone	SAMSUNG	GH59-11129H	N/A	N/A

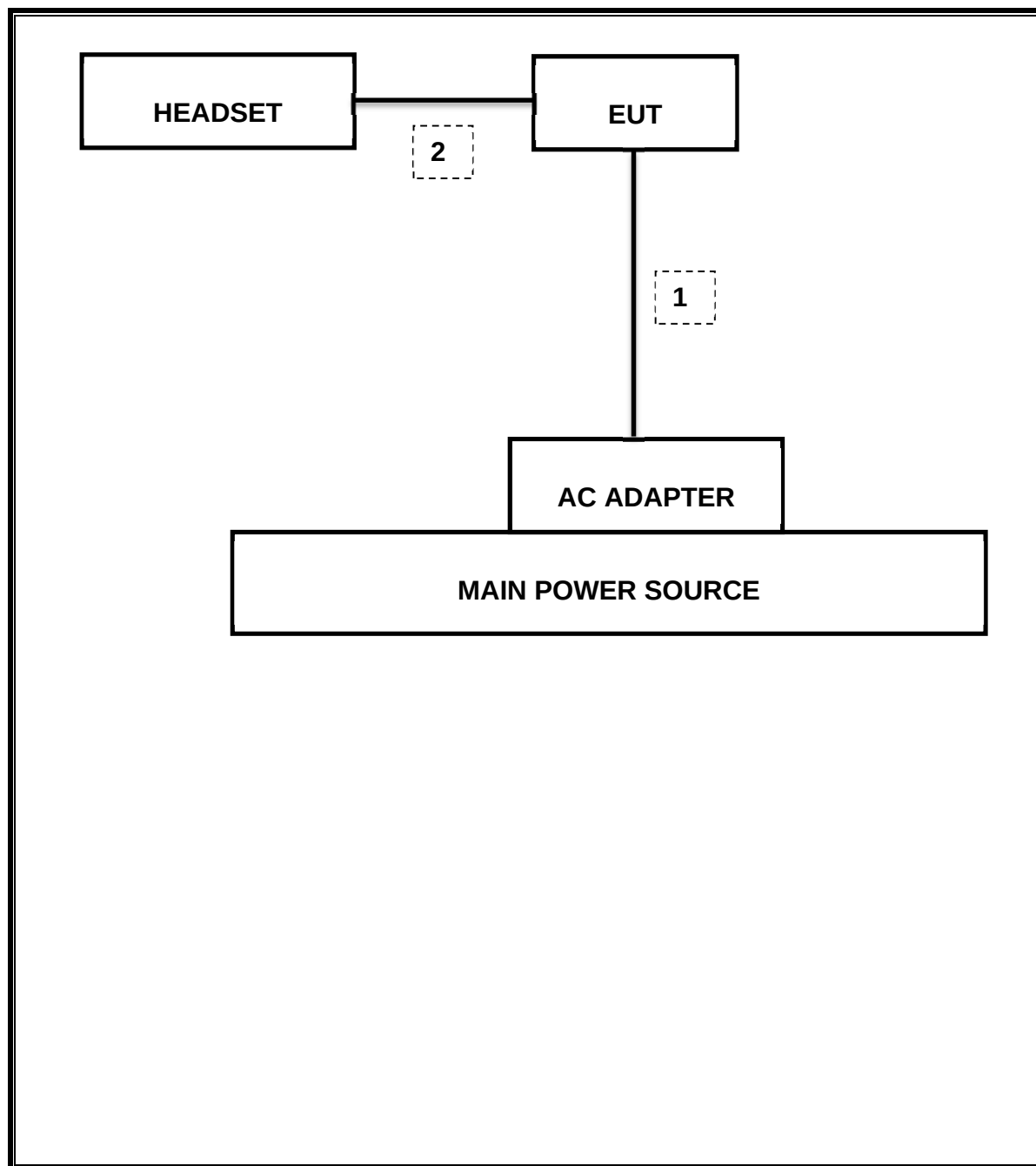
I/O CABLES

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
1	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	750	11-17-15
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	04-25-16
Antenna, Horn, 18 GHz	ETS	3115	00161451	05-17-16
Antenna, Horn, 18 GHz	ETS	3117	00168724	06-17-16
Antenna, Horn, 18 GHz	ETS	3117	00168717	06-17-16
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	08-18-16
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-18-16
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-18-16
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-18-16
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-19-16
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-19-16
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	08-18-16
Average Power Sensor	R&S	NRZ-Z91	102681	08-18-16
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-18-16
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-19-16
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-19-16
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-19-16
Attenuator / Switch driver	HP	11713A	3748A04272	N/A
Low Pass Filter 3GHz	Micro-Tronics	LPS17541	009	08-18-16
Low Pass Filter 3GHz	Micro-Tronics	LPS17541	015	08-18-16
High Pass Filter 5GHz	Micro-Tronics	HPS17542	009	08-18-16
High Pass Filter 6GHz	Micro-Tronics	HPM17543	010	08-18-16
High Pass Filter 5GHz	Micro-Tronics	HPS17542	016	08-18-16
High Pass Filter 6GHz	Micro-Tronics	HPM17543	015	08-18-16
LISN	R&S	ENV-216	101836	08-19-16
LISN	R&S	ENV-216	101837	08-19-16

7. MEASUREMENT METHODS

KDB 558074 D01 DTS Meas Guidance v03r03: Measurement Procedure §9.2.3.1 AVGPM is used for power and §10.2 AVGPS-2 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						
802.11b	8.415	8.513	0.988	98.8%	0.00	0.010
802.11g	1.396	1.494	0.934	93.4%	0.29	0.716
802.11n HT20	1.296	1.394	0.930	93.0%	0.32	0.772



[802.11b Mode]

[802.11g Mode]

[802.11n Mode]

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	7.08 MHz
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-28.565 dBm
15.247	TX conducted output power	<30dBm		Pass	16.42 dBm
15.247	PSD	<8dBm		Pass	-14.433 dBm
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass	47.00 dBuV (QP)
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass	50.03 dBuV/m (QP)

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

Reference to KDB 558074 D01 DTS Meas Guidance v03r03: 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

10.1.1. 802.11b MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Low	2412	8.039	0.5
Mid	2437	7.086	0.5
High	2462	7.092	0.5
Worst		7.086	0.5

10.1.2. 802.11g MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Low	2412	16.325	0.5
Mid	2437	16.354	0.5
High	2462	16.333	0.5
Worst		16.325	0.5

10.1.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Low	2412	17.304	0.5
Mid	2437	17.581	0.5
High	2462	17.564	0.5
Worst		17.304	0.5

802.11b Mode
Low CH

802.11b Mode
Middle CH

802.11b Mode
High CH

Keysight Spectrum Analyzer - Sweep SA

RL RF 50 Ω DC SENSE:INT1 ALIGN: AUTO 10:08:37 AM Sep 16, 2015

PNO: Wide IF Gain: Low Trig: Free Run Atten: 20 dB #Avg Type: RMS Avg/Hold: 100/100

Ref Offset 10.15 dB Ref 20.00 dBm

10 dB/div Log

ΔMkr3 8.039 MHz -0.046 dB

Center 2.41200 GHz #Res BW 100 kHz Span 20.00 MHz Sweep 1.333 ms (20001 pts)

MSG STATUS

Keysight Spectrum Analyzer - Sweep SA

RL RF 50 Ω DC SENSE:INT1 ALIGN: AUTO 10:09:34 AM Sep 16, 2015

PNO: Wide IF Gain: Low Trig: Free Run Atten: 20 dB #Avg Type: RMS Avg/Hold: 100/100

Ref Offset 10.15 dB Ref 20.00 dBm

10 dB/div Log

ΔMkr3 7.086 MHz 0.030 dB

Center 2.43700 GHz #Res BW 100 kHz Span 20.00 MHz Sweep 1.333 ms (20001 pts)

MSG STATUS

Keysight Spectrum Analyzer - Sweep SA

RL RF 50 Ω DC SENSE:INT1 ALIGN: AUTO 10:10:35 AM Sep 16, 2015

PNO: Wide IF Gain: Low Trig: Free Run Atten: 20 dB #Avg Type: RMS Avg/Hold: 100/100

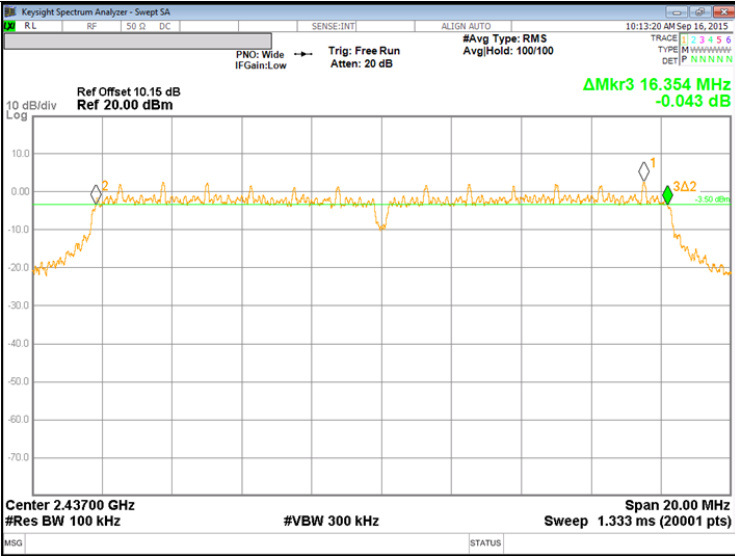
Ref Offset 10.15 dB Ref 20.00 dBm

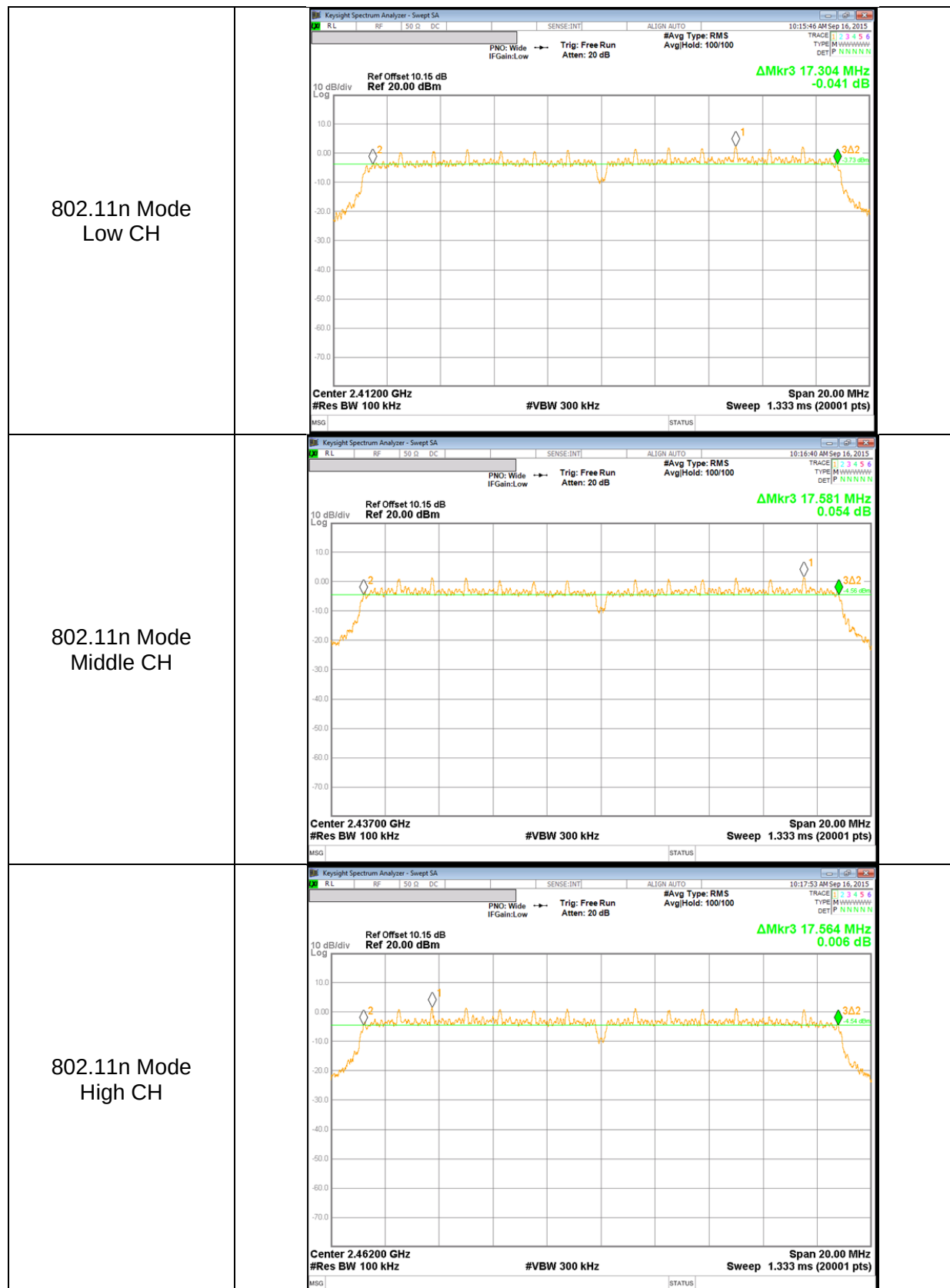
10 dB/div Log

ΔMkr3 7.092 MHz 0.010 dB

Center 2.46200 GHz #Res BW 100 kHz Span 20.00 MHz Sweep 1.333 ms (20001 pts)

MSG STATUS

802.11g Mode Low CH	
802.11g Mode Middle CH	
802.11g Mode High CH	



10.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

10.2.1. 802.11b MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	2412	12.826
Mid	2437	12.710
High	2462	12.925
Worst		12.925

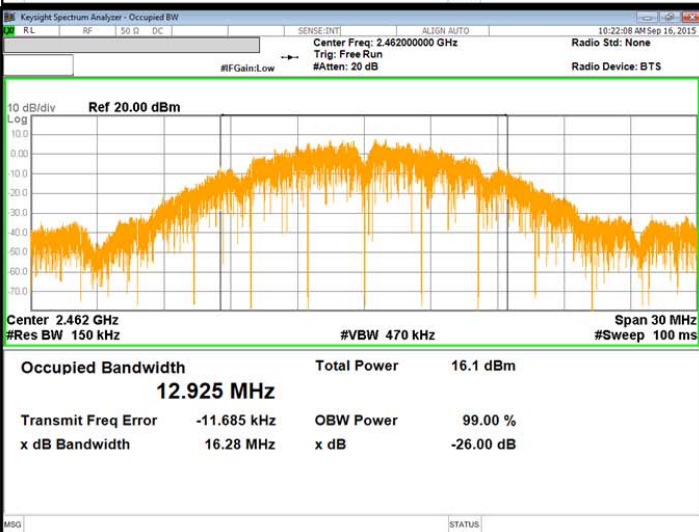
10.2.2. 802.11g MODE IN THE 2.4 GHz BAND

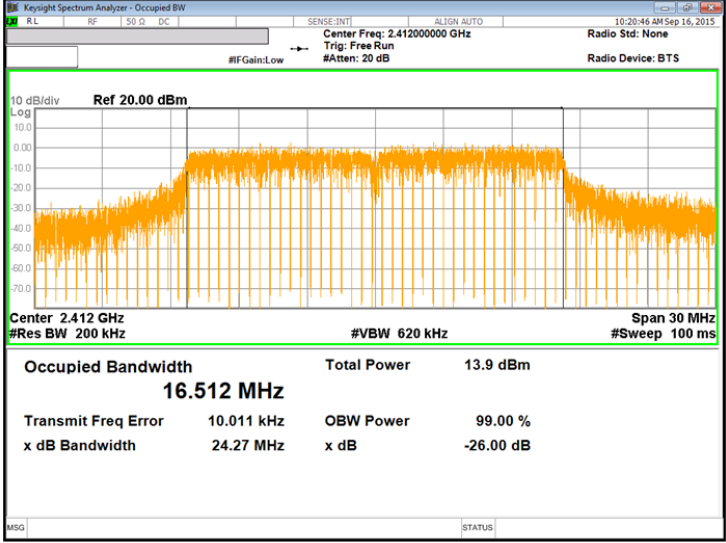
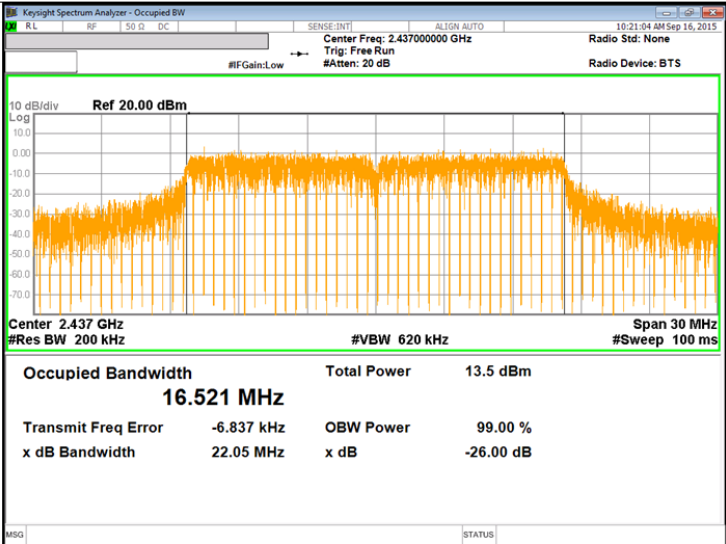
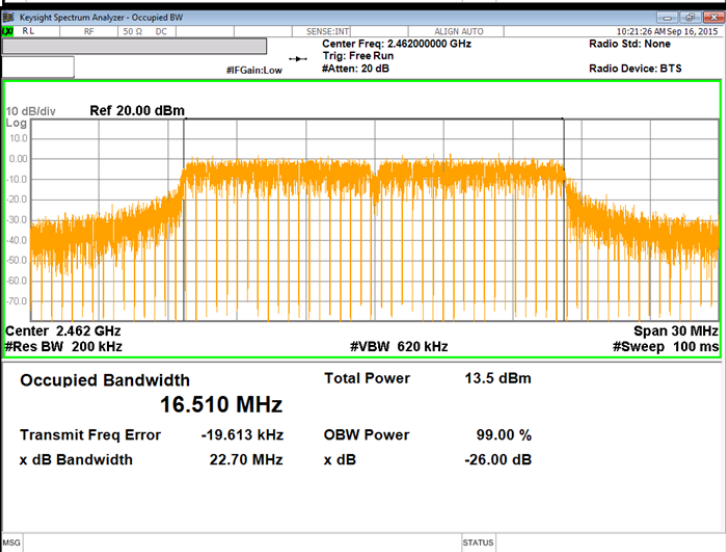
Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	2412	16.512
Mid	2437	16.521
High	2462	16.510
Worst		16.521

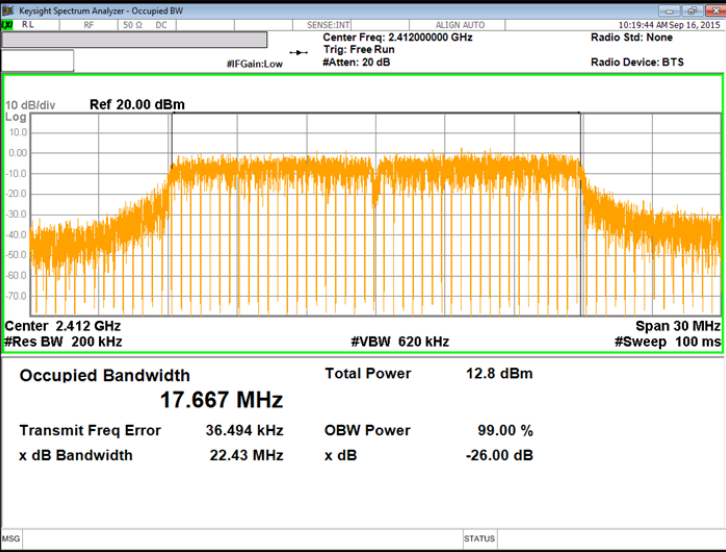
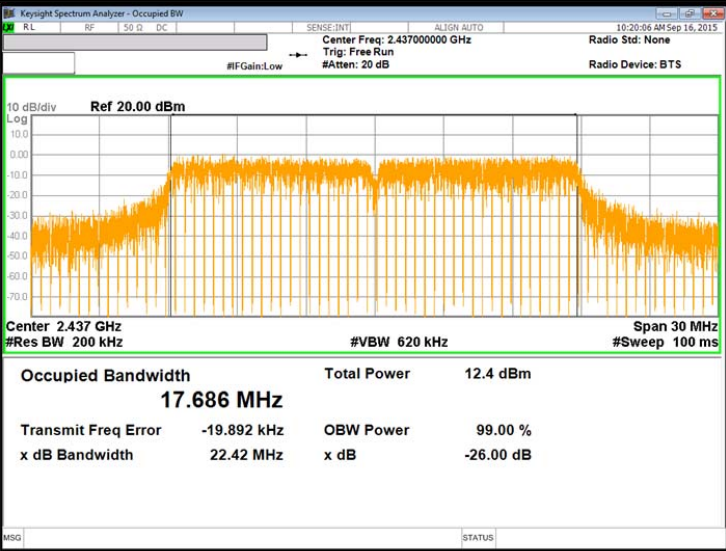
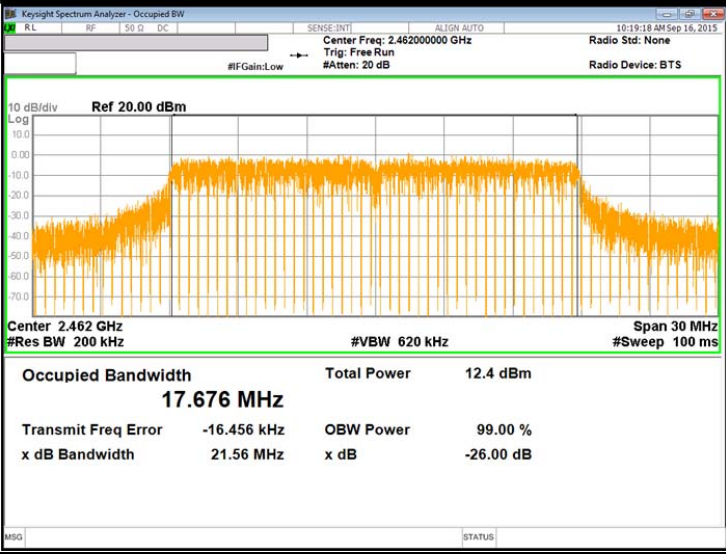
10.2.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	2412	17.667
Mid	2437	17.686
High	2462	17.676
Worst		17.686

10.2.4. 99% BANDWIDTH PLOTS

802.11b Mode Low CH	 Center Freq: 2.41200000 GHz Trig: Free Run #Atten: 20 dB Radio Std: None Radio Device: BTS Ref 20.00 dBm Center 2.412 GHz #Res BW 150 kHz #VBW 470 kHz Span 30 MHz #Sweep 100 ms Occupied Bandwidth 12.826 MHz Total Power 16.5 dBm Transmit Freq Error 152.99 kHz OBW Power 99.00 % x dB Bandwidth 16.53 MHz x dB -26.00 dB
802.11b Mode Middle CH	 Center Freq: 2.43700000 GHz Trig: Free Run #Atten: 20 dB Radio Std: None Radio Device: BTS Ref 20.00 dBm Center 2.437 GHz #Res BW 150 kHz #VBW 470 kHz Span 30 MHz #Sweep 100 ms Occupied Bandwidth 12.710 MHz Total Power 16.1 dBm Transmit Freq Error 33.616 kHz OBW Power 99.00 % x dB Bandwidth 15.69 MHz x dB -26.00 dB
802.11b Mode High CH	 Center Freq: 2.46200000 GHz Trig: Free Run #Atten: 20 dB Radio Std: None Radio Device: BTS Ref 20.00 dBm Center 2.462 GHz #Res BW 150 kHz #VBW 470 kHz Span 30 MHz #Sweep 100 ms Occupied Bandwidth 12.925 MHz Total Power 16.1 dBm Transmit Freq Error -11.685 kHz OBW Power 99.00 % x dB Bandwidth 16.28 MHz x dB -26.00 dB

802.11g Mode Low CH	 KeySight Spectrum Analyzer - Occupied BW Center Freq: 2.41200000 GHz Trig: Free Run #Atten: 20 dB Radio Std: None Radio Device: BTS 10 dB/div Ref 20.00 dBm Center 2.412 GHz #Res BW 200 kHz #VBW 620 kHz Span 30 MHz #Sweep 100 ms Occupied Bandwidth 16.512 MHz Total Power 13.9 dBm Transmit Freq Error 10.011 kHz OBW Power 99.00 % x dB Bandwidth 24.27 MHz x dB -26.00 dB
802.11g Mode Middle CH	 KeySight Spectrum Analyzer - Occupied BW Center Freq: 2.437000000 GHz Trig: Free Run #Atten: 20 dB Radio Std: None Radio Device: BTS 10 dB/div Ref 20.00 dBm Center 2.437 GHz #Res BW 200 kHz #VBW 620 kHz Span 30 MHz #Sweep 100 ms Occupied Bandwidth 16.521 MHz Total Power 13.5 dBm Transmit Freq Error -6.837 kHz OBW Power 99.00 % x dB Bandwidth 22.05 MHz x dB -26.00 dB
802.11g Mode High CH	 KeySight Spectrum Analyzer - Occupied BW Center Freq: 2.462000000 GHz Trig: Free Run #Atten: 20 dB Radio Std: None Radio Device: BTS 10 dB/div Ref 20.00 dBm Center 2.462 GHz #Res BW 200 kHz #VBW 620 kHz Span 30 MHz #Sweep 100 ms Occupied Bandwidth 16.510 MHz Total Power 13.5 dBm Transmit Freq Error -19.613 kHz OBW Power 99.00 % x dB Bandwidth 22.70 MHz x dB -26.00 dB

802.11n Mode Low CH	 Center Freq: 2.412000000 GHz Trig: Free Run #Atten: 20 dB Radio Device: BTS Ref 20.00 dBm Center 2.412 GHz #Res BW 200 kHz #VBW 620 kHz Span 30 MHz #Sweep 100 ms Occupied Bandwidth 17.667 MHz Total Power 12.8 dBm Transmit Freq Error 36.494 kHz OBW Power 99.00 % x dB Bandwidth 22.43 MHz x dB -26.00 dB
802.11n Mode Middle CH	 Center Freq: 2.437000000 GHz Trig: Free Run #Atten: 20 dB Radio Device: BTS Ref 20.00 dBm Center 2.437 GHz #Res BW 200 kHz #VBW 620 kHz Span 30 MHz #Sweep 100 ms Occupied Bandwidth 17.686 MHz Total Power 12.4 dBm Transmit Freq Error -19.892 kHz OBW Power 99.00 % x dB Bandwidth 22.42 MHz x dB -26.00 dB
802.11n Mode High CH	 Center Freq: 2.462000000 GHz Trig: Free Run #Atten: 20 dB Radio Device: BTS Ref 20.00 dBm Center 2.462 GHz #Res BW 200 kHz #VBW 620 kHz Span 30 MHz #Sweep 100 ms Occupied Bandwidth 17.676 MHz Total Power 12.4 dBm Transmit Freq Error -16.456 kHz OBW Power 99.00 % x dB Bandwidth 21.56 MHz x dB -26.00 dB

10.3. OUTPUT POWER

LIMITS

FCC §15.247

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Duty cycle correction factor is added to the average output power results for duty cycle < 98%.

DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

TEST PROCEDURE

The transmitter output is connected to a power meter.

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.

RESULTS

10.3.1. 802.11b MODE IN THE 2.4 GHz BAND

Limits

Channel	Frequency [MHz]	Directional Gain Primary [dBi]	FCC Power Limit [dBm]	IC Power Limit [dBm]	IC EIRP Limit [dBm]	Max Power [dBm]
Low	2412	1.20	30.00	30.00	36.00	30.00
Mid	2437	1.20	30.00	30.00	36.00	30.00
High	2462	1.20	30.00	30.00	36.00	30.00

Results

Channel	Frequency [MHz]	Primary Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Margin [dB]
Low	2412	16.42	16.42	36.00	-19.58
Mid	2437	16.03	16.03	36.00	-19.97
High	2462	16.17	16.17	36.00	-19.83
Worst			16.42	36.00	-19.58

10.3.2. 802.11g MODE IN THE 2.4 GHz BAND

Limits

Channel	Frequency [MHz]	Directional Gain Primary [dBi]	FCC Power Limit [dBm]	IC Power Limit [dBm]	IC EIRP Limit [dBm]	Max Power [dBm]
Low	2412	1.20	30.00	30.00	36.00	30.00
Mid	2437	1.20	30.00	30.00	36.00	30.00
High	2462	1.20	30.00	30.00	36.00	30.00

Results

Channel	Frequency [MHz]	Primary Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Margin [dB]
Low	2412	14.02	14.02	36.00	-21.98
Mid	2437	13.68	13.68	36.00	-22.32
High	2462	13.71	13.71	36.00	-22.29
Worst			14.02	36.00	-21.98

10.3.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Limits

Channel	Frequency [MHz]	Directional Gain Primary [dBi]	FCC Power Limit [dBm]	IC Power Limit [dBm]	IC EIRP Limit [dBm]	Max Power [dBm]
Low	2412	1.20	30.00	30.00	36.00	30.00
Mid	2437	1.20	30.00	30.00	36.00	30.00
High	2462	1.20	30.00	30.00	36.00	30.00

Results

Channel	Frequency [MHz]	Primary Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Margin [dB]
Low	2412	13.07	13.07	36.00	-22.93
Mid	2437	13.03	13.03	36.00	-22.97
High	2462	12.81	12.81	36.00	-23.19
Worst			13.07	36.00	-22.93

10.4. 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 "Method AVGPS-2" under KDB558074 D01 DTS Meas Guidance v03r03

RESULTS

10.4.1. 802.11b MODE IN THE 2.4 GHz BAND

PSD Results

Channel	Frequency [MHz]	PSD Meas [dBm]	Duty Factor [dB]	Final PSD [dBm]	Limit [dBm]	Margin [dB]
Low	2412	-14.433	0.00	-14.43	8.00	-22.43
Mid	2437	-14.886	0.00	-14.89	8.00	-22.89
High	2462	-14.819	0.00	-14.82	8.00	-22.82

10.4.2. 802.11g MODE IN THE 2.4 GHz BAND

PSD Results

Channel	Frequency [MHz]	PSD Meas [dBm]	Duty Factor [dB]	Final PSD [dBm]	Limit [dBm]	Margin [dB]
Low	2412	-19.698	0.29	-19.41	8.00	-27.70
Mid	2437	-20.731	0.29	-20.44	8.00	-28.73
High	2462	-20.849	0.29	-20.56	8.00	-28.85

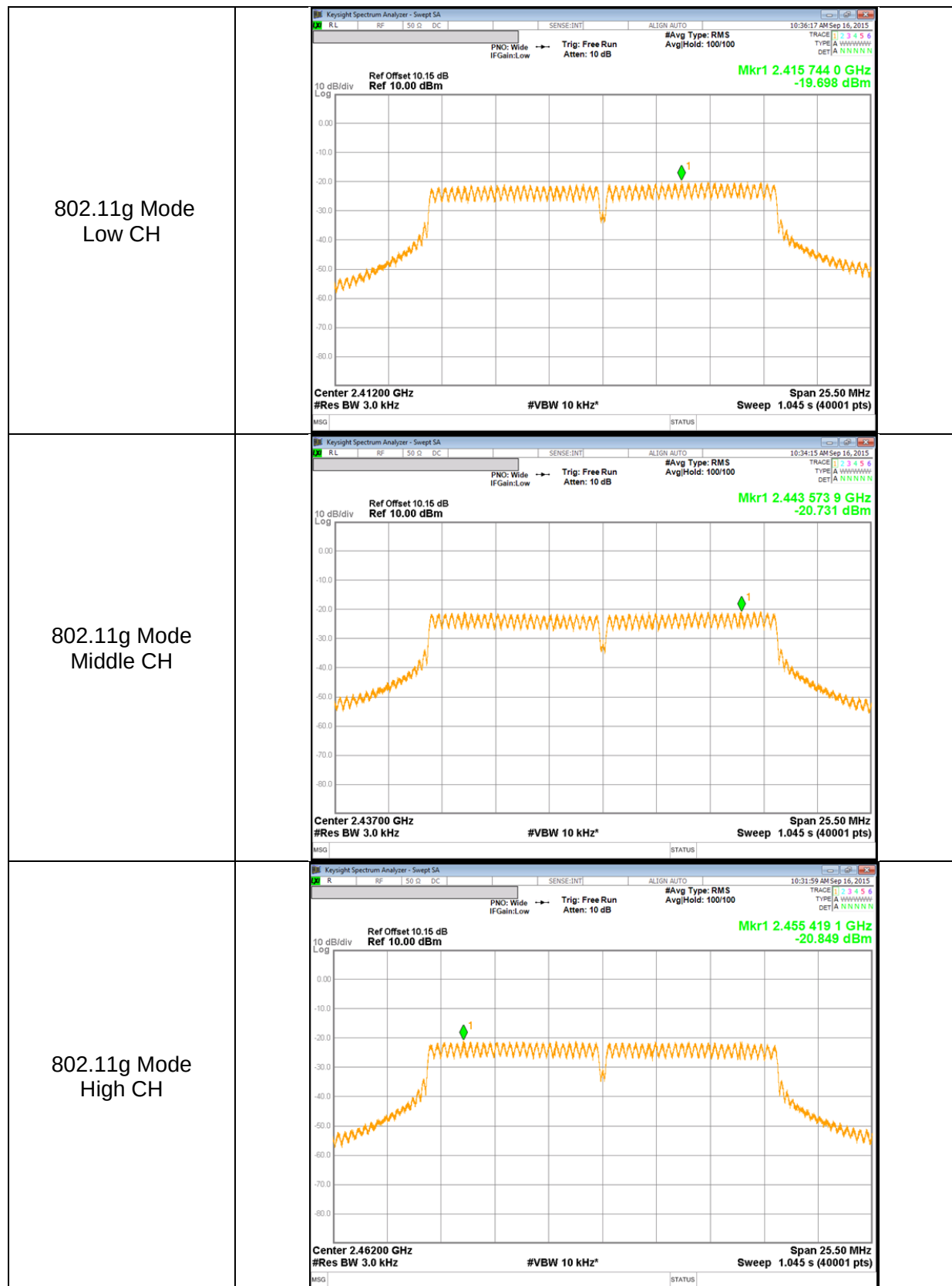
10.4.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

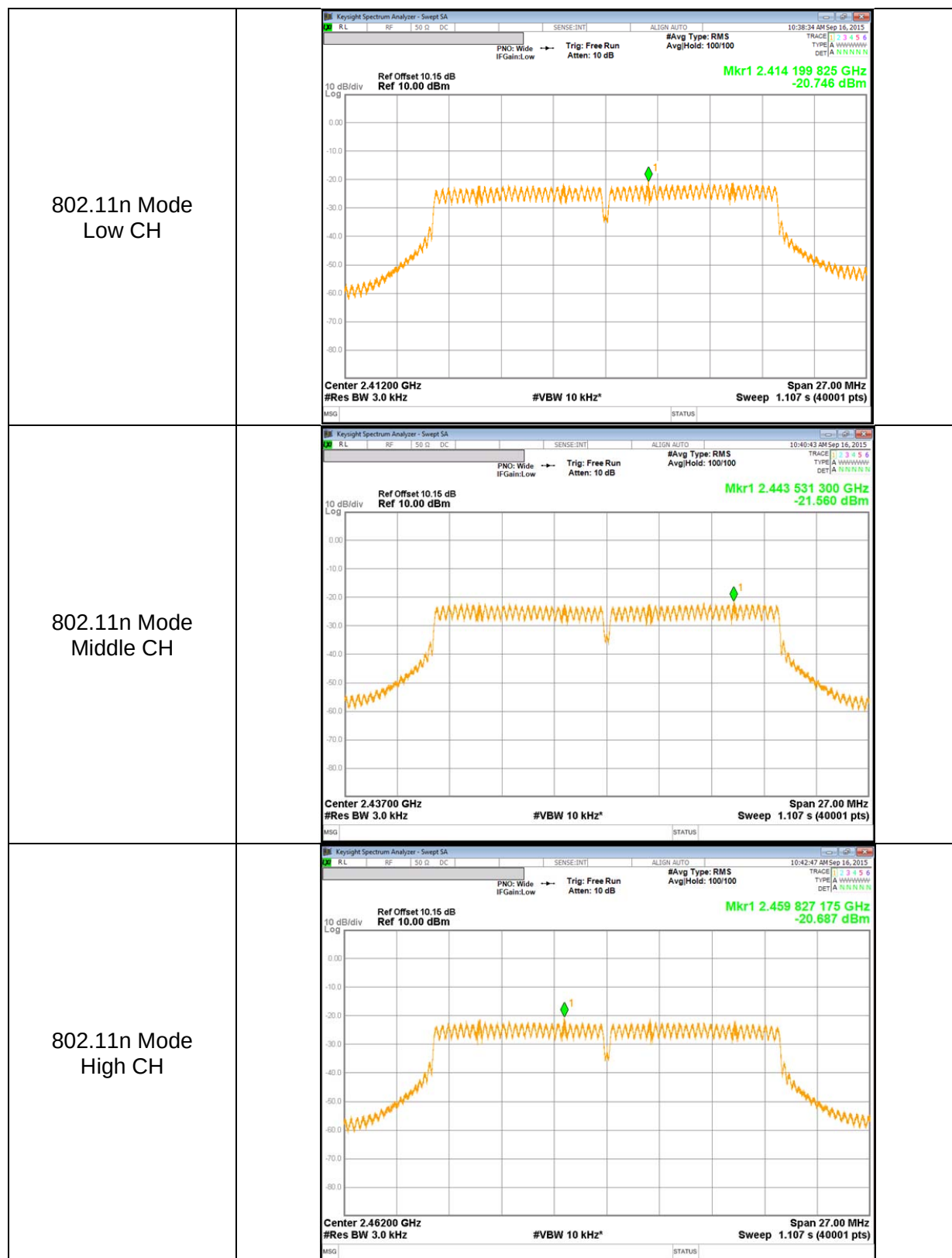
PSD Results

Channel	Frequency [MHz]	PSD Meas [dBm]	Duty Factor [dB]	Final PSD [dBm]	Limit [dBm]	Margin [dB]
Low	2412	-20.746	0.32	-20.43	8.00	-28.75
Mid	2437	-21.56	0.32	-21.24	8.00	-29.56
High	2462	-20.687	0.32	-20.37	8.00	-28.69

10.4.4. PSD PLOTS

802.11b Mode Low CH	
802.11b Mode Middle CH	
802.11b Mode High CH	





10.5. 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

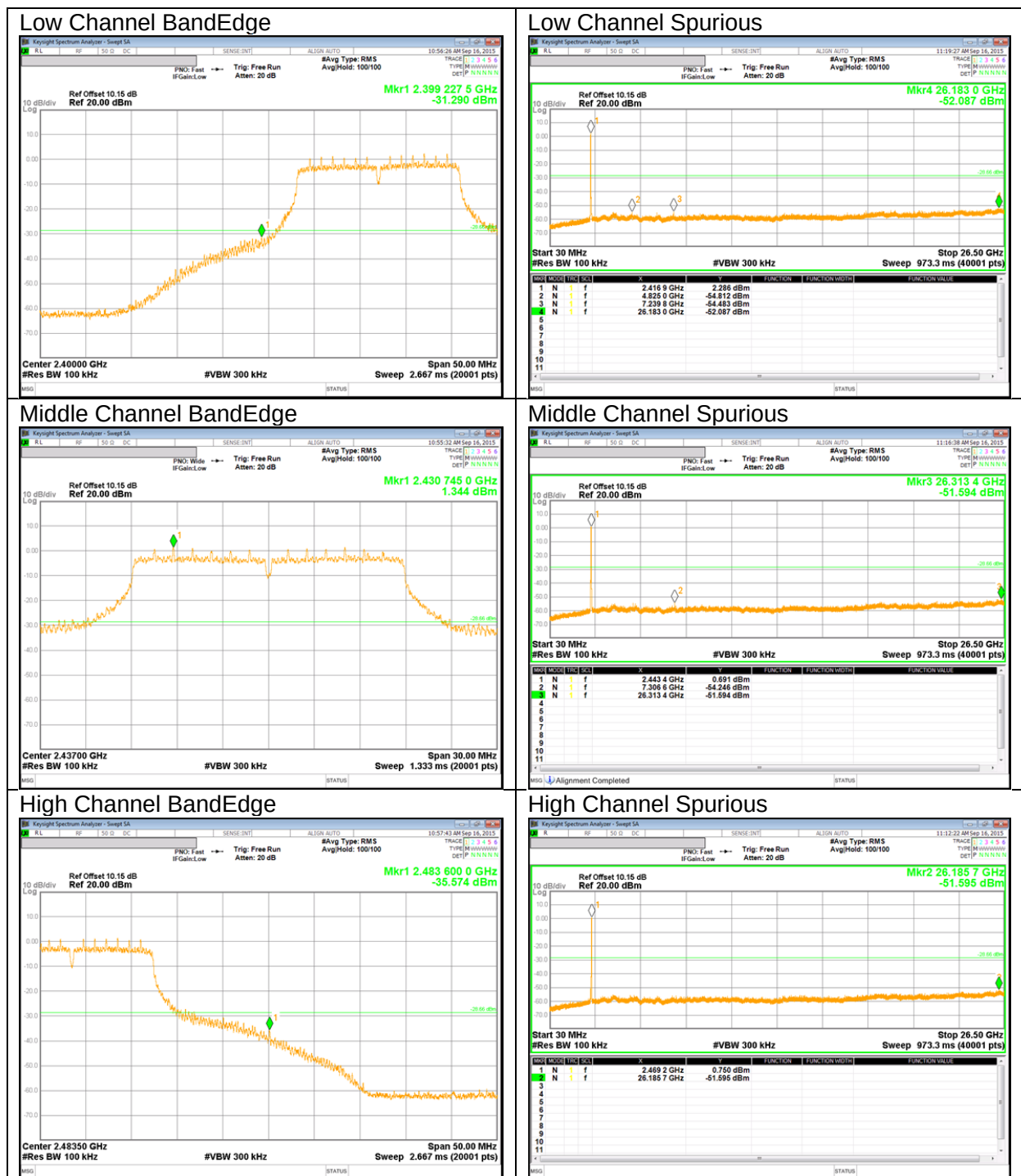
10.5.1. 802.11b MODE IN THE 2.4 GHz BAND



10.5.2. 802.11g MODE IN THE 2.4 GHz BAND



10.5.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND



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.

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; the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor for average measurements. Duty cycle factor = $10\log(1/x)$ For this sample B mode = 0dB (duty cycle >98%); G mode = 0.29dB; N mode = 0.32dB.

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

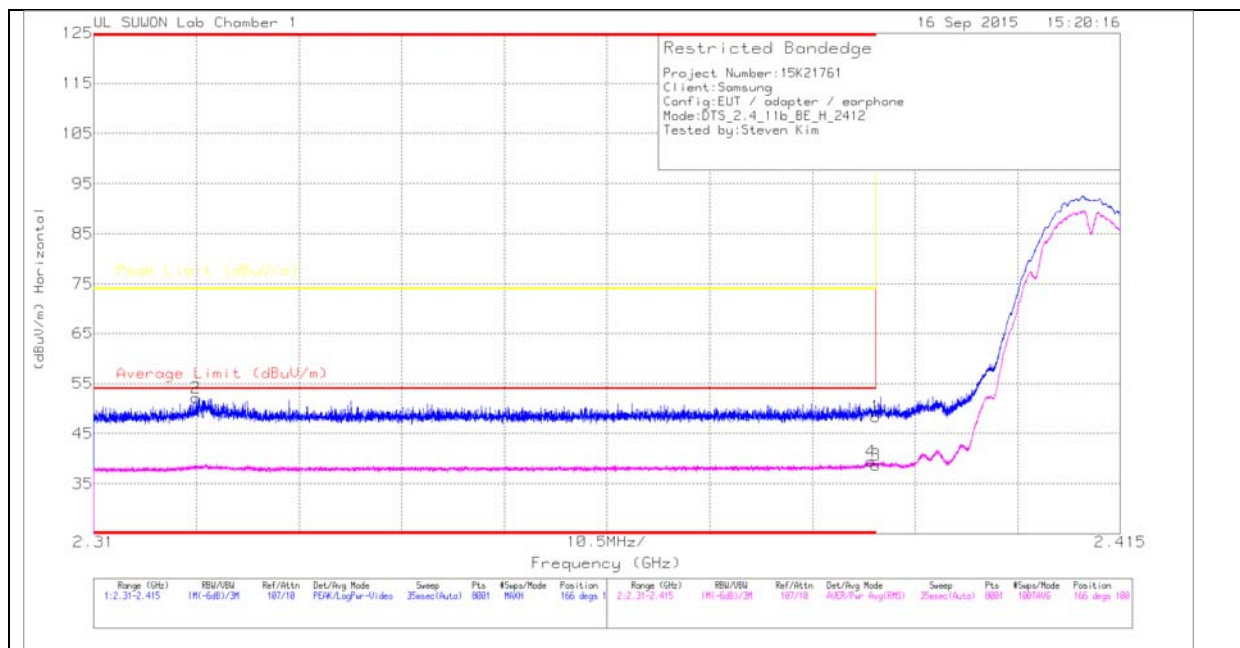
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

11.2. TRANSMITTER ABOVE 1 GHz

11.2.1. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

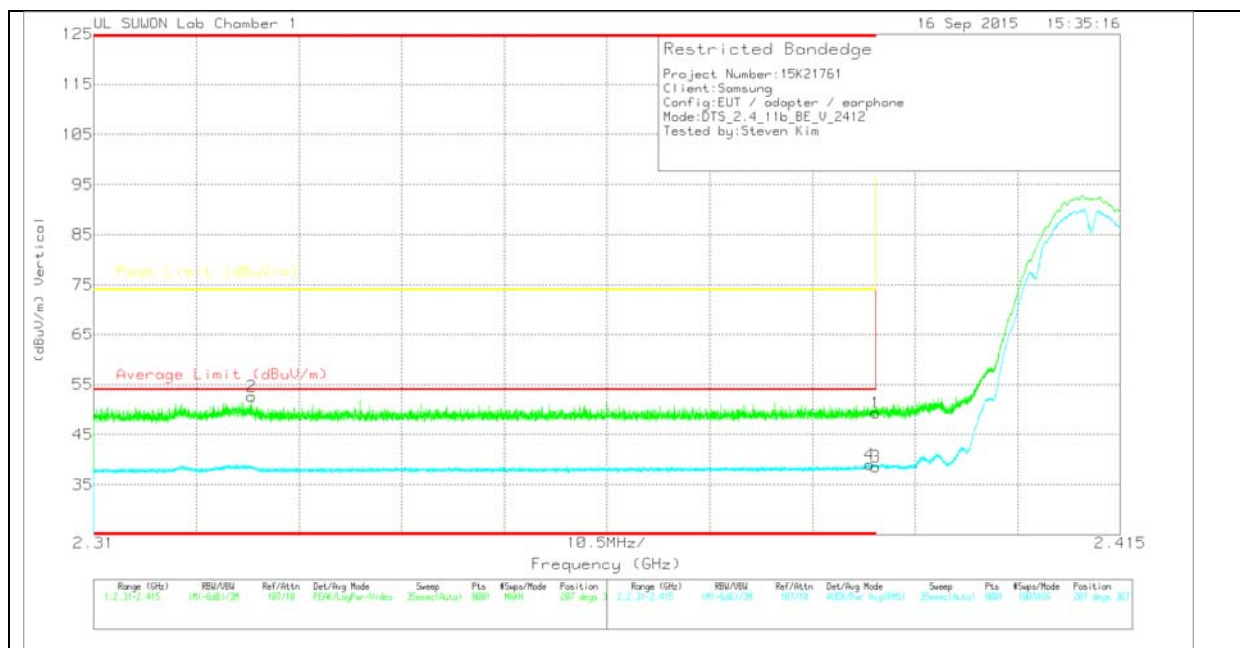
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 24)_150619	Path_2_10dB	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	39.37	Pk	31.8	-22.8	0	48.37	-	-	74	-25.63	166	100	H
2	* 2.32	43.34	Pk	31.7	-22.9	0	52.14	-	-	74	-21.86	166	100	H
3	* 2.39	29.73	RMS	31.8	-22.8	0	38.73	54	-15.27	-	-	166	100	H
4	* 2.389	30.45	RMS	31.8	-22.8	0	39.45	54	-14.55	-	-	166	100	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	40.31	Pk			0	49.31	-	-	74	-24.69	207	367	V
2	* 2.326	43.81	Pk			0	52.61	-	-	74	-21.39	207	367	V
3	* 2.39	29.59	RMS			0	38.59	54	-15.41	-	-	207	367	V
4	* 2.389	30.06	RMS			0	39.06	54	-14.94	-	-	207	367	V

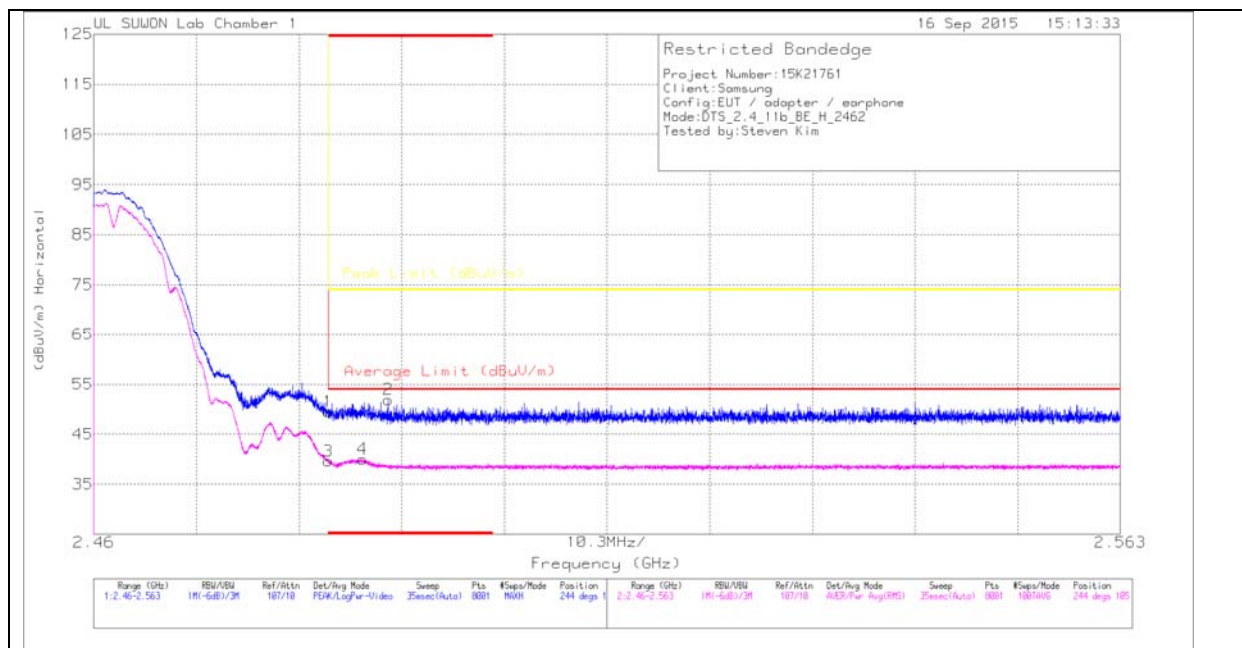
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

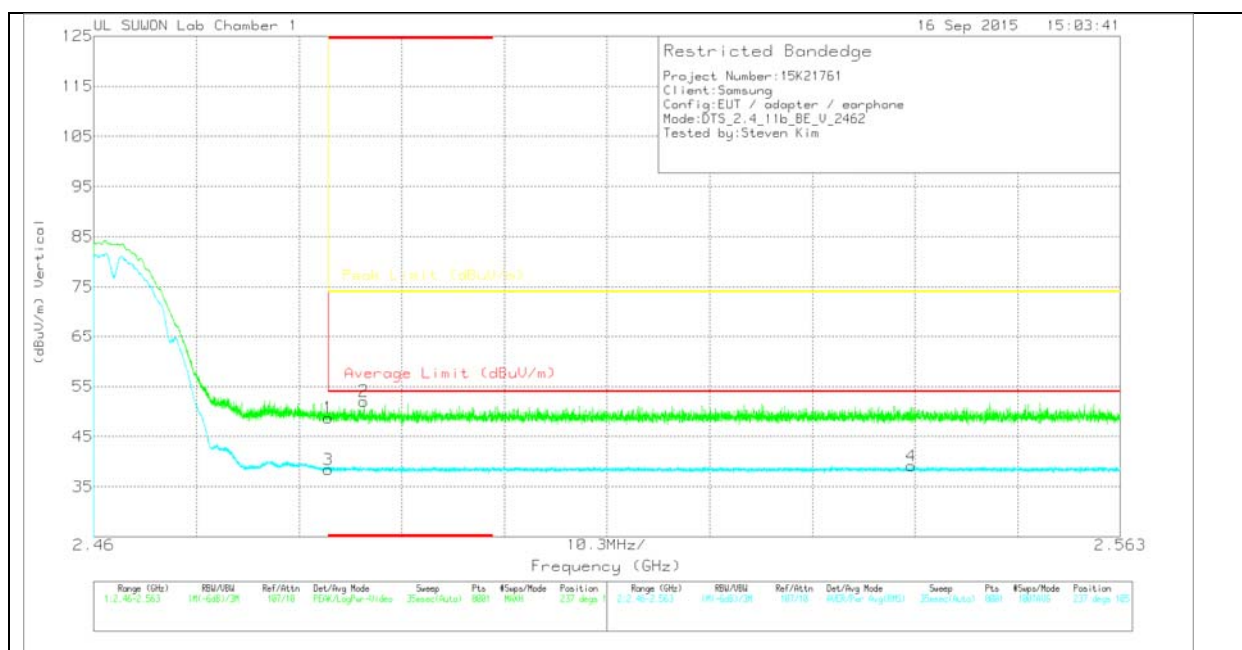
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 24)_150619	Path_2_10dB	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	40.12	Pk	32	-22.6	0	49.52	-	-	74	-24.48	244	105	H
2	* 2.49	42.54	Pk	32	-22.6	0	51.94	-	-	74	-22.06	244	105	H
3	* 2.484	30.25	RMS	32	-22.6	0	39.65	54	-14.35	-	-	244	105	H
4	* 2.487	30.67	RMS	32	-22.6	0	40.07	54	-13.93	-	-	244	105	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	39.34	Pk	32	-22.6	0	48.74	-	-	74	-25.26	237	105	V
2	* 2.487	42.64	Pk	32	-22.6	0	52.04	-	-	74	-21.96	237	105	V
3	* 2.484	29.02	RMS	32	-22.6	0	38.42	54	-15.58	-	-	237	105	V
4	2.542	29.76	RMS	32	-22.6	0	39.16	54	-14.84	-	-	237	105	V

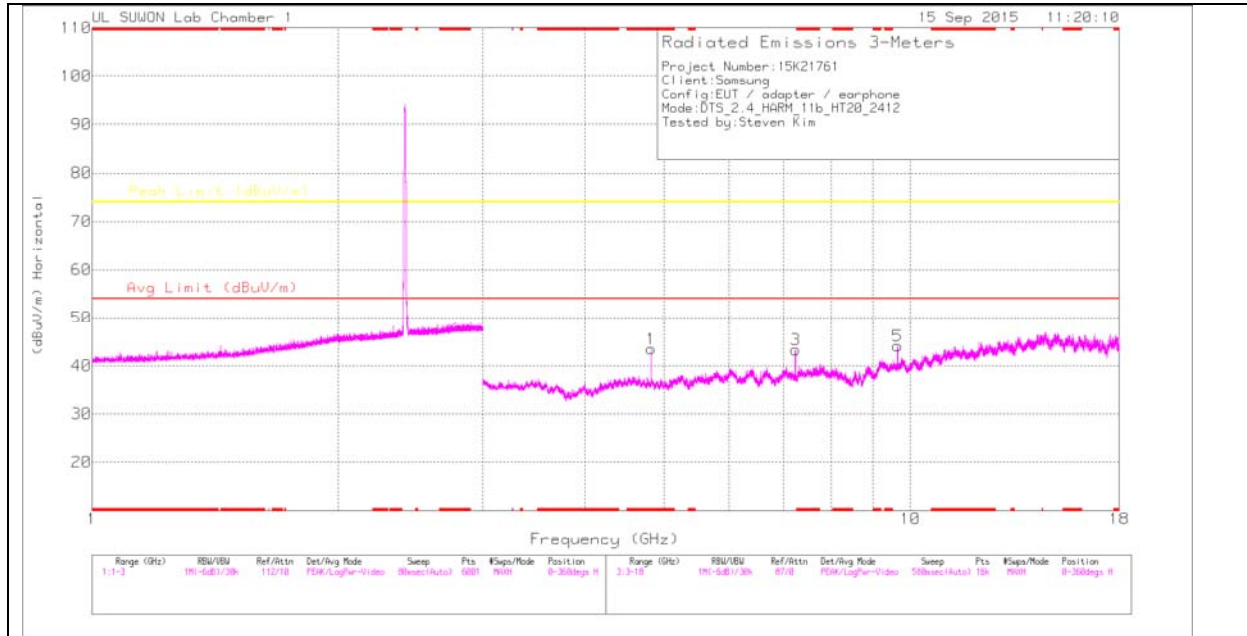
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

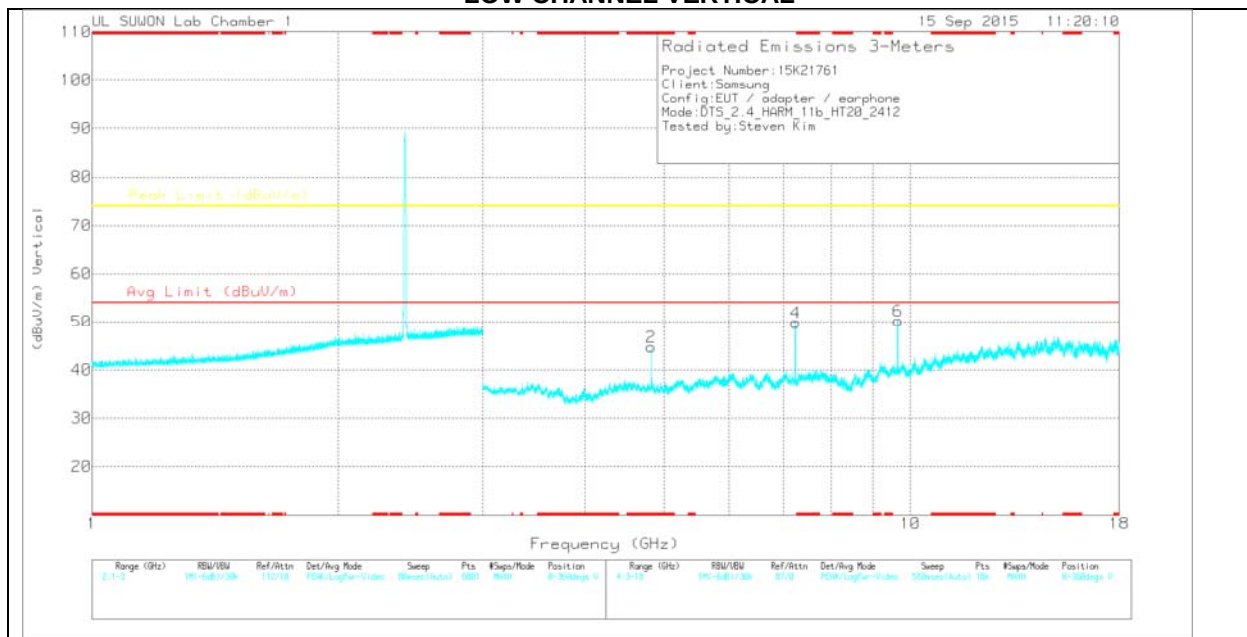
RMS - RMS detection

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(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	* 4.823	34.95	PK	33.9	-25.3	0	43.55	-	-	74	-30.45	0-360	100	H
3	7.236	30.54	PK	35.8	-23	0	43.34	-	-	74	-30.66	0-360	200	H
5	9.647	26.31	PK	36.9	-19	0	44.21	-	-	74	-29.79	0-360	200	H
2	* 4.823	36.19	PK	33.9	-25.3	0	44.79	-	-	74	-29.21	0-360	200	V
4	7.235	37.07	PK	35.8	-23	0	49.87	-	-	74	-24.13	0-360	100	V
6	9.648	32.33	PK	36.9	-19	0	50.23	-	-	74	-23.77	0-360	100	V

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

PK – Peak Detector

Radiated Emissions

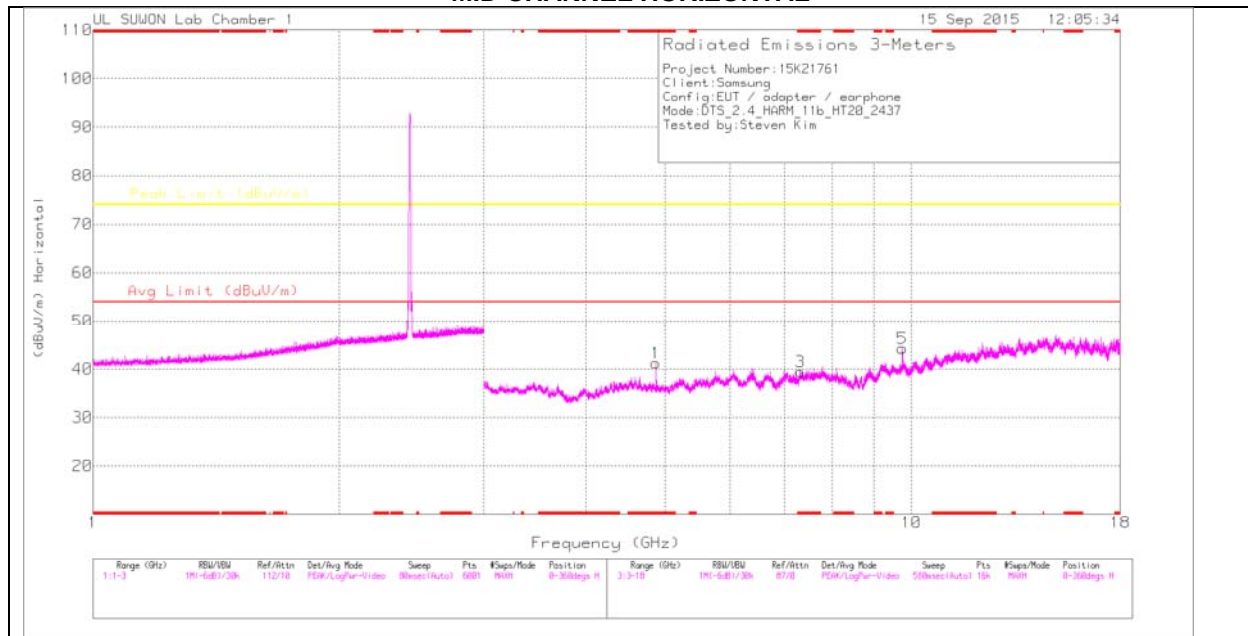
Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	Path_3_3 GHP	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.824	42.32	PK2	33.9	-25.3	0	50.92	-	-	74	-23.08	324	240	H
* 4.824	33.3	MAv1	33.9	-25.3	0	41.9	54	-12.1	-	-	324	240	H
7.237	41.37	PK2	35.8	-23	0	54.17	-	-	74	-19.83	101	268	H
9.648	35.42	PK2	36.9	-19	0	53.32	-	-	74	-20.68	357	374	H
* 4.824	43.06	PK2	33.9	-25.3	0	51.66	-	-	74	-22.34	284	339	V
* 4.824	36.62	MAv1	33.9	-25.3	0	45.22	54	-8.78	-	-	284	339	V
7.237	46.07	PK2	35.8	-23	0	58.87	-	-	74	-15.13	71	348	V
9.648	37.11	PK2	36.9	-19	0	55.01	-	-	74	-18.99	360	103	V

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

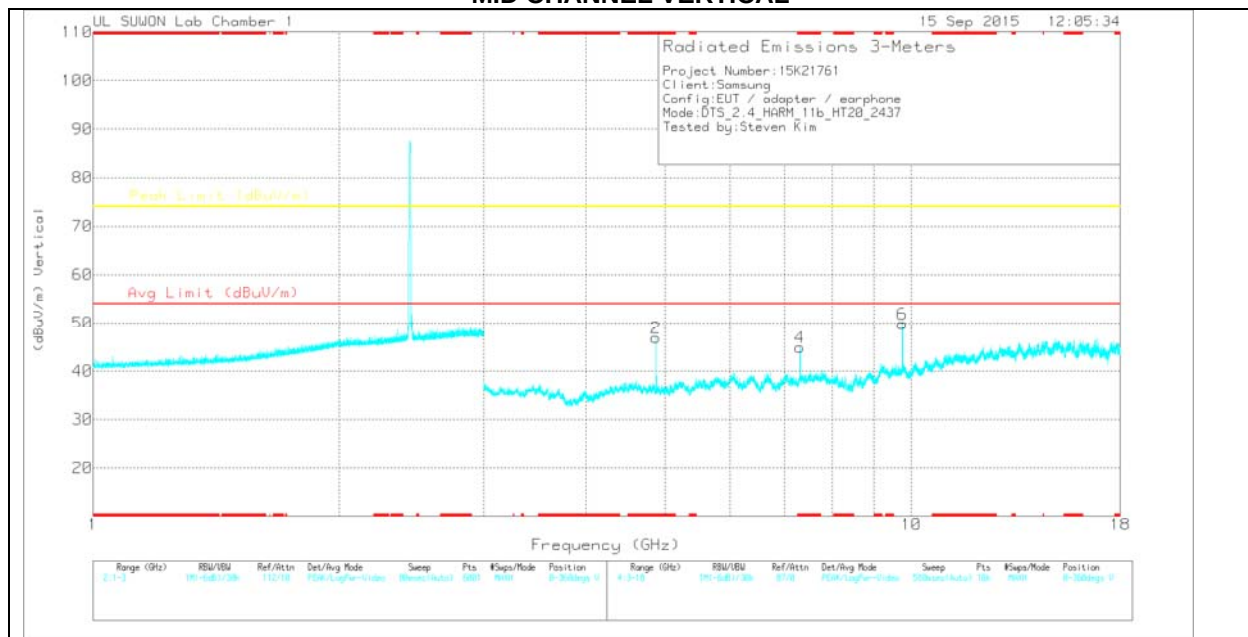
PK2 - KDB558074 Method: Maximum Peak

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	* 4.874	32.5	PK	33.9	-25.2	0	41.2	-	-	74	-32.8	0-360	100	H
3	* 7.311	26.16	PK	35.9	-22.6	0	39.46	-	-	74	-34.54	0-360	200	H
5	9.748	26.53	PK	37	-19.3	0	44.23	-	-	74	-29.77	0-360	200	H
2	* 4.874	38.2	PK	33.9	-25.2	0	46.9	-	-	74	-27.1	0-360	100	V
4	* 7.309	31.66	PK	35.9	-22.6	0	44.96	-	-	74	-29.04	0-360	100	V
6	9.748	32.18	PK	37	-19.3	0	49.88	-	-	74	-24.12	0-360	100	V

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

PK – Peak detector

Radiated Emissions

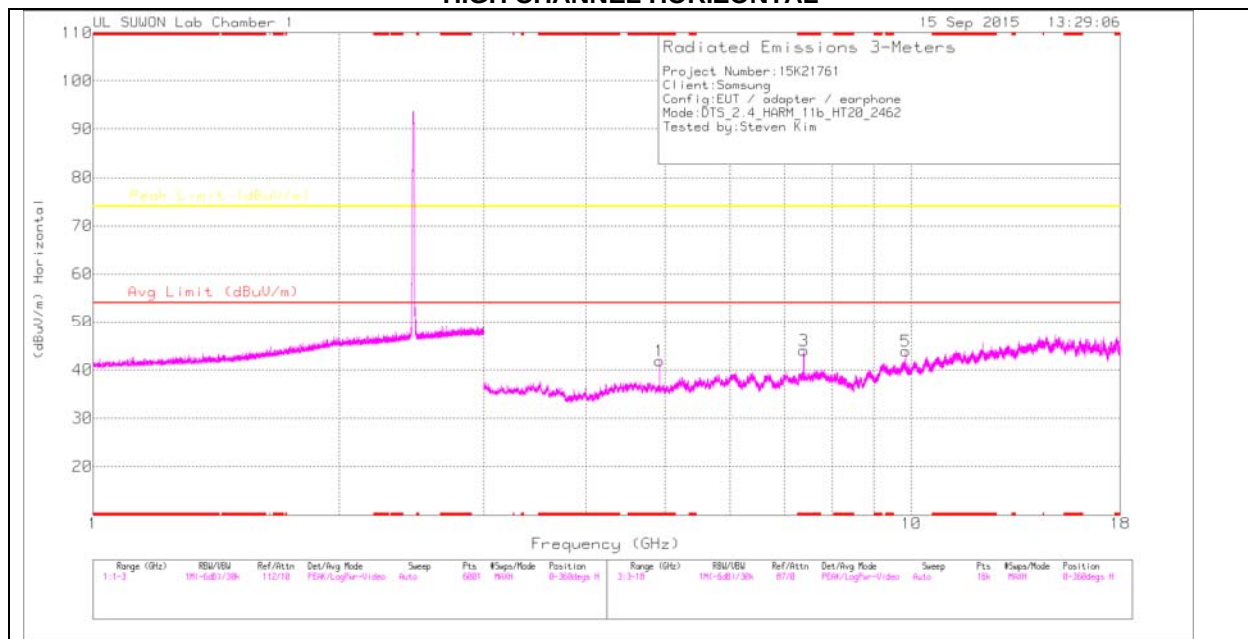
Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_1 50619	Path_3_3 GHP	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.874	42.06	PK2	33.9	-25.2	0	50.76	-	-	74	-23.24	60	338	H
* 4.874	34.79	MAv1	33.9	-25.2	0	43.49	54	-10.51	-	-	60	338	H
* 7.309	39.52	PK2	35.9	-22.6	0	52.82	-	-	74	-21.18	341	312	H
* 7.31	29.58	MAv1	35.9	-22.6	0	42.88	54	-11.12	-	-	341	312	H
9.748	34.59	PK2	37	-19.3	0	52.29	-	-	74	-21.71	265	288	H
* 4.874	44.37	PK2	33.9	-25.2	0	53.07	-	-	74	-20.93	96	100	V
* 4.874	38.77	MAv1	33.9	-25.2	0	47.47	54	-6.53	-	-	96	100	V
* 7.309	40.76	PK2	35.9	-22.6	0	54.06	-	-	74	-19.94	159	101	V
* 7.31	32.15	MAv1	35.9	-22.6	0	45.45	54	-8.55	-	-	159	101	V
9.748	37.25	PK2	37	-19.3	0	54.95	-	-	74	-19.05	7	100	V

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

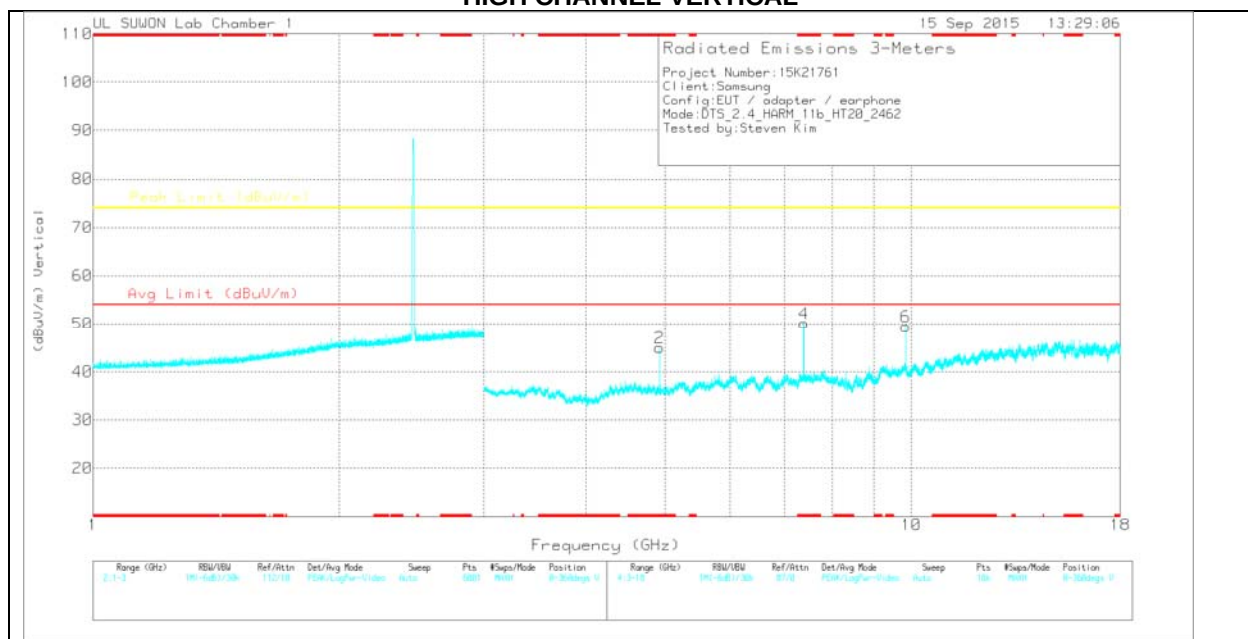
PK2 - KDB558074 Method: Maximum Peak

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.

HIGH 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	* 4.924	33.08	PK	33.9	-25.1	0	41.88	-	-	74	-32.12	0-360	200	H
3	* 7.386	30.36	PK	35.9	-22.2	0	44.06	-	-	74	-29.94	0-360	200	H
5	9.848	26.04	PK	37.1	-19.2	0	43.94	-	-	74	-30.06	0-360	200	H
2	* 4.924	36.27	PK	33.9	-25.1	0	45.07	-	-	74	-28.93	0-360	100	V
4	* 7.387	36.41	PK	35.9	-22.2	0	50.11	-	-	74	-23.89	0-360	100	V
6	9.848	31.52	PK	37.1	-19.2	0	49.42	-	-	74	-24.58	0-360	100	V

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

PK – Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_1 50619	Path_3_3 GHP	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.924	42.59	PK2	33.9	-25.1	0	51.39	-	-	74	-22.61	56	335	H
* 4.924	35.24	MAv1	33.9	-25.1	0	44.04	54	-9.96	-	-	56	335	H
* 7.387	39.98	PK2	35.9	-22.2	0	53.68	-	-	74	-20.32	109	358	H
* 7.387	31.39	MAv1	35.9	-22.2	0	45.09	54	-8.91	-	-	109	358	H
9.848	34.52	PK2	37.1	-19.2	0	52.42	-	-	74	-21.58	0	292	H
* 4.924	43.02	PK2	33.9	-25.1	0	51.82	-	-	74	-22.18	286	100	V
* 4.924	37.06	MAv1	33.9	-25.1	0	45.86	54	-8.14	-	-	286	100	V
* 7.387	43.24	PK2	35.9	-22.2	0	56.94	-	-	74	-17.06	61	353	V
* 7.387	36.33	MAv1	35.9	-22.2	0	50.03	54	-3.97	-	-	61	353	V
9.848	36.78	PK2	37.1	-19.2	0	54.68	-	-	74	-19.32	357	251	V

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

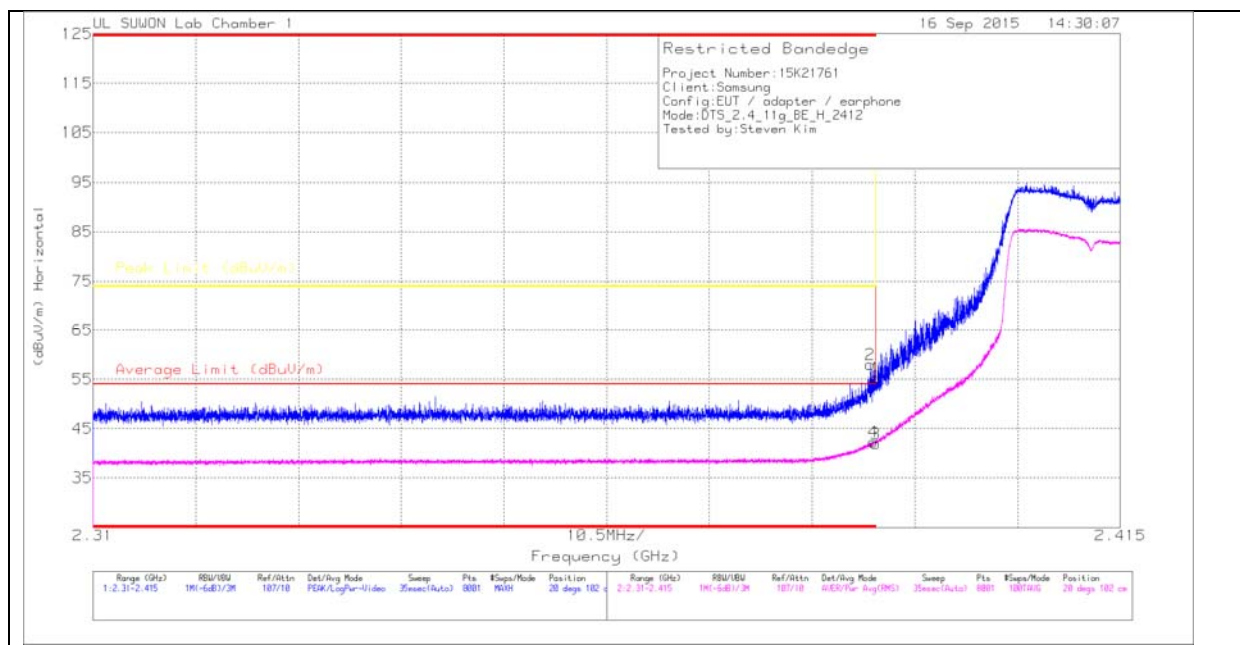
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

11.2.2. TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

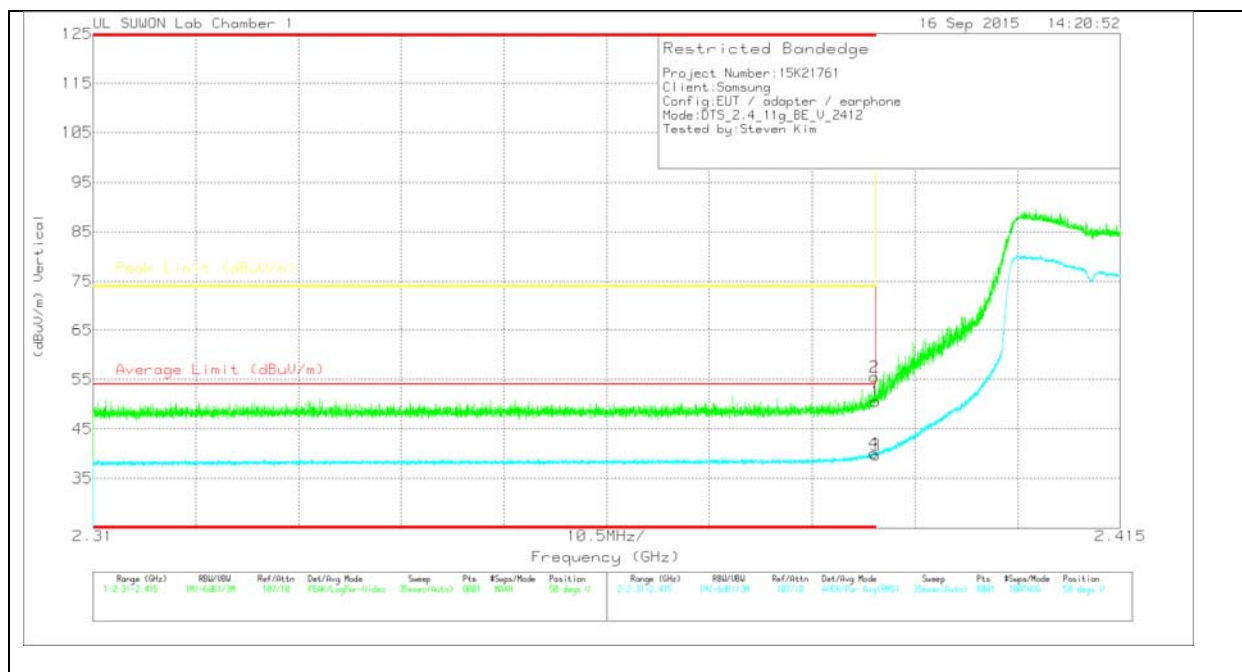
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 24)_150619	Path_2_10dB	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	46.32	Pk	31.8	-22.8	0	55.32	-	-	74	-18.68	20	102	H
2	* 2.389	48.95	Pk	31.8	-22.8	0	57.95	-	-	74	-16.05	20	102	H
3	* 2.39	32.67	RMS	31.8	-22.8	.29	41.96	54	-12.04	-	-	20	102	H
4	* 2.39	33.05	RMS	31.8	-22.8	.29	42.34	54	-11.66	-	-	20	102	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	3117001687 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	41.58	Pk	31.8	-22.8	0	50.58	-	-	74	-23.42	50	100	V
2	* 2.39	46.51	Pk	31.8	-22.8	0	55.51	-	-	74	-18.49	50	100	V
3	* 2.39	30.43	RMS	31.8	-22.8	.29	39.72	54	-14.28	-	-	50	100	V
4	* 2.39	30.77	RMS	31.8	-22.8	.29	40.06	54	-13.94	-	-	50	100	V

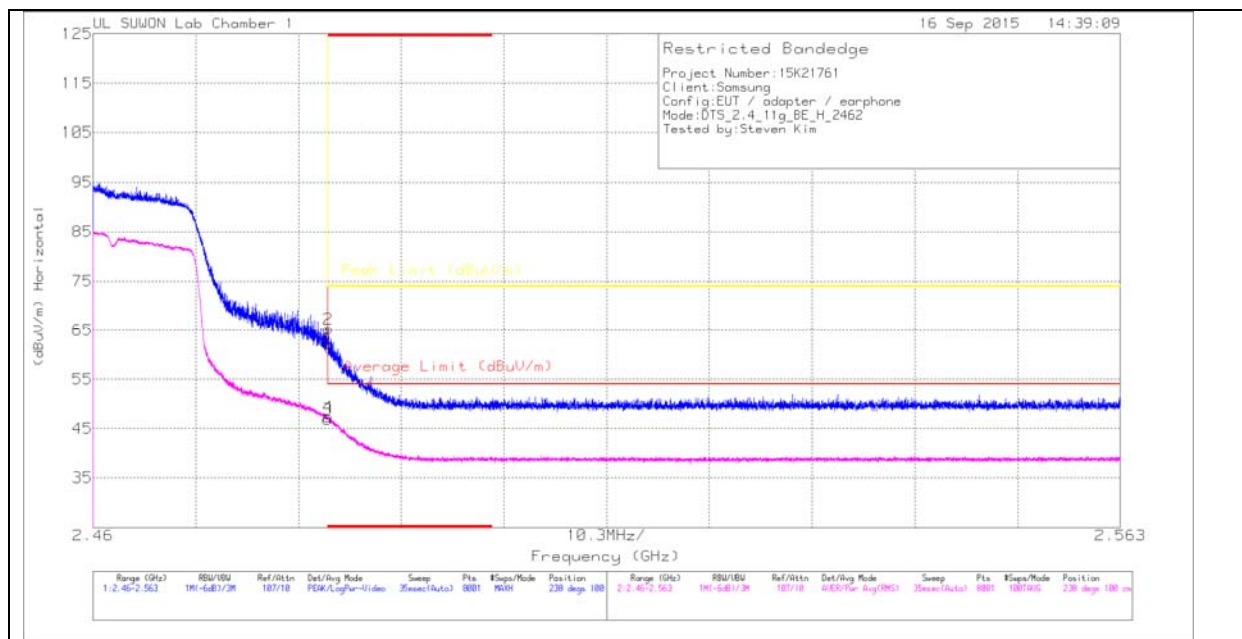
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

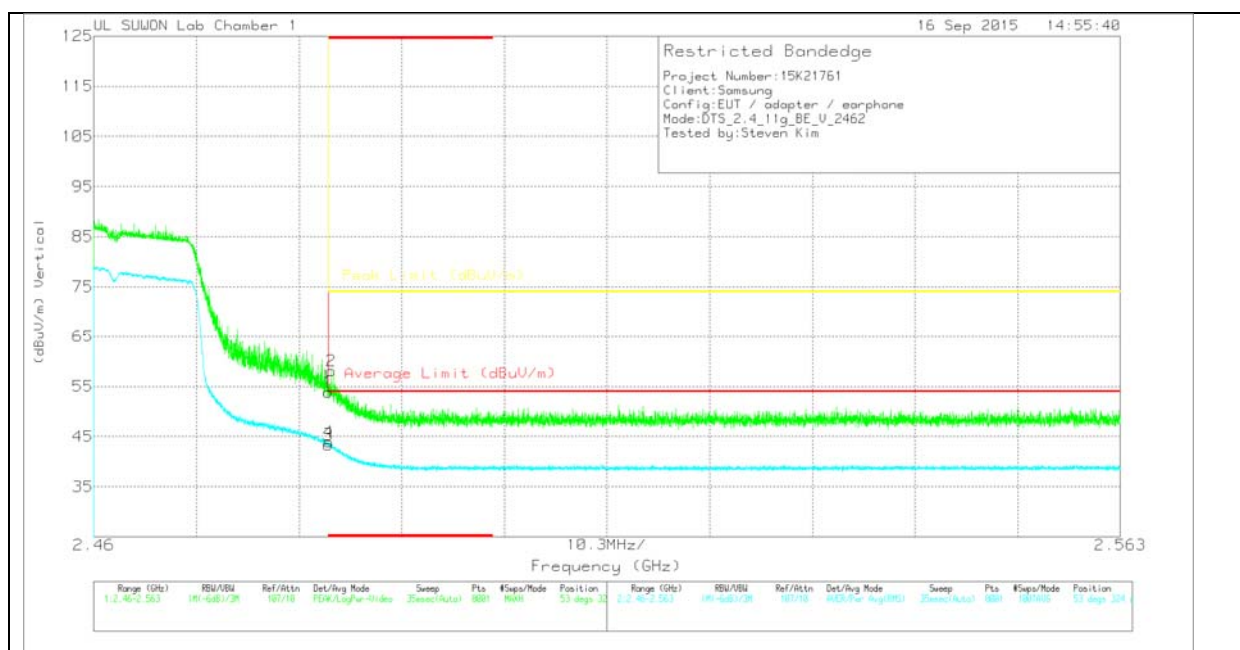
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 24)_150619	Path_2_10dB	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	52.86	Pk	32	-22.6	0	62.26	-	-	74	-11.74	238	100	H
2	* 2.484	55.87	Pk	32	-22.6	0	65.27	-	-	74	-8.73	238	100	H
3	* 2.484	37.21	RMS	32	-22.6	.29	46.9	54	-7.1	-	-	238	100	H
4	* 2.484	37.66	RMS	32	-22.6	.29	47.35	54	-6.65	-	-	238	100	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	44.49	Pk	32	-22.6	0	53.89	-	-	74	-20.11	53	324	V
2	* 2.484	48.68	Pk	32	-22.6	0	58.08	-	-	74	-15.92	53	324	V
3	* 2.484	33.67	RMS	32	-22.6	.29	43.36	54	-10.64	-	-	53	324	V
4	* 2.484	34.21	RMS	32	-22.6	.29	43.9	54	-10.1	-	-	53	324	V

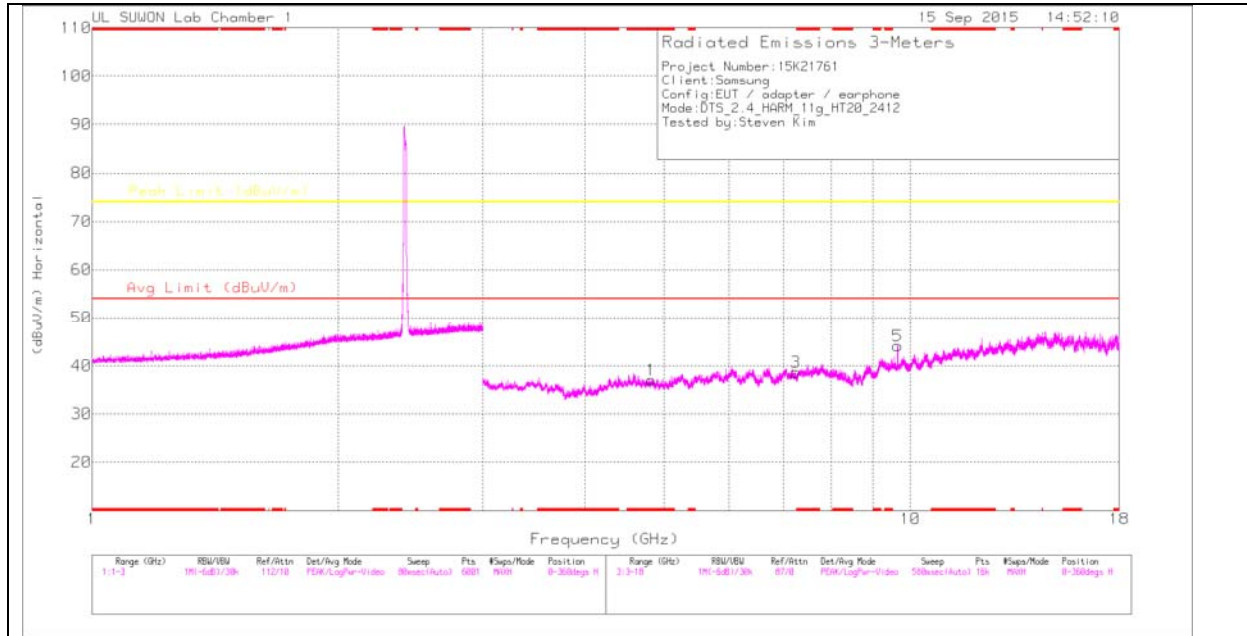
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

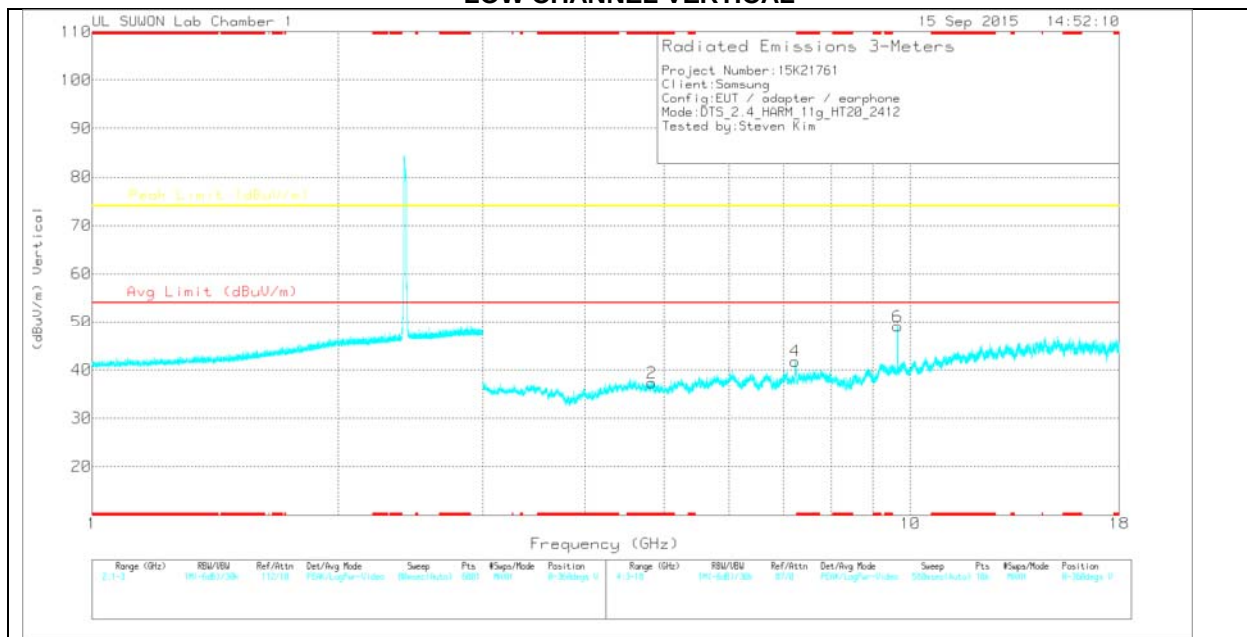
RMS - RMS detection

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(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	* 4.824	28.51	PK	33.9	-25.3	0	37.11	-	-	74	-36.89	0-360	200	H
3	7.241	25.86	PK	35.8	-23	0	38.66	-	-	74	-35.34	0-360	100	H
5	9.647	26.25	PK	36.9	-19	0	44.15	-	-	74	-29.85	0-360	200	H
2	* 4.827	28.68	PK	33.9	-25.3	0	37.28	-	-	74	-36.72	0-360	200	V
4	7.233	29.02	PK	35.8	-23	0	41.82	-	-	74	-32.18	0-360	100	V
6	9.647	31.21	PK	36.9	-19	0	49.11	-	-	74	-24.89	0-360	100	V

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

PK – Peak detector

Radiated Emissions

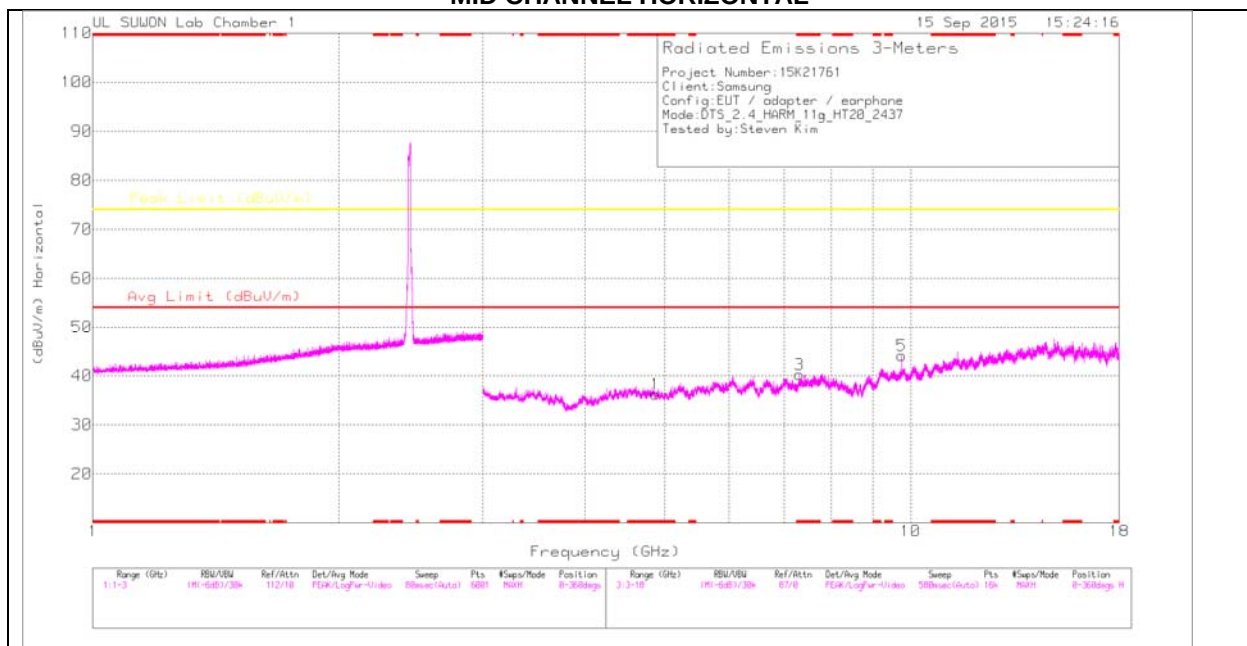
Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	Path_3_3 GHP	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
9.648	35.33	PK2	36.9	-19	0	53.23	-	-	74	-20.77	16	332	H
7.242	44.9	PK2	35.8	-23	0	57.7	-	-	74	-16.3	57	353	V
9.648	36.92	PK2	36.9	-19	0	54.82	-	-	74	-19.18	360	103	V

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

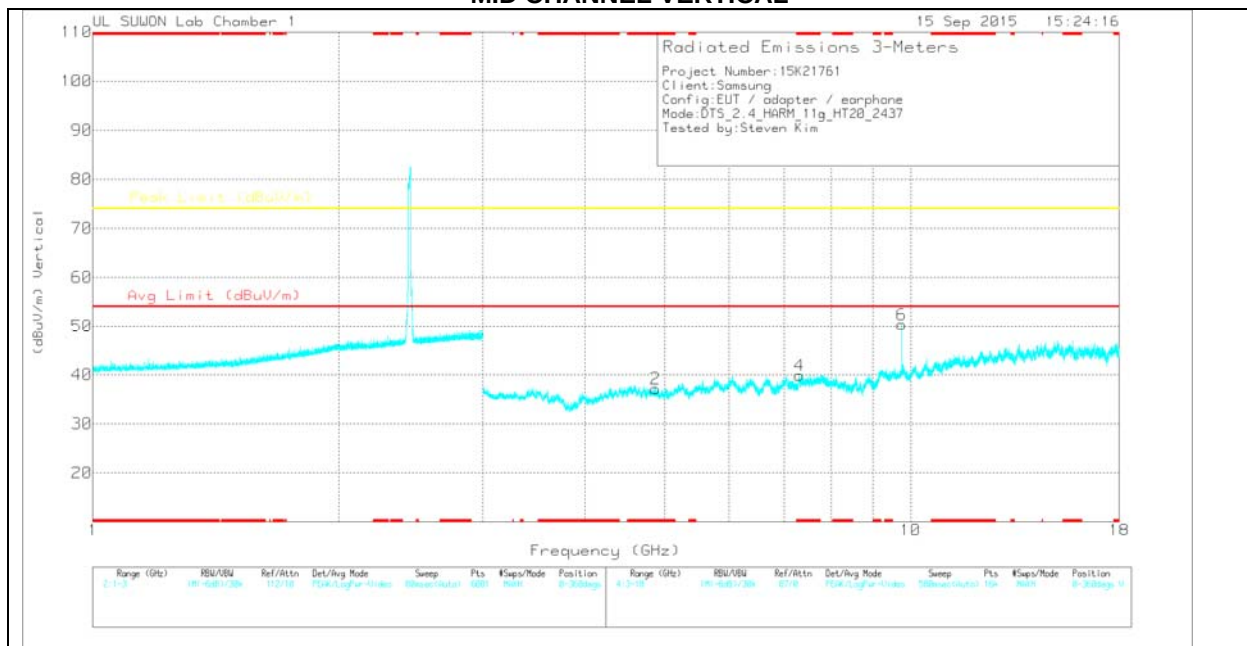
PK2 - KDB558074 Method: Maximum Peak

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(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	* 4.874	27.54	PK	33.9	-25.2	0	36.24	-	-	74	-37.76	0-360	100	H
3	* 7.308	26.97	PK	35.9	-22.6	0	40.27	-	-	74	-33.73	0-360	200	H
5	9.748	26.42	PK	37	-19.3	0	44.12	-	-	74	-29.88	0-360	200	H
2	* 4.874	28.46	PK	33.9	-25.2	0	37.16	-	-	74	-36.84	0-360	100	V
4	* 7.31	26.58	PK	35.9	-22.6	0	39.88	-	-	74	-34.12	0-360	100	V
6	9.748	32.67	PK	37	-19.3	0	50.37	-	-	74	-23.63	0-360	100	V

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

PK – Peak detector

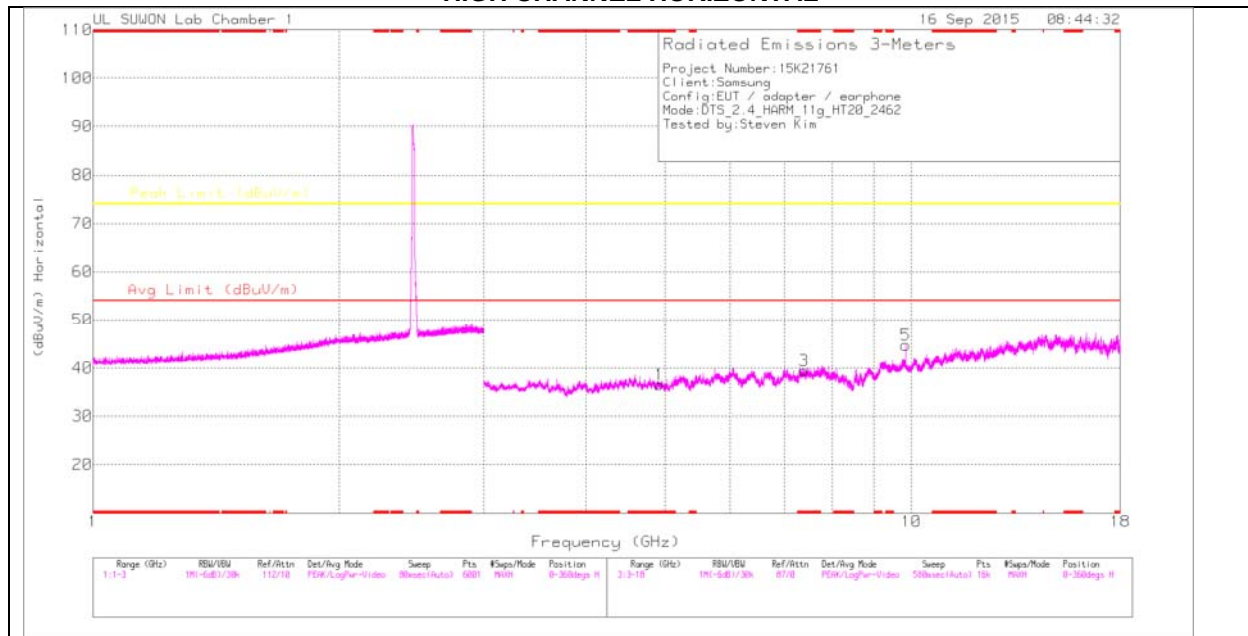
Radiated Emissions

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
9.748	35.56	PK2	37	-19.3	0	53.26	-	-	74	-20.74	360	345	H
9.748	37.5	PK2	37	-19.3	0	55.2	-	-	74	-18.8	6	100	V

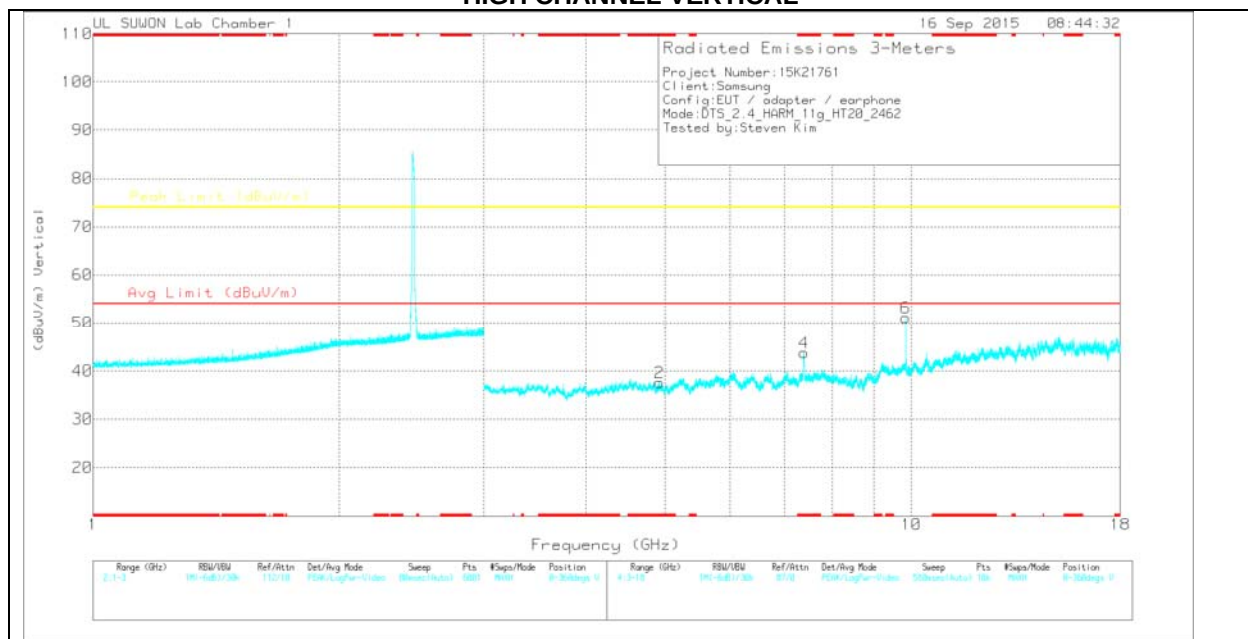
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

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	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	* 4.925	27.78	PK	33.9	-25.1	0	36.58	-	-	74	-37.42	0-360	200	H
3	* 7.392	25.7	PK	35.9	-22.1	0	39.5	-	-	74	-34.5	0-360	200	H
5	9.848	26.83	PK	37.1	-19.2	0	44.73	-	-	74	-29.27	0-360	200	H
2	* 4.926	28.76	PK	33.9	-25.1	0	37.56	-	-	74	-36.44	0-360	100	V
4	* 7.388	30.13	PK	35.9	-22.2	0	43.83	-	-	74	-30.17	0-360	100	V
6	9.848	33.21	PK	37.1	-19.2	0	51.11	-	-	74	-22.89	0-360	100	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
9.848	33.99	PK2	37.1	-19.2	0	51.89	-	-	74	-22.11	234	329	H
* 7.395	44.63	PK2	36	-22.1	0	58.53	-	-	74	-15.47	162	102	V
* 7.388	29.42	MAv1	35.9	-22.2	.29	43.41	54	-10.59	-	-	162	102	V
9.848	37.13	PK2	37.1	-19.2	0	55.03	-	-	74	-18.97	358	263	V

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

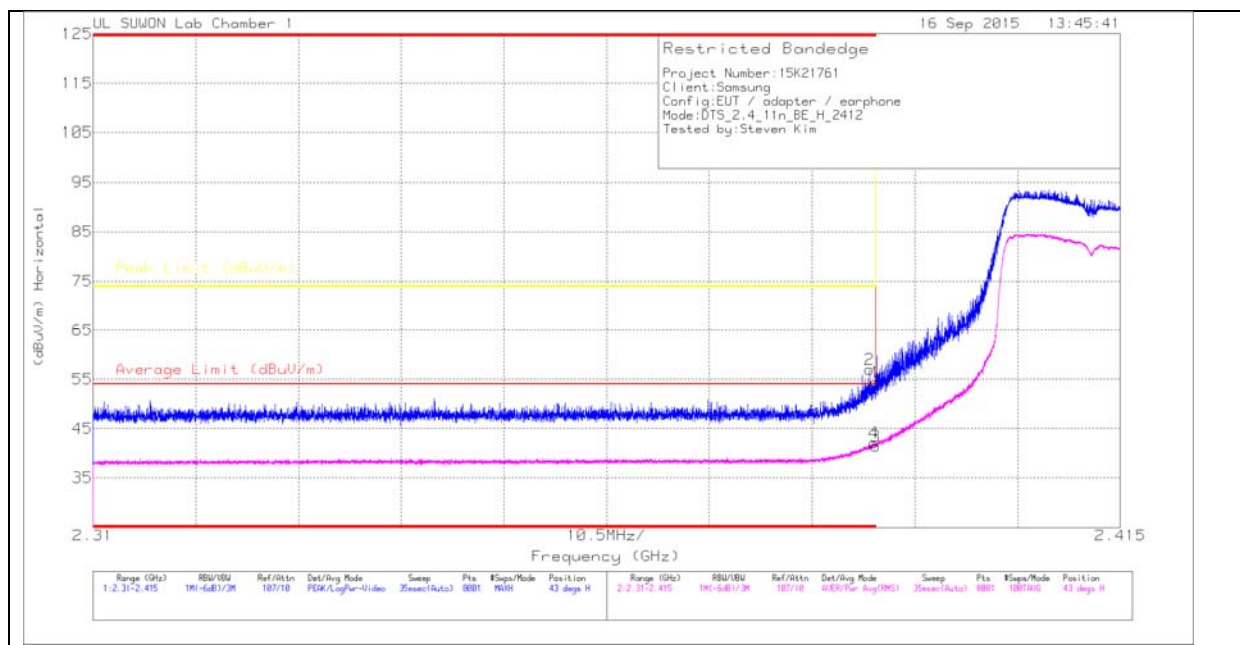
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

11.2.3. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

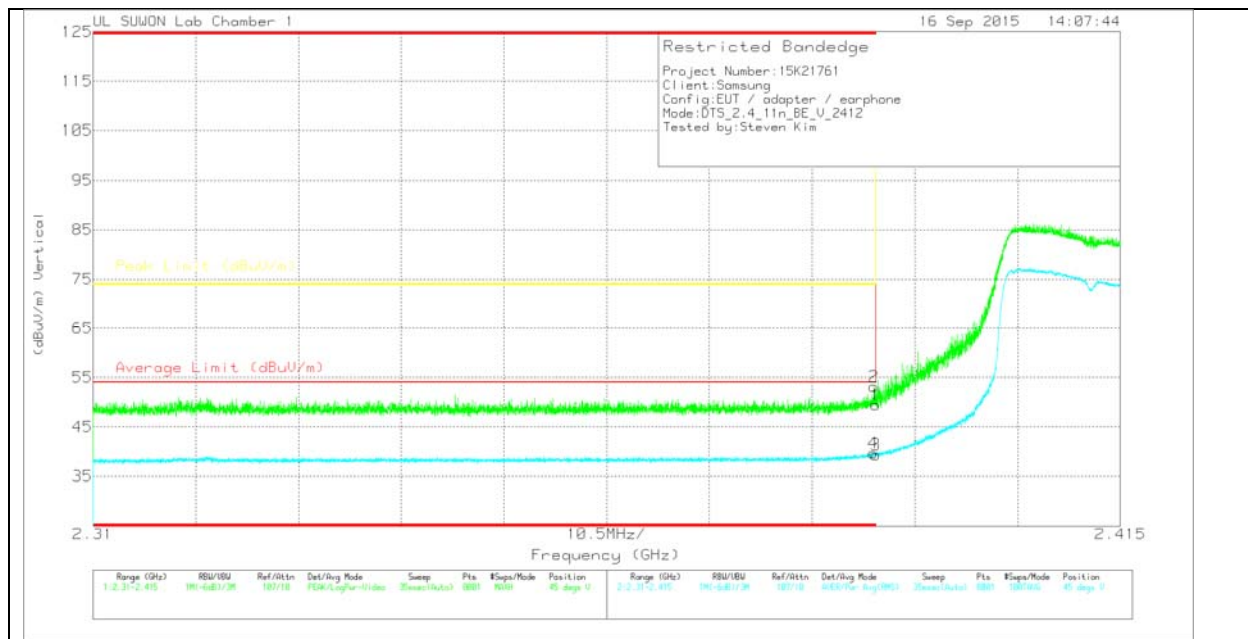
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 24)_150619	Path_2_10dB	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	45.38	Pk	31.8	-22.8	0	54.38	-	-	74	-19.62	43	101	H
2	* 2.389	48	Pk	31.8	-22.8	0	57	-	-	74	-17	43	101	H
3	* 2.39	32.13	RMS	31.8	-22.8	.32	41.45	54	-12.55	-	-	43	101	H
4	* 2.39	32.78	RMS	31.8	-22.8	.32	42.1	54	-11.9	-	-	43	101	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	40.46	Pk	31.8	-22.8	0	49.46	-	-	74	-24.54	45	220	V
2	* 2.39	44.21	Pk	31.8	-22.8	0	53.21	-	-	74	-20.79	45	220	V
3	* 2.39	30.06	RMS	31.8	-22.8	.32	39.38	54	-14.62	-	-	45	220	V
4	* 2.39	30.42	RMS	31.8	-22.8	.32	39.74	54	-14.26	-	-	45	220	V

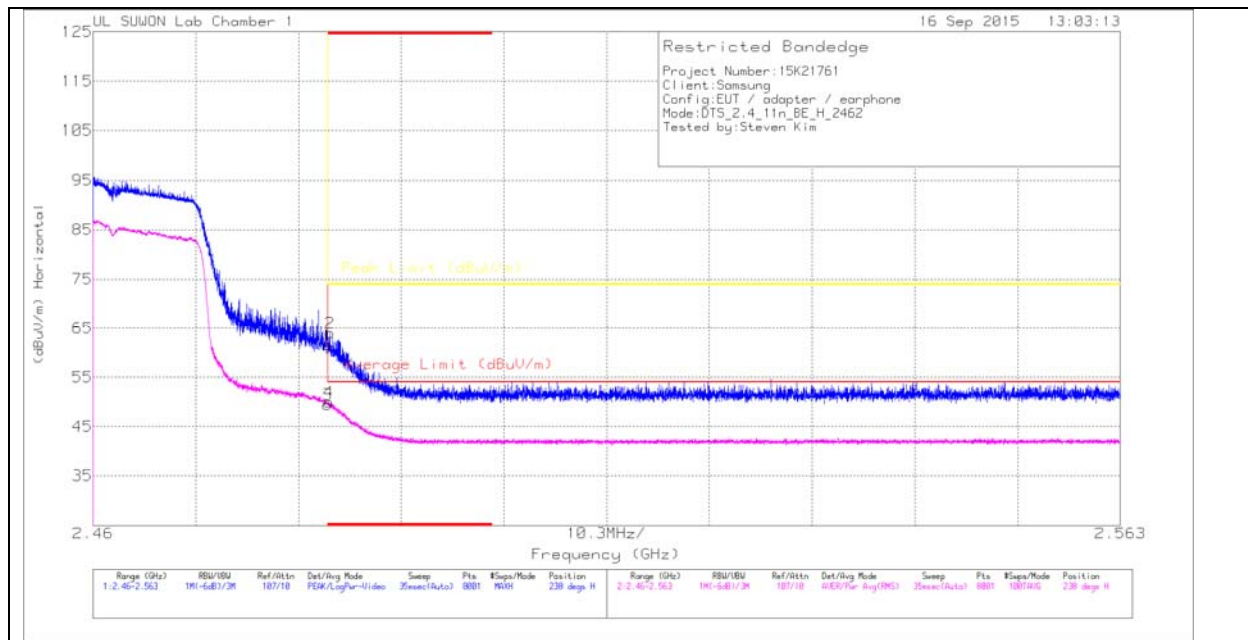
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

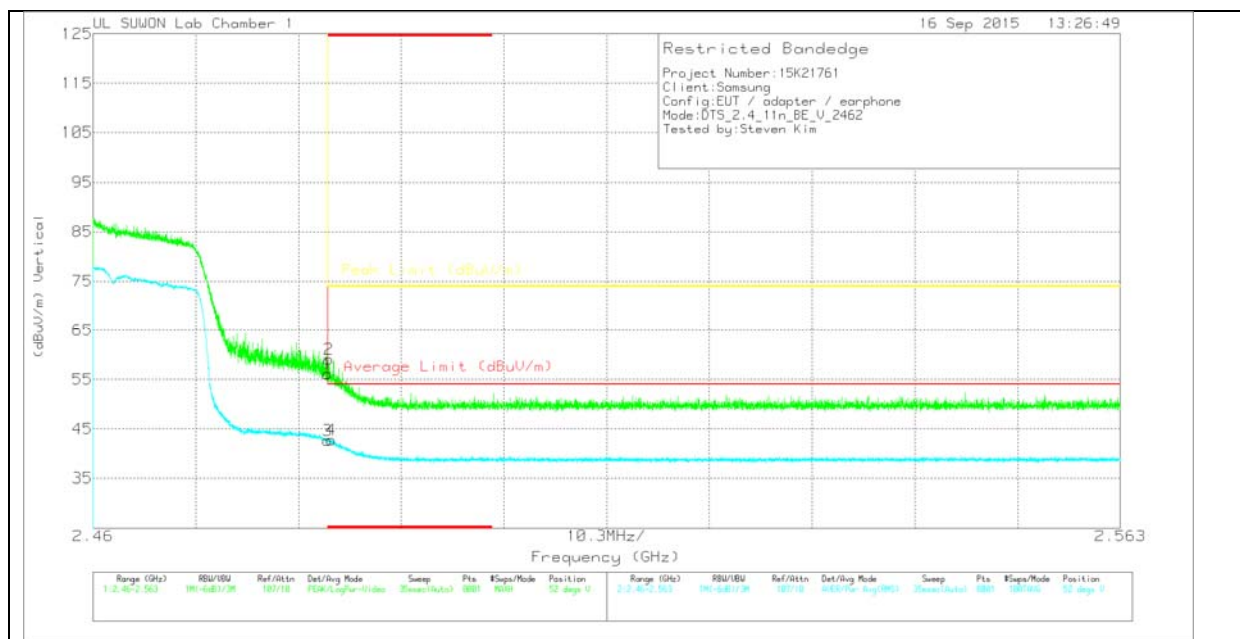
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 24)_150619	Path_2_10dB	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	49.14	Pk	31.8	-19.4	0	61.54	-	-	74	-12.46	238	107	H
2	* 2.484	51.61	Pk	31.8	-19.4	0	64.01	-	-	74	-9.99	238	107	H
3	* 2.484	36.69	RMS	31.8	-19.4	.32	49.41	54	-4.59	-	-	238	107	H
4	* 2.484	37.19	RMS	31.8	-19.4	.32	49.91	54	-4.09	-	-	238	107	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	46.69	Pk	32	-22.6	0	56.09	-	-	74	-17.91	52	262	V
2	* 2.484	49.73	Pk	32	-22.6	0	59.13	-	-	74	-14.87	52	262	V
3	* 2.484	32.98	RMS	32	-22.6	.32	42.7	54	-11.3	-	-	52	262	V
4	* 2.484	33.07	RMS	32	-22.6	.32	42.79	54	-11.21	-	-	52	262	V

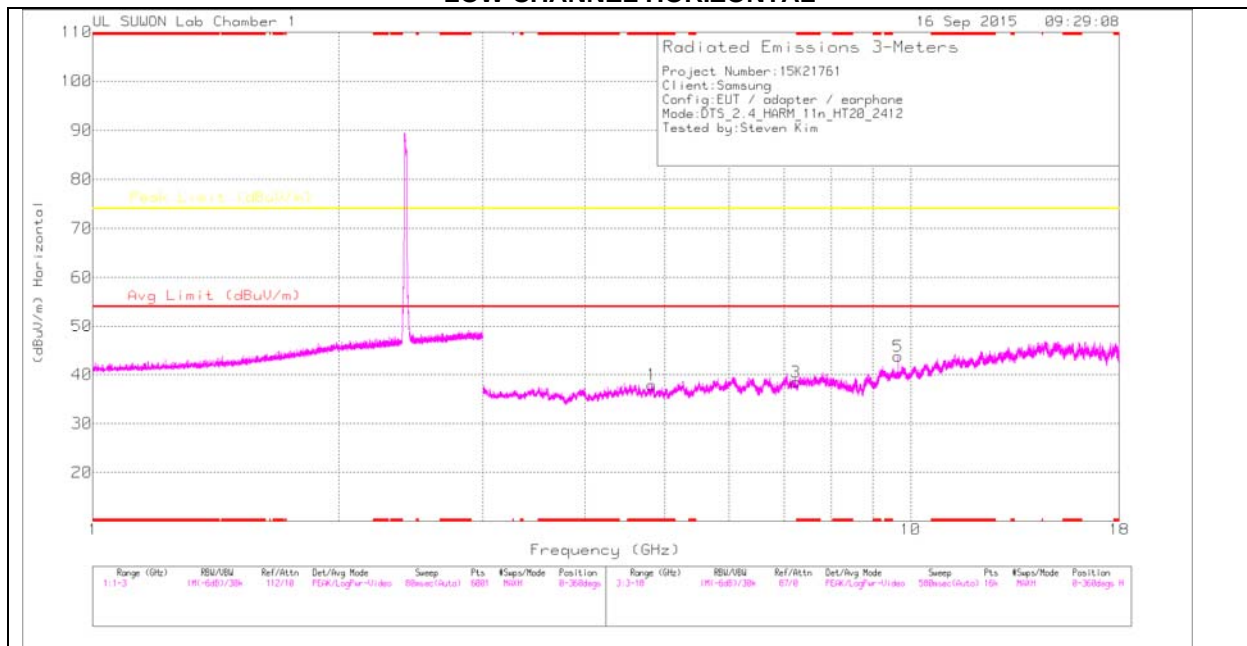
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

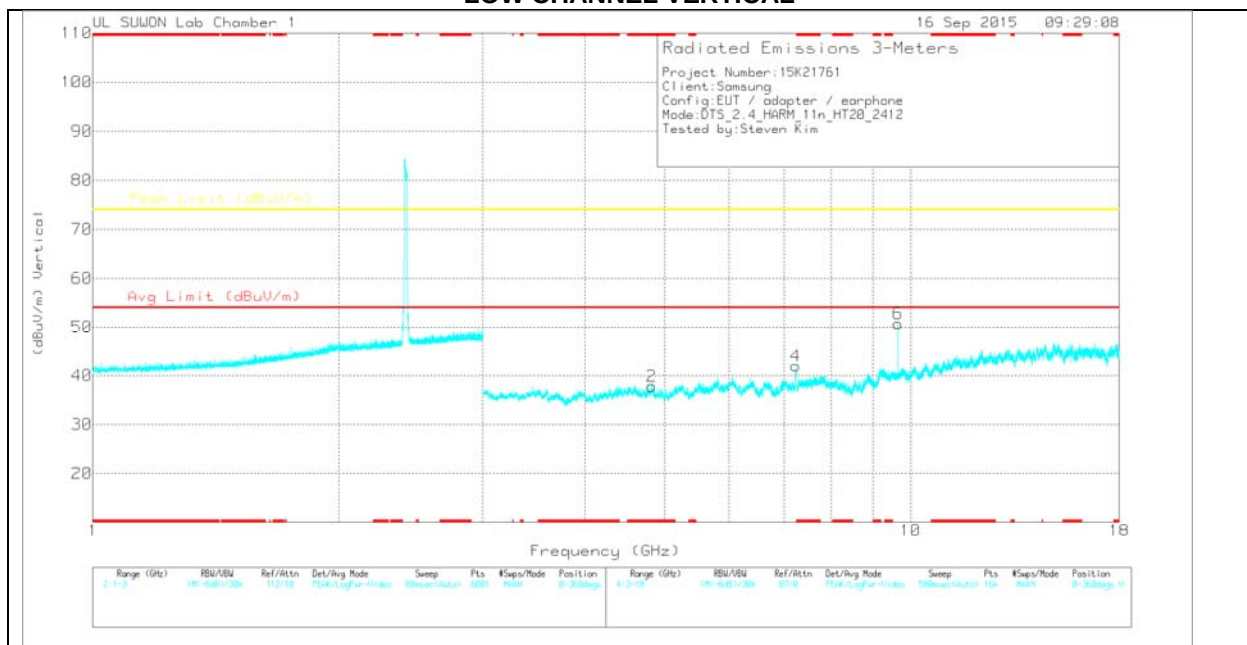
RMS - RMS detection

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(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	* 4.826	29.32	PK	33.9	-25.3	0	37.92	-	-	74	-36.08	0-360	100	H
3	7.238	25.7	PK	35.8	-23	0	38.5	-	-	74	-35.5	0-360	100	H
5	9.647	25.83	PK	36.9	-19	0	43.73	-	-	74	-30.27	0-360	200	H
2	* 4.823	29.23	PK	33.9	-25.3	0	37.83	-	-	74	-36.17	0-360	100	V
4	7.239	29.16	PK	35.8	-23	0	41.96	-	-	74	-32.04	0-360	100	V
6	9.648	32.89	PK	36.9	-19	0	50.79	-	-	74	-23.21	0-360	100	V

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

PK – Peak detector

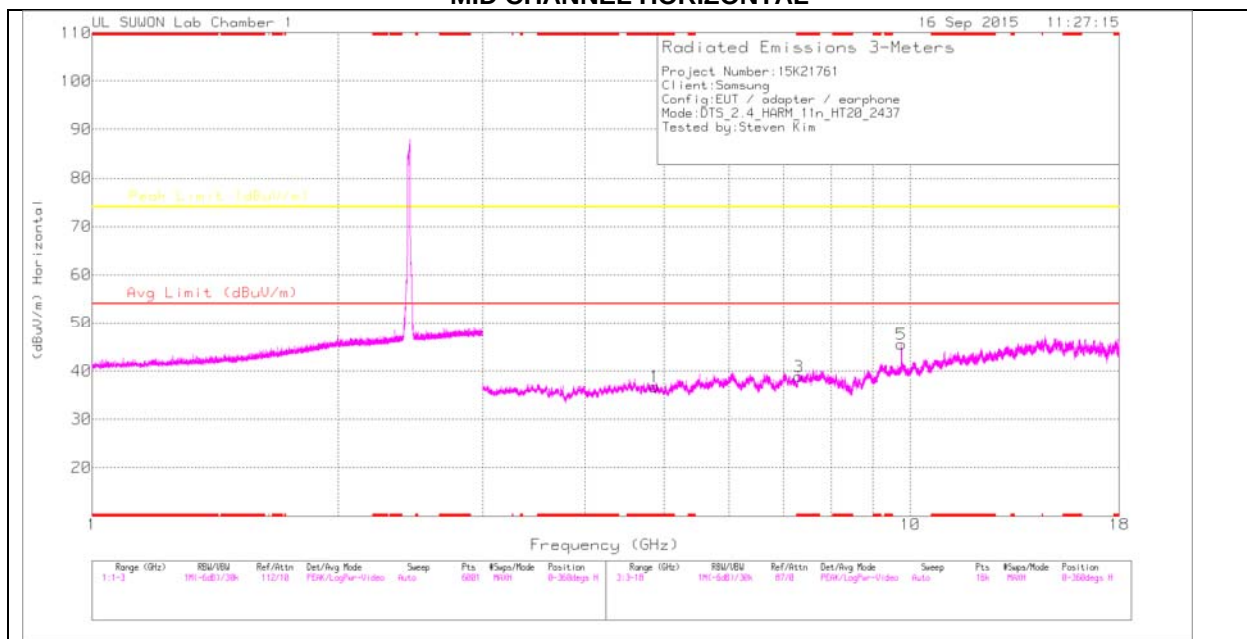
Radiated Emissions

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
9.658	33.21	PK2	36.9	-19.1	0	51.01	-	-	74	-22.99	138	280	H
7.239	38.12	PK2	35.8	-23	0	50.92	-	-	74	-23.08	163	345	V
9.648	37.55	PK2	36.9	-19	0	55.45	-	-	74	-18.55	4	100	V

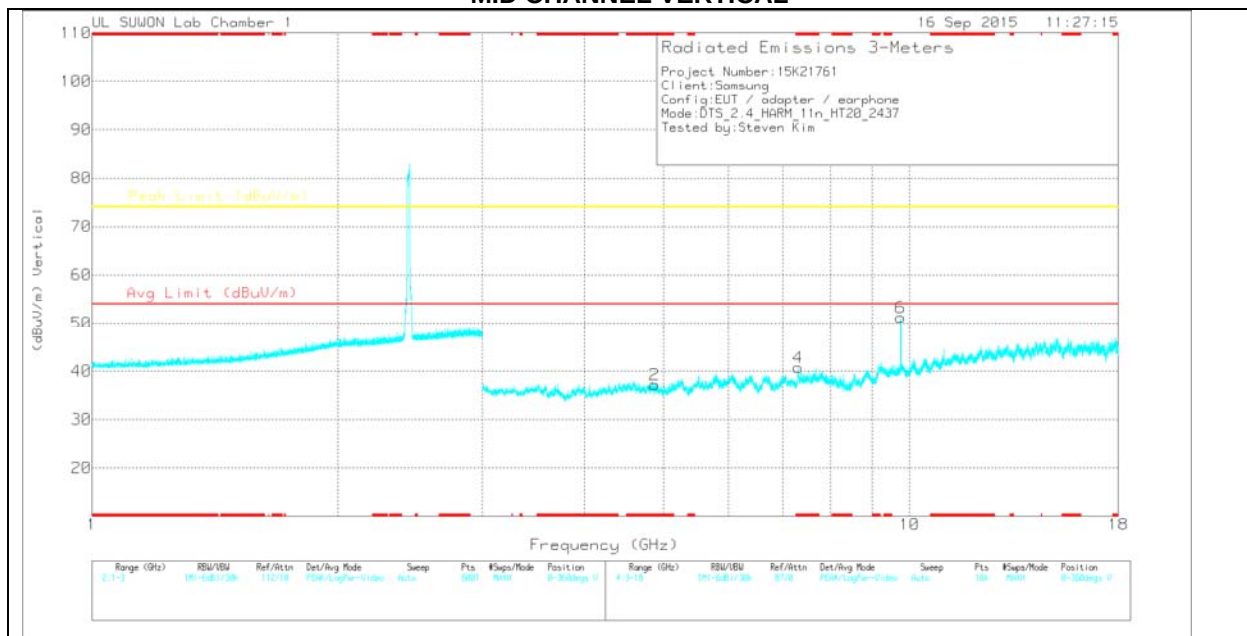
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



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

MID CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_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	* 4.872	28.06	PK	33.9	-25.2	0	36.76	-	-	74	-37.24	0-360	200	H
3	* 7.303	25.69	PK	35.9	-22.7	0	38.89	-	-	74	-35.11	0-360	100	H
5	9.748	27.84	PK	37	-19.3	0	45.54	-	-	74	-28.46	0-360	200	H
2	* 4.876	28.53	PK	33.9	-25.2	0	37.23	-	-	74	-36.77	0-360	100	V
4	* 7.307	27.39	PK	35.9	-22.6	0	40.69	-	-	74	-33.31	0-360	100	V
6	9.748	33.48	PK	37	-19.3	0	51.18	-	-	74	-22.82	0-360	100	V

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

PK – Peak detector

Radiated Emissions

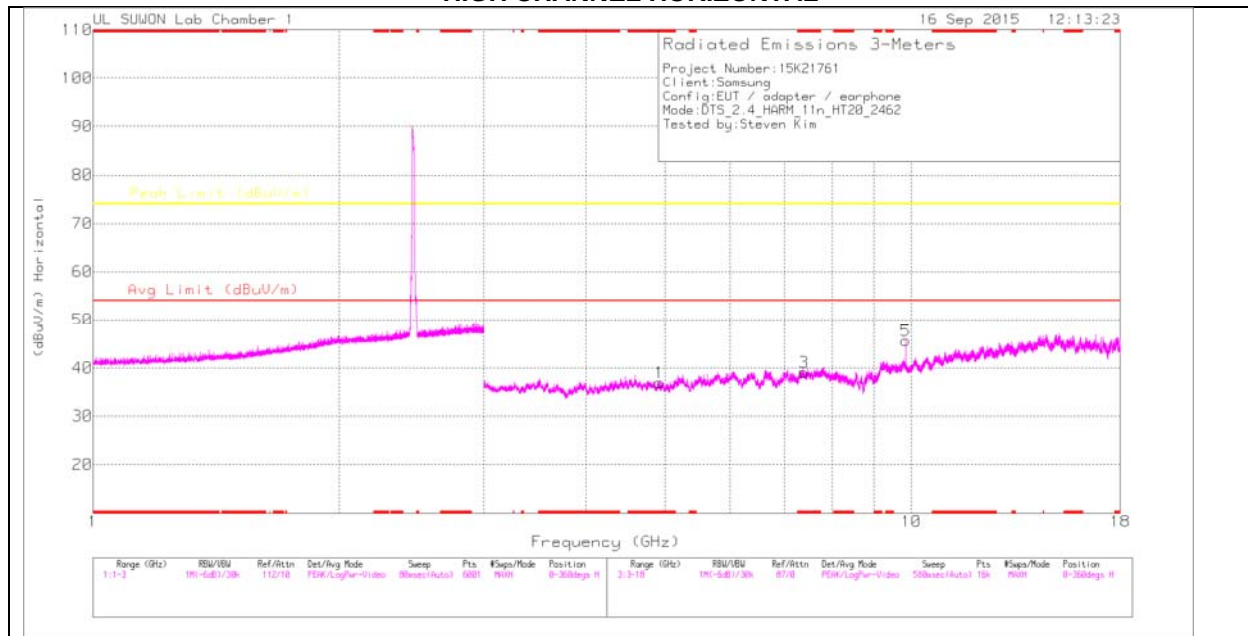
Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
9.748	35.06	PK2	37	-19.3	0	52.76	-	-	74	-21.24	297	372	H
9.748	38.08	PK2	37	-19.3	0	55.78	-	-	74	-18.22	4	101	V

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

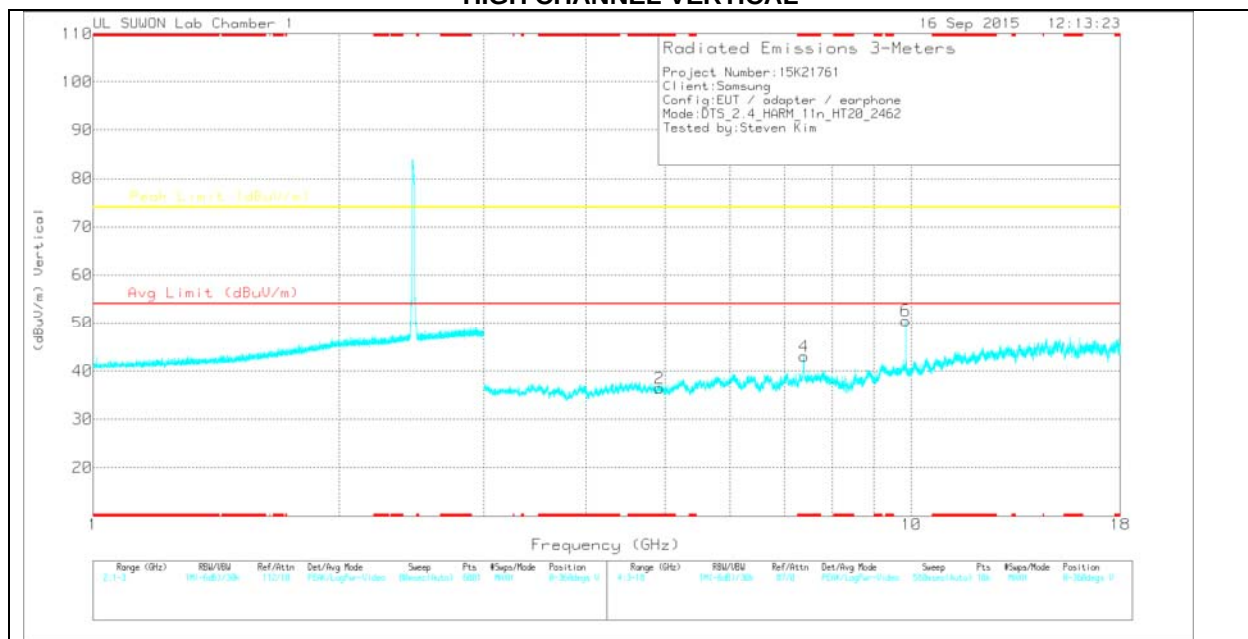
PK2 - KDB558074 Method: Maximum Peak

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.

HIGH 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	* 4.926	28.11	PK	33.9	-25.1	0	36.91	-	-	74	-37.09	0-360	100	H
3	* 7.389	25.43	PK	35.9	-22.2	0	39.13	-	-	74	-34.87	0-360	200	H
5	9.848	27.75	PK	37.1	-19.2	0	45.65	-	-	74	-28.35	0-360	200	H
2	* 4.923	27.65	PK	33.9	-25.1	0	36.45	-	-	74	-37.55	0-360	200	V
4	* 7.392	29.23	PK	35.9	-22.1	0	43.03	-	-	74	-30.97	0-360	100	V
6	9.848	32.64	PK	37.1	-19.2	0	50.54	-	-	74	-23.46	0-360	100	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
9.848	35.6	PK2	37.1	-19.2	0	53.5	-	-	74	-20.5	346	323	H
* 7.401	43.49	PK2	36	-22.1	0	57.39	-	-	74	-16.61	163	100	V
* 7.385	27.85	MAv1	35.9	-22.2	.32	41.87	54	-12.13	-	-	163	100	V
9.848	37.09	PK2	37.1	-19.2	0	54.99	-	-	74	-19.01	0	248	V

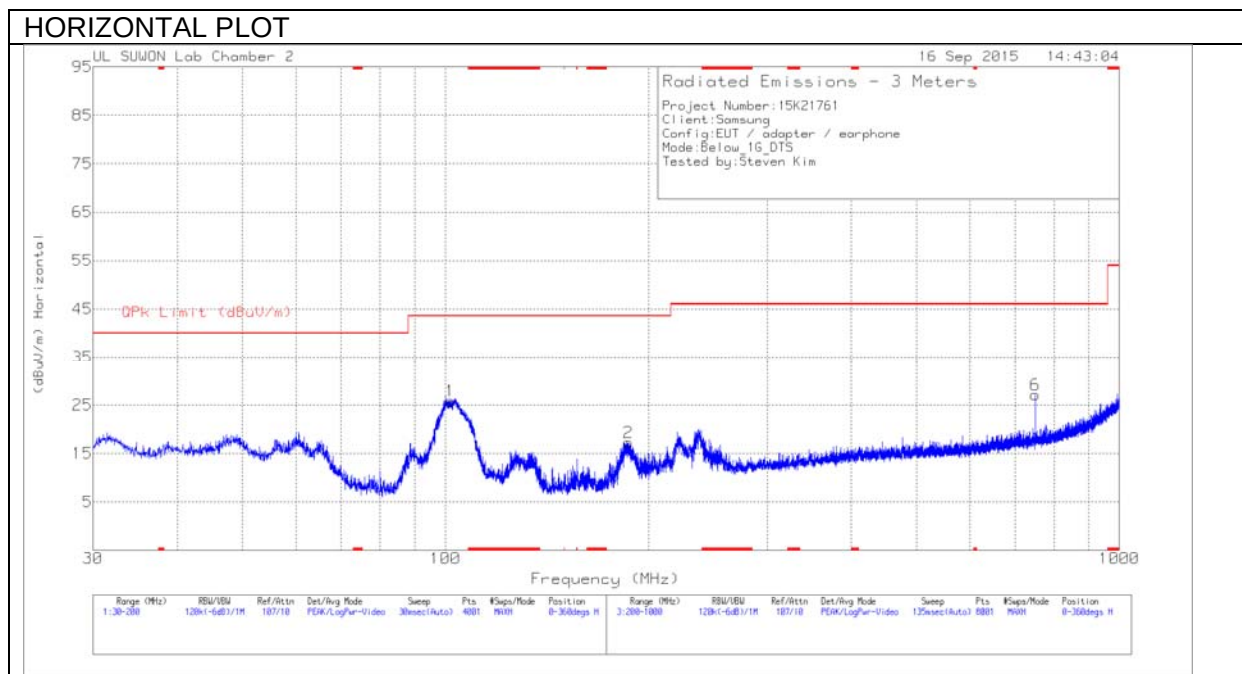
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

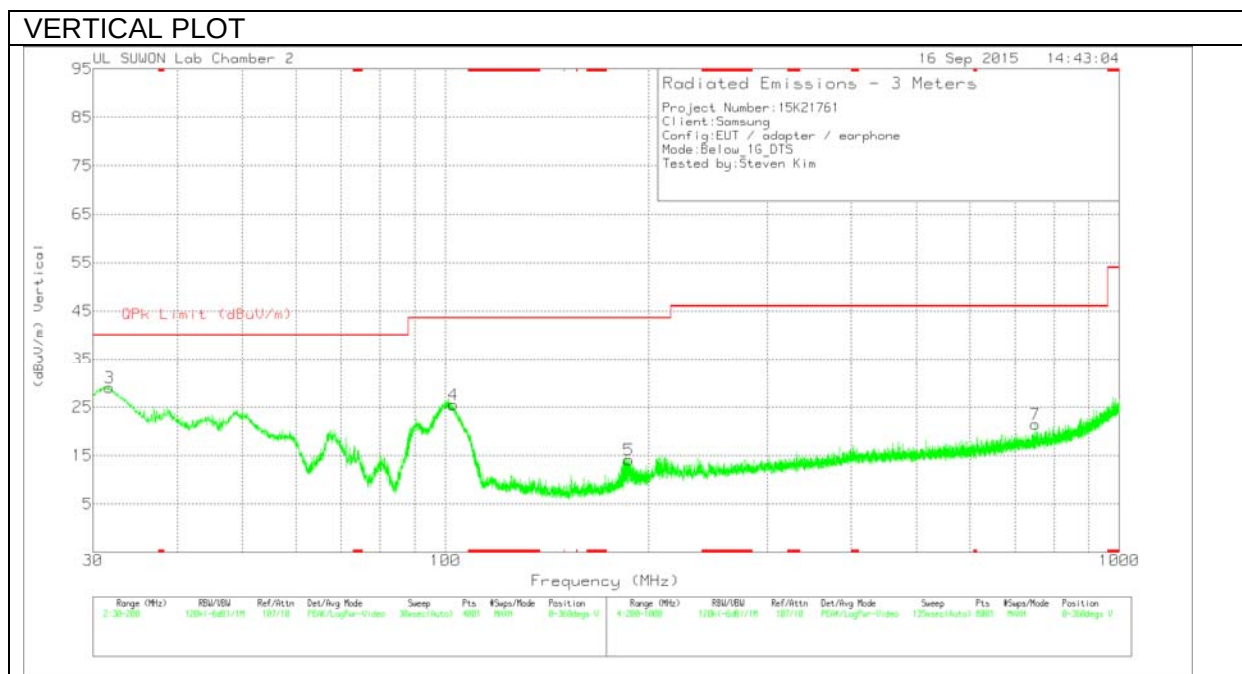
MAv1 - KDB558074 Option 1 Maximum RMS Average

11.3. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



Below 1G Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163-749	Below_1G	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	101.7825	44.98	Pk	11.4	-30.5	25.88	43.52	-17.64	0-360	400	H
2	186.6975	37.47	Pk	10.1	-30.3	17.27	43.52	-26.25	0-360	100	H
3	31.7425	49.45	Pk	10.4	-30.8	29.05	40	-10.95	0-360	100	V
4	102.76	44.65	Pk	11.4	-30.6	25.45	43.52	-18.07	0-360	100	V
5	187.0375	34.29	Pk	10.1	-30.3	14.09	43.52	-29.43	0-360	100	V
6	750.6	38.44	Pk	17.6	-28.9	27.14	46.02	-18.88	0-360	100	H
7	750.6	32.78	Pk	17.6	-28.9	21.48	46.02	-24.54	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

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 2009.

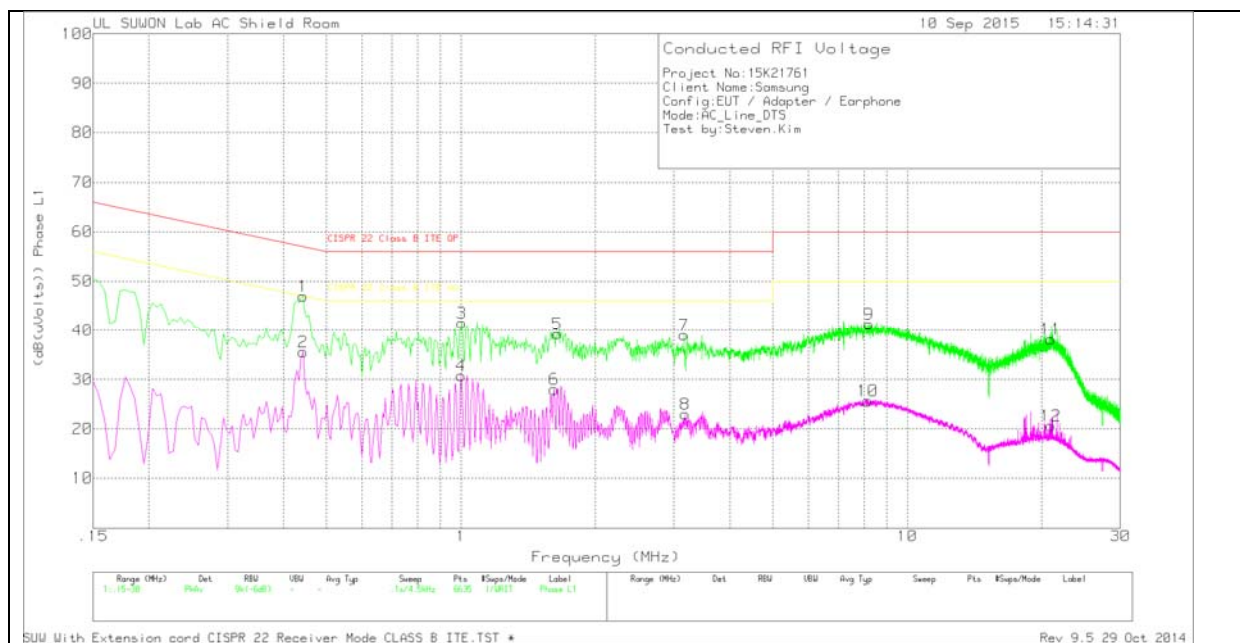
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

6 WORST EMISSIONS

LINE 1 PLOT



LINE 1 RESULTS

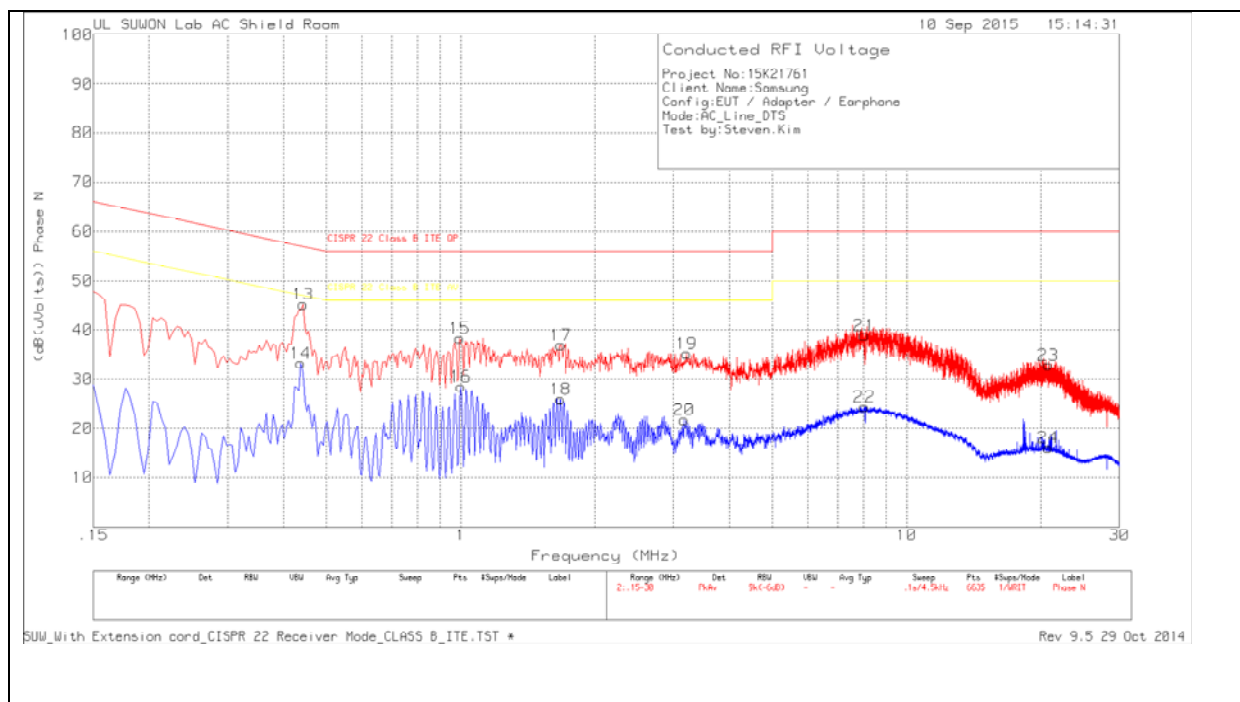
Phase L1 .15 - 30MHz

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	.4425	36.9	Pk	10.1	0	47	57.01	-10.01	-	-
2	.4425	25.53	Av	10.1	0	35.63	-	-	47.01	-11.38
3	1.005	31.68	Pk	9.9	0	41.58	56	-14.42	-	-
4	1.0005	20.84	Av	9.9	0	30.74	-	-	46	-15.26
5	1.644	29.43	Pk	9.8	.1	39.33	56	-16.67	-	-
6	1.617	18.09	Av	9.8	.1	27.99	-	-	46	-18.01
7	3.165	29.13	Pk	9.8	.1	39.03	56	-16.97	-	-
8	3.1785	13.09	Av	9.8	.1	22.99	-	-	46	-23.01
9	8.196	31.24	Pk	9.9	.1	41.24	60	-18.76	-	-
10	8.16	15.64	Av	9.9	.1	25.64	-	-	50	-24.36
11	20.9895	27.65	Pk	10.4	.2	38.25	60	-21.75	-	-
12	20.9895	10.03	Av	10.4	.2	20.63	-	-	50	-29.37

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 (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
13	.4425	35.18	Pk	10.1	0	45.28	57.01	-11.73	-	-
14	.438	23.15	Av	10.1	0	33.25	-	-	47.1	-13.85
15	.996	28.38	Pk	9.9	0	38.28	56	-17.72	-	-
16	1.0005	18.58	Av	9.9	0	28.48	-	-	46	-17.52
17	1.67775	27.05	Pk	9.8	.1	36.95	56	-19.05	-	-
18	1.6755	16.09	Av	9.8	.1	25.99	-	-	46	-20.01
19	3.21	25.37	Pk	9.8	.1	35.27	56	-20.73	-	-
20	3.1695	11.84	Av	9.8	.1	21.74	-	-	46	-24.26
21	8.0385	28.92	Pk	9.9	.1	38.92	60	-21.08	-	-
22	8.0385	14.39	Av	9.9	.1	24.39	-	-	50	-25.61
23	20.751	22.03	Pk	10.6	.2	32.83	60	-27.17	-	-
24	20.7915	5.27	Av	10.6	.2	16.07	-	-	50	-33.93

Pk - Peak detector

Av - Average detection