



FCC 47 CFR PART 15 SUBPART C

**BLUETOOTH LOW ENERGY
CERTIFICATION TEST REPORT**

FOR

GSM/WCDMA/LTE Phone with BT, BLE, DTS/UNII a/b/g/n/ac & NFC

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**Prepared for
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Revision History

<u>Ver.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
1	8/3/16	Initial Issue	Brian Kiewra
2	2016-08-15	Corrected maximum power in section 5.2 Identified measurement procedure in section 2 Corrected standard reference in section 10	Brian Kiewra

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SONY MOBILE COMMUNICATIONS, INC.
4-12-3 HIGASHI-SHINAGAWA,
SHINAGAWA -KU,TOKYO, 140-0002, JAPAN

EUT DESCRIPTION: GSM/WCDMA/LTE Phone with BT, BLE, DTS/UNII a/b/g/n/ac &
NFC

SERIAL NUMBER: Radiated: CB512AP7SN, CB512AP7UK
Conducted: CB512AP7SV

DATE TESTED: 2016-07-14 to 2016-08-03

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass

UL LLC 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 LLC 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 LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC 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 NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released
For UL LLC By:



Jeff Moser
EMC Program Manager
UL – Consumer Technology Division

Prepared By:



Brian T. Kiewra
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UL – Consumer Technology Division

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Dr., Research Triangle Park, NC 27709, USA and 2800 Suite B, Perimeter Park Drive, Morrisville, NC 27560.

12 Laboratory Dr., RTP, NC 27709
<input type="checkbox"/> Chamber A
<input type="checkbox"/> Chamber C

2800 Suite B Perimeter Park Dr., Morrisville, NC 27560
<input type="checkbox"/> Chamber NORTH
<input checked="" type="checkbox"/> Chamber SOUTH

UL LLC (RTP) is accredited by NVLAP, Laboratory Code 200246-0. The full scope of accreditation can be viewed at <http://www.nist.gov/nvlap/>

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	3.52 dB
Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Radiated Disturbance, 26000 to 40000 MHz	5.24 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 with BT, BLE, DTS/UNII a/b/g/n/ac & NFC

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	BLE	6.40	3.94

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes two integrated antennas, with the following maximum gains:

Frequency Range (MHz)	Antenna Gain (dBi)
	Ant 0 (Main)
2402 – 2480	-6.2

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was SONY, s_atp_1_600_7_9.

The test utility software used during testing was Tera Term ver 4.89 (SVN# 6182).

5.5. 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,Z, it was determined that X-Axis orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X-Axis orientation.

5.6. DESCRIPTION OF TEST SETUP
SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Desktop	Lenovo	ThinkCentre	MG00ADEN	NA
Laptop	Lenovo	T450	RTP0116PC0A2UQT	NA
Headphones	Sony	MH410x	12271A100010396	NA
PowerSupply	Sony	1300-7146.1B	5816W02400051	NA

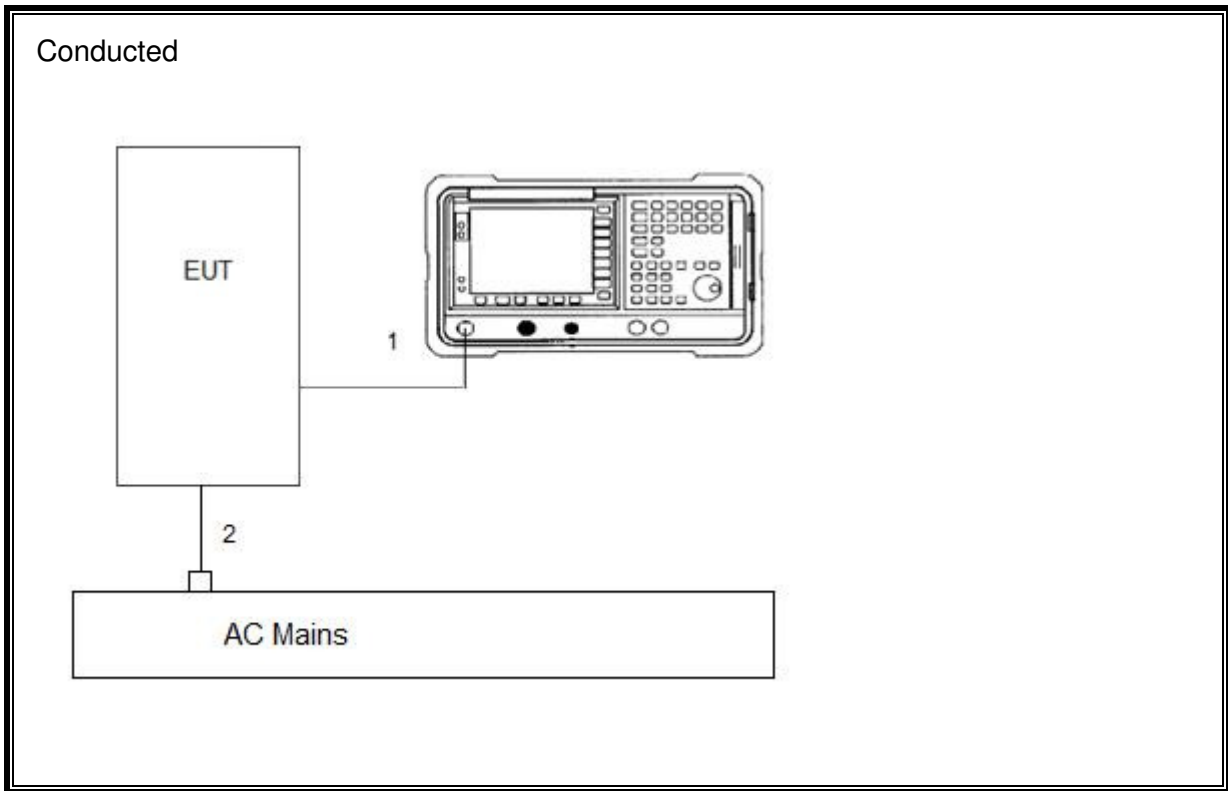
I/O CABLES

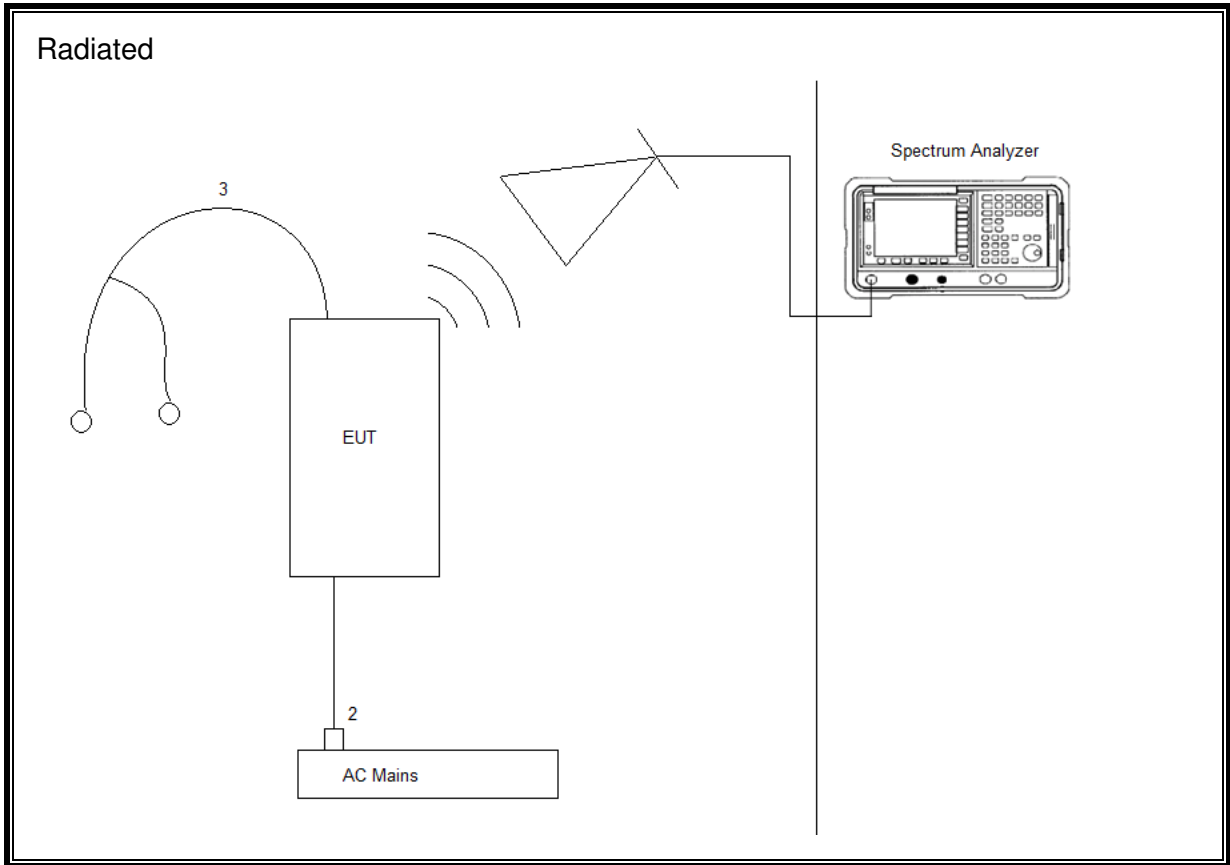
I/O Cable List					
Cable No	Port	# of Identical ports	Connector Type	Cable Length (m)	Remarks
1	Antenna Port	1	RF	<1m	NA
2	DC Mains	1	Mini-USB	>1m	NA
3	Audio	1	3.5mm	>1m	Headphone

TEST SETUP

The EUT is setup as a standalone device. 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 Used - Radiated Disturbance Emissions Test Equipment (Morrisville - South Chamber)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	0.009-30MHz	(Loop Ant.)			
AT0079	Active Loop Antenna	ETS-Lindgren	6502	2015-12-08	2016-12-31
	30-1000 MHz				
AT0074	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2016-06-07	2017-06-30
	1-18 GHz				
AT0069	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2016-03-07	2017-03-31
	18-40 GHz				
AT0076	Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2015-08-27	2016-08-31
	Gain-Loss Chains				
S-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2015-10-07	2016-10-31
S-SAC02	Gain-loss string: 30-1000MHz	Various	Various	2016-06-26	2017-06-30
S-SAC03	Gain-loss string: 1-18GHz	Various	Various	2015-08-22	2016-08-31
S-SAC04	Gain-loss string: 18-40GHz	Various	Various	2016-02-29	2017-02-28
	Receiver & Software				
SA0025	Spectrum Analyzer	Agilent	N9030A	2016-03-17	2017-03-31
SA0026 (18-40GHz RSE)	Spectrum Analyzer	Agilent	N9030A	2016-02-24	2017-02-28
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
	Additional Equipment used				
HI0078	Temp/Humid/Pressure Meter	Springfield Precision	PreciseTemp	2016-06-13	2017-06-13

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
Conducted Room 1					
72822	Spectrum Analyzer	Agilent Technologies	E4446A	2015-09-02	2016-09-30
PWM004	RF Power Meter	Keysight Technologies	N1911A	2016-06-22	2017-06-22
PWS004	Peak and Avg Power Sensor, 50MHz to 6GHz	Keysight Technologies	E9323A	2016-06-22	2017-06-22
HI0078	Temp/Humid/Pressure Meter	Springfield Precision	PreciseTemp	2016-06-13	2017-06-13
MM0167	True RMS Multimeter	Agilent	U1232A	2015-08-17	2016-08-31
76022	DC Regulated Power Supply	CircuitSpecialists .Com	CSI3005X5	N/A	N/A

Test Equipment Used - Line-Conducted Emissions – Voltage (Morrisville – Conducted 1)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
CBL077	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3476-240	2016-06-15	2017-06-30
HI0078	Temp/Humid/Pressure Meter	Springfield Precision	PreciseTemp	2016-06-13	2017-06-13
LISN003	LISN, 50-ohm/50-uH, 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50-25-2-01-550V	2015-08-24	2016-08-31
LISN008	LISN, 50-ohm/50-uH, 2-conductor, 25A (For support gear only.)	Solar Electronics	8012-50-R-24-BNC	2015-09-03	2016-09-30
MM0167	Multi-meter	Agilent	U1232A	2015-08-17	2016-08-31
PRE0101521 (75141)	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2015-08-26	2016-08-31
TL001	Transient Limiter, 0.009-30MHz	Com-Power	LIT-930A	2016-06-09	2017-06-30
PS214	AC Power Source	Elgar	CW2501M (s/n 1523A02396)	NA	NA
PS215	AC Power Source	Elgar	CW2501M (s/n 1523A02397)	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
Miscellaneous (if needed)					
ATA220	ISN for Unshielded Balanced Pairs	Teseq, Inc.	ISN T8	2015-08-24	2016-08-31
TN0129	ISN for Shielded Balanced Pairs	Teseq, Inc.	ISN ST08	2015-08-24	2016-08-31

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
TN0145	ISN for Cat-6 Unshielded Balanced Pairs	Teseq, Inc.	ISN T8-Cat6	2015-08-25	2016-08-31
CDECABLE001	ANSI C63.4 1m extension cable.	UL	Per Annex B of ANSI C63.4	2016-06-04	2017-06-30

7. MEASUREMENT METHODS

On Time and Duty Cycle: KDB 558074 D01 v03r05, Section 6.0

Output Power: KDB 558074 D01 v03r05, Section 9.1.2

Power Spectral Density: KDB 558074 D01 v03r05, Section 10.2.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v03r05, Section 11.0.

Out-of-band emissions in restricted bands: KDB 558074 D01 v03r05, Section 12.1.

Band-edge: KDB 558074 D01 v03r05, Section 12.1.

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

TEST INFORMATION

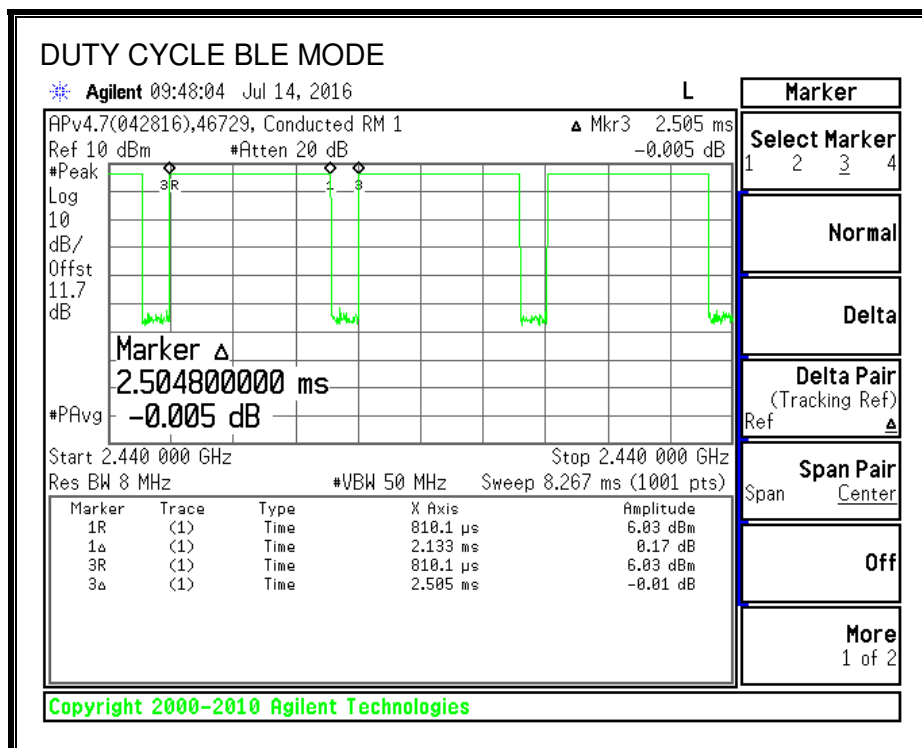
Date: 2016-07-14

Tester: Ron Reichard

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/B Minimum VBW (kHz)
BLE	2.133	2.505	0.851	85.15%	0.70	0.469

DUTY CYCLE PLOTS



8.2. 6 dB BANDWIDTH LIMITS

FCC §15.247 (a) (2)

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

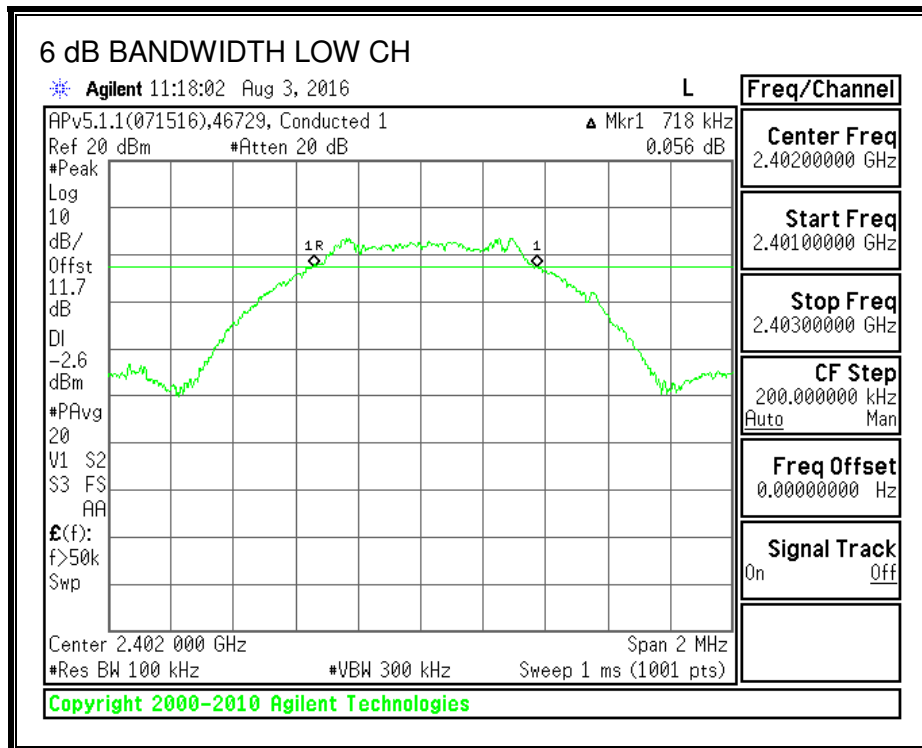
TEST INFORMATION

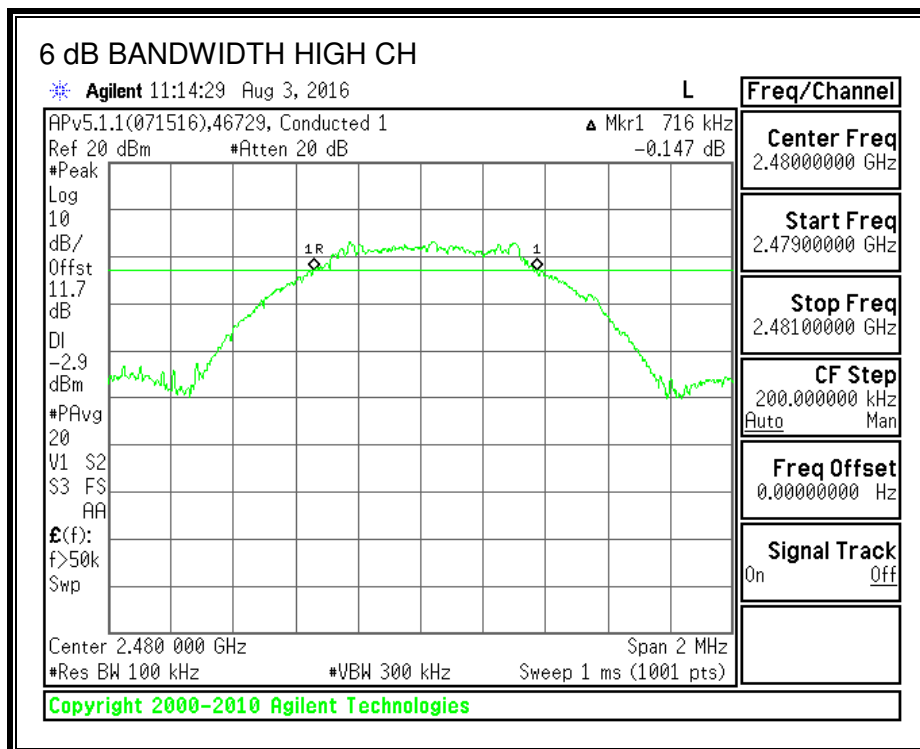
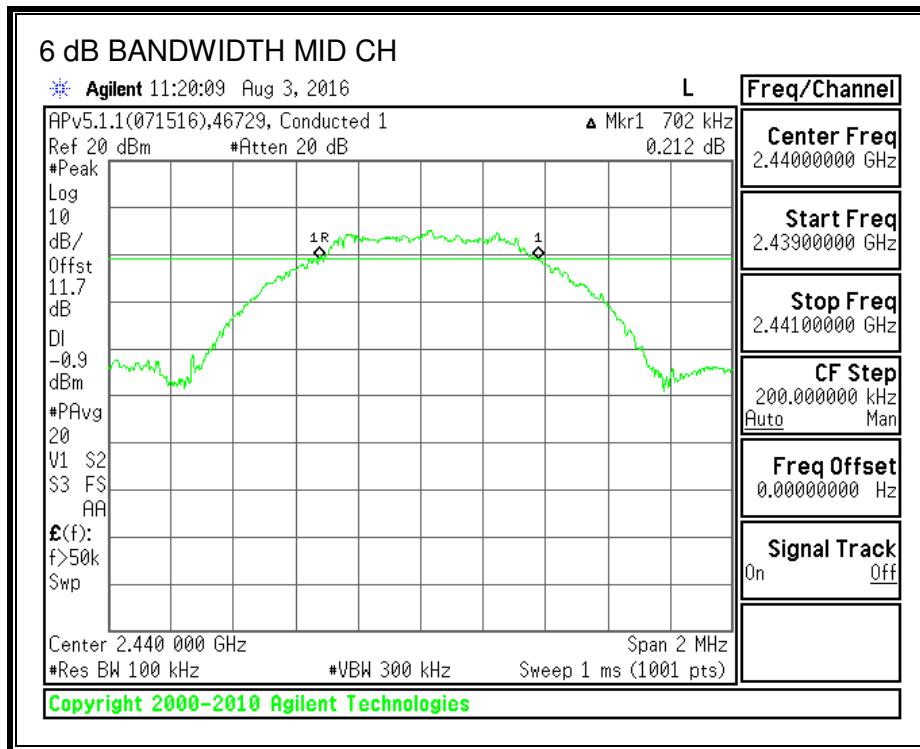
Date: 2016-07-25
 Tester: Ron Reichard

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.7180	0.5
Middle	2440	0.7020	0.5
High	2480	0.7160	0.5

6 dB BANDWIDTH





8.3. 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 INFORMATION

Date: 2016-07-29

Tester: Ron Reichard

RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	4.900	30	-25.100
Middle	2440	6.400	30	-23.600
High	2480	4.500	30	-25.500

8.4. AVERAGE POWER LIMITS

None; for reporting purposes only.

TEST INFORMATION

Date: 2016-07-29
Tester: Ron Reichard

RESULTS

The cable assembly insertion loss of 11.7 dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	4.4
Middle	2440	6.1
High	2480	4.2

**8.5. POWER SPECTRAL DENSITY
LIMITS**

FCC §15.247 (e)

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 INFORMATION

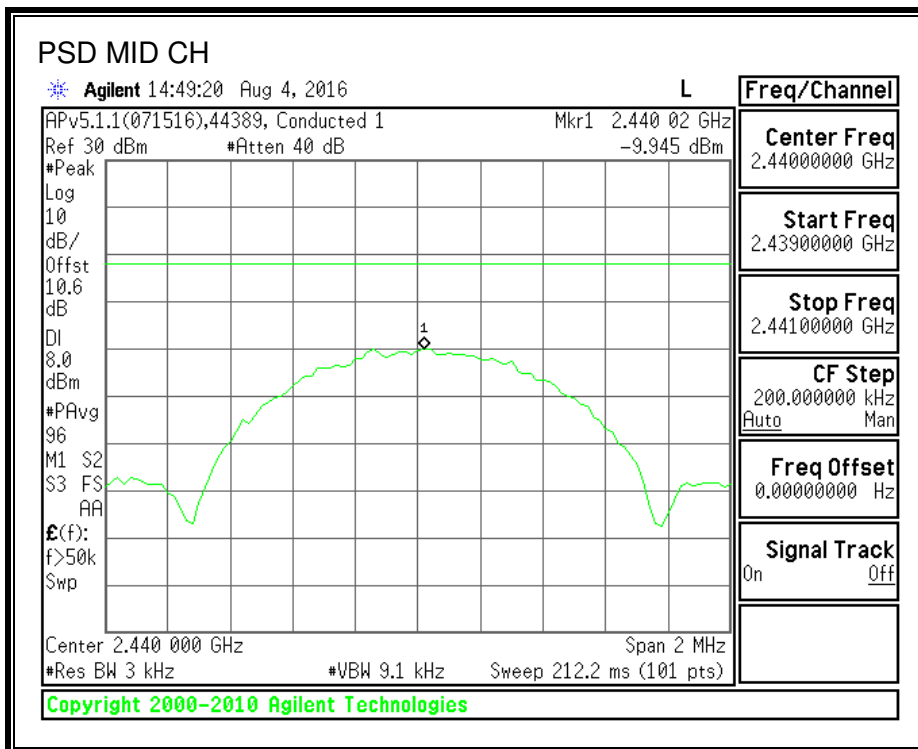
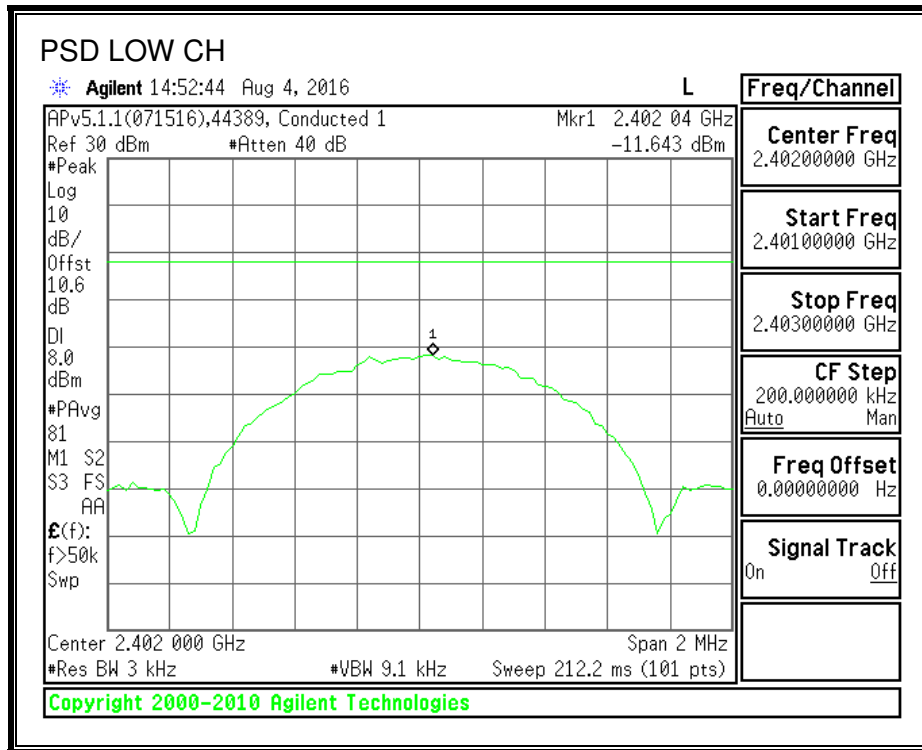
Date: 2016-07-25

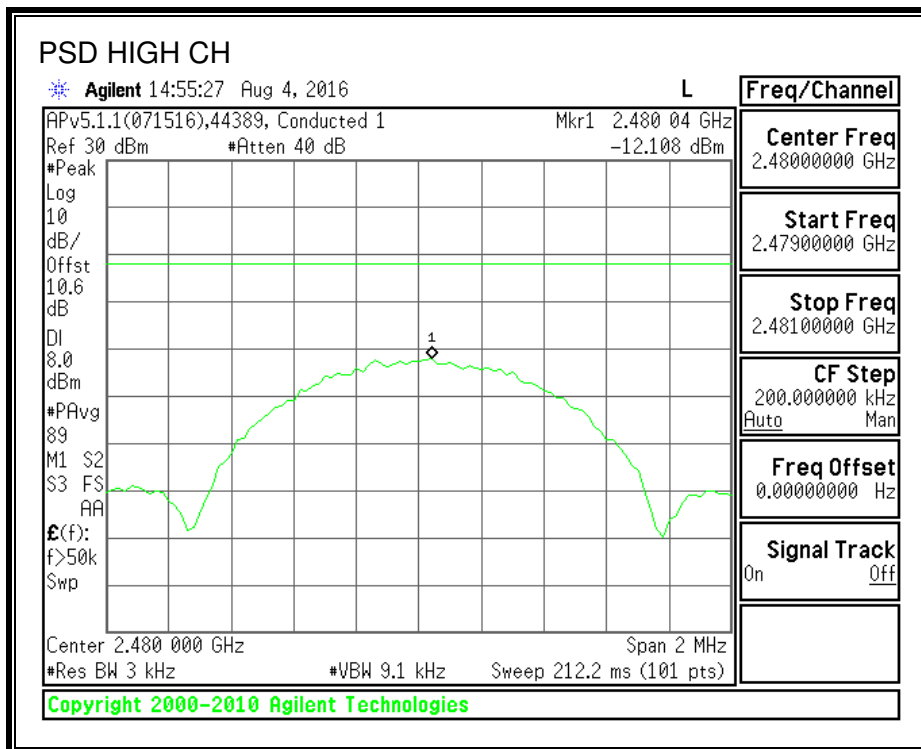
Tester: Ron Reichard

RESULTS

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-11.64	8	-19.64
Middle	2440	-9.95	8	-17.95
High	2480	-12.11	8	-20.11

POWER SPECTRAL DENSITY





8.6. CONDUCTED SPURIOUS EMISSIONS LIMITS

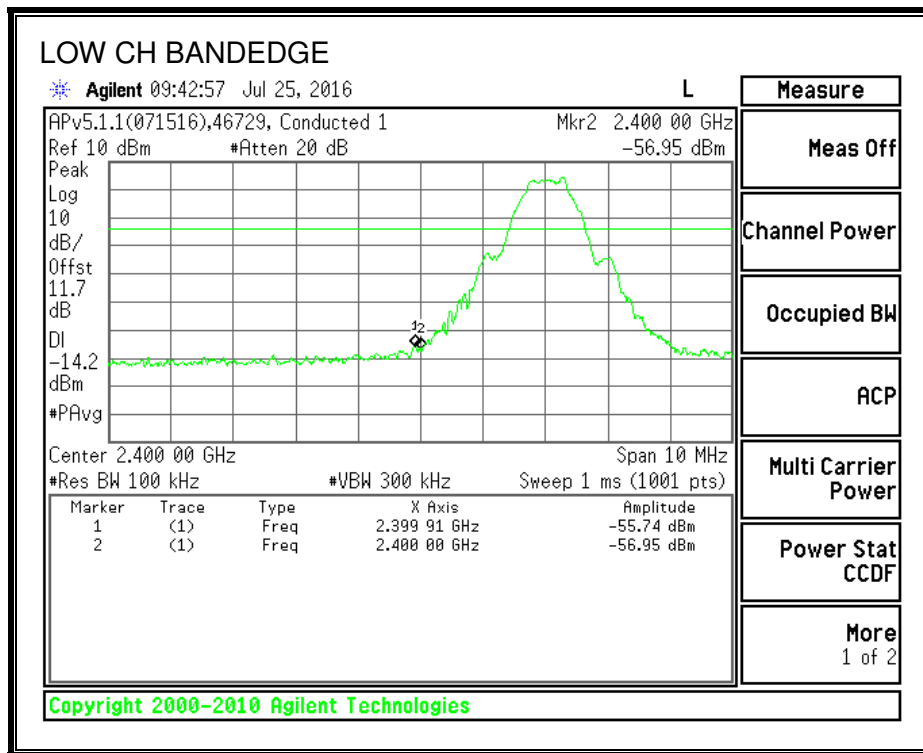
FCC §15.247 (d)

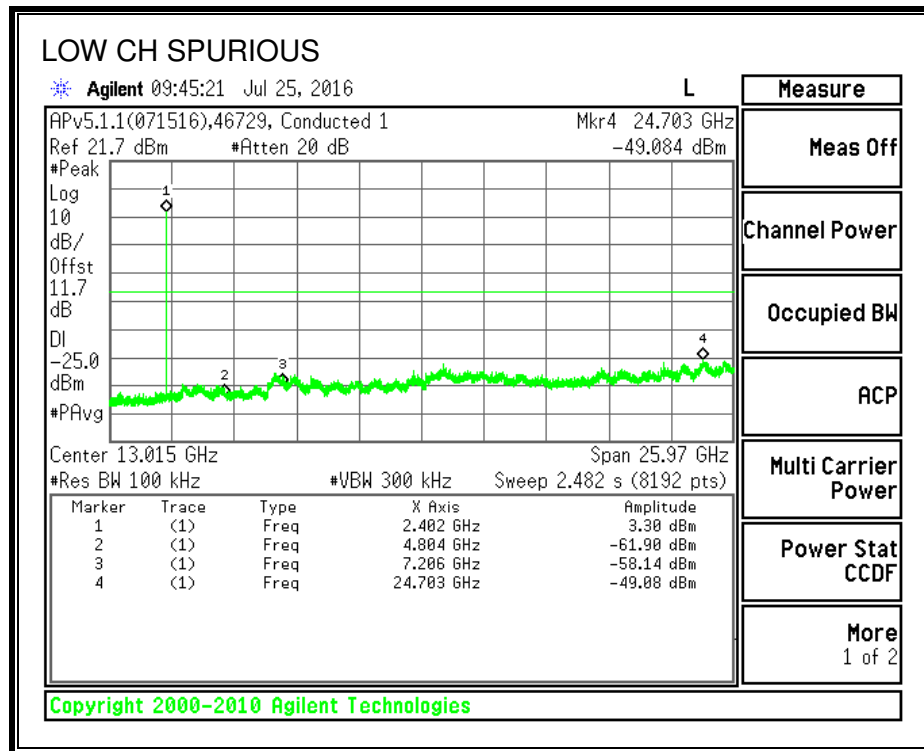
\Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST INFORMATION

Date: 2016-07-25
 Tester: Ron Reichard

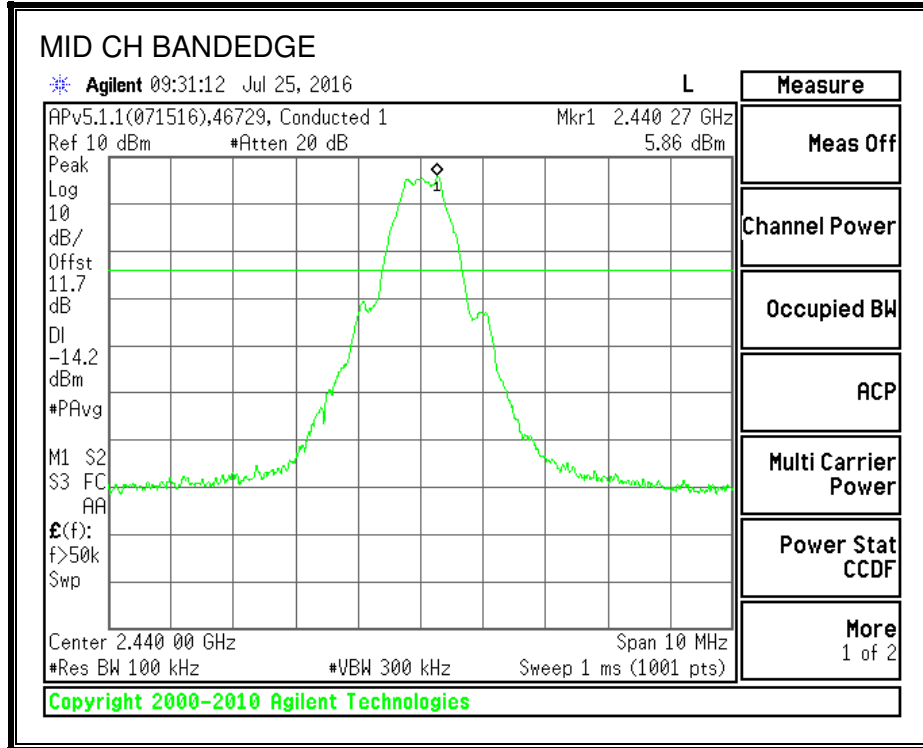
RESULTS SPURIOUS EMISSIONS, LOW CHANNEL

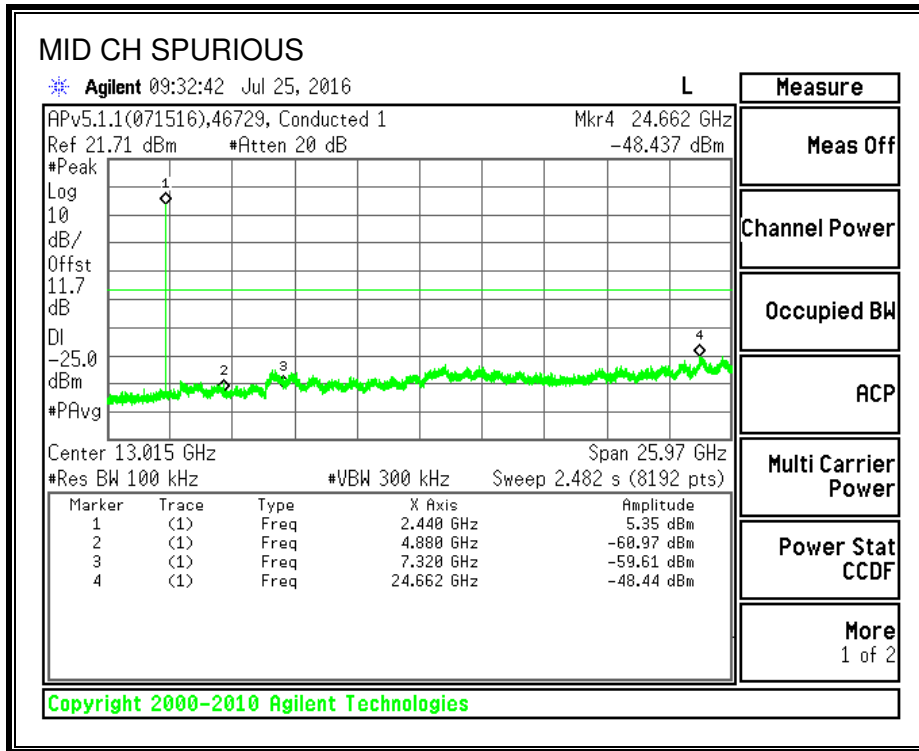




Note: Conducted spurious limit should be -14.1dBm, but compliant to lower limit of -25dBm.

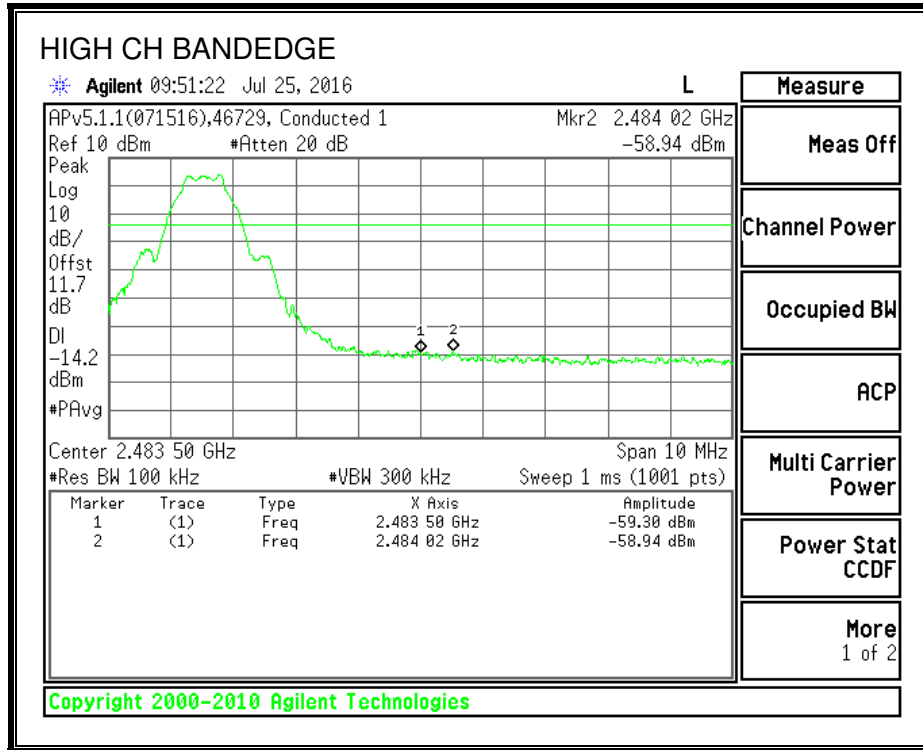
SPURIOUS EMISSIONS, MID CHANNEL

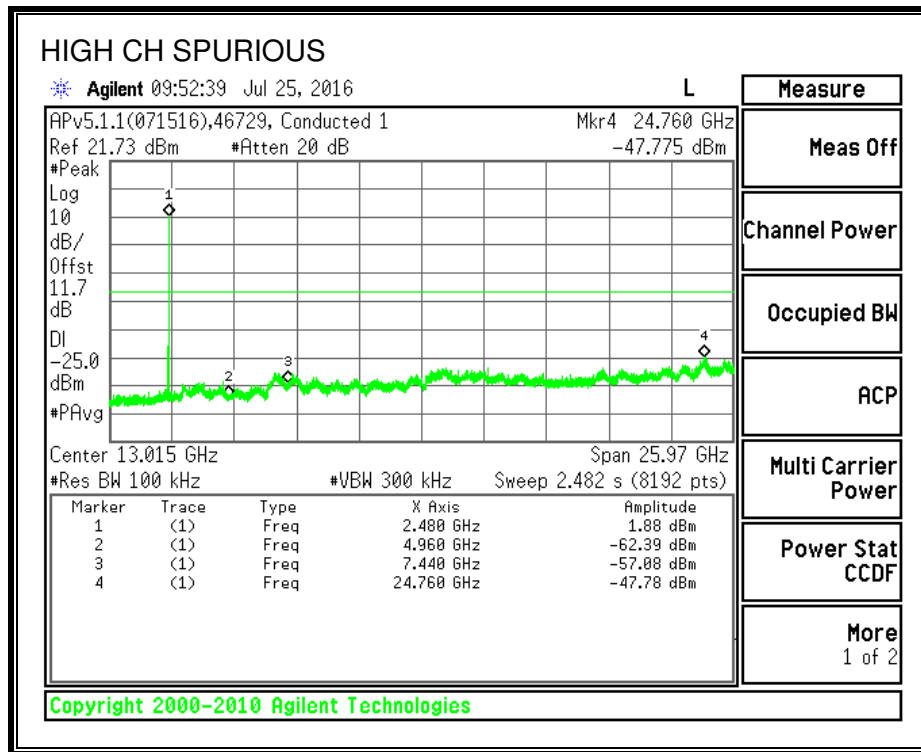




Note: Conducted spurious limit should be -14.1dBm, but compliant to lower limit of -25dBm.

SPURIOUS EMISSIONS, HIGH CHANNEL





Note: Conducted spurious limit should be -14.1dBm, but compliant to lower limit of -25dBm.

9. RADIATED TEST RESULTS

9.1. 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
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
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 for below 1GHz measurements and 1.5 m above the ground plane for above 1GHz measurements. The antenna to EUT distance is 3 meters.

For measurements below 1 GHz the resolution bandwidth is set to 120 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements for the 30-1000 MHz range, 9 kHz for peak detection measurements or 9 kHz for quasi-peak detection measurements for the 0.15-30 MHz range and 200 Hz for peak detection measurements or 200 Hz for quasi-peak detection measurements for the 9 to 150 kHz range. Peak detection is used unless otherwise noted as quasi-peak.

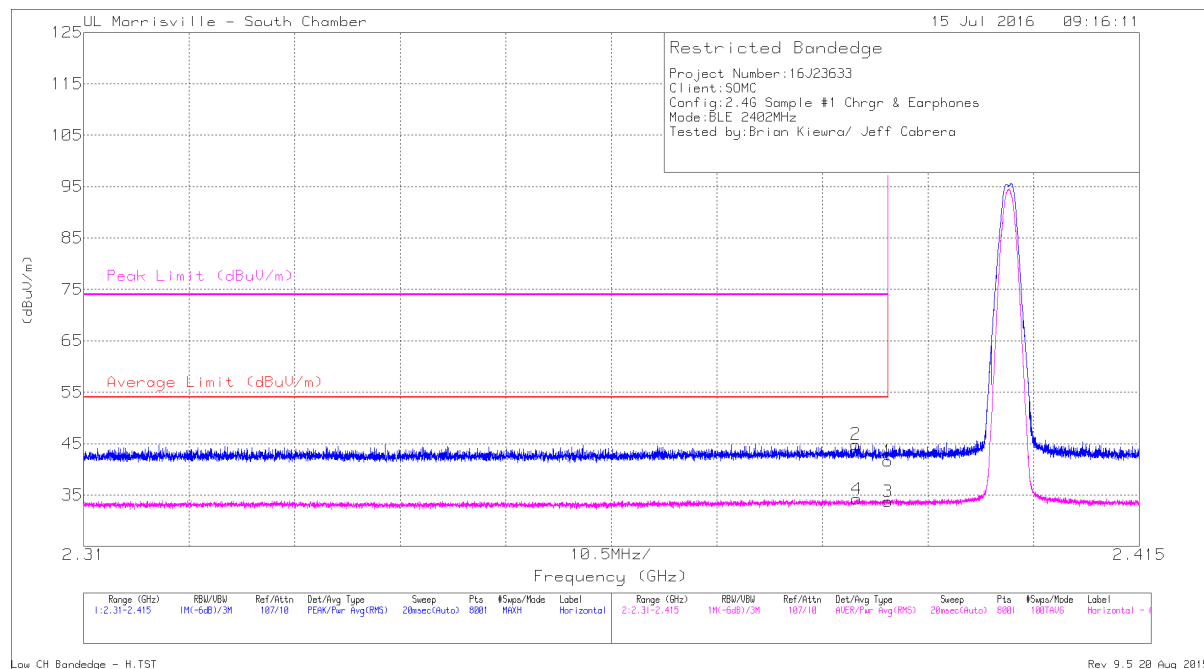
For peak measurements above 1 GHz, the resolution bandwidth is set to 1 MHz and the video bandwidth is set to 3 MHz. For average measurements above 1GHz, the resolution bandwidth and video bandwidth are set as described in ANSI C63.10:2013 for the applicable measurement. For this evaluation, RMS Power Averaging was used and the resolution/video bandwidth settings were 1MHz/3MHz.

The spectrum from 9 kHz to 26 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.

9.2. TX ABOVE 1 GHz FOR BLE MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



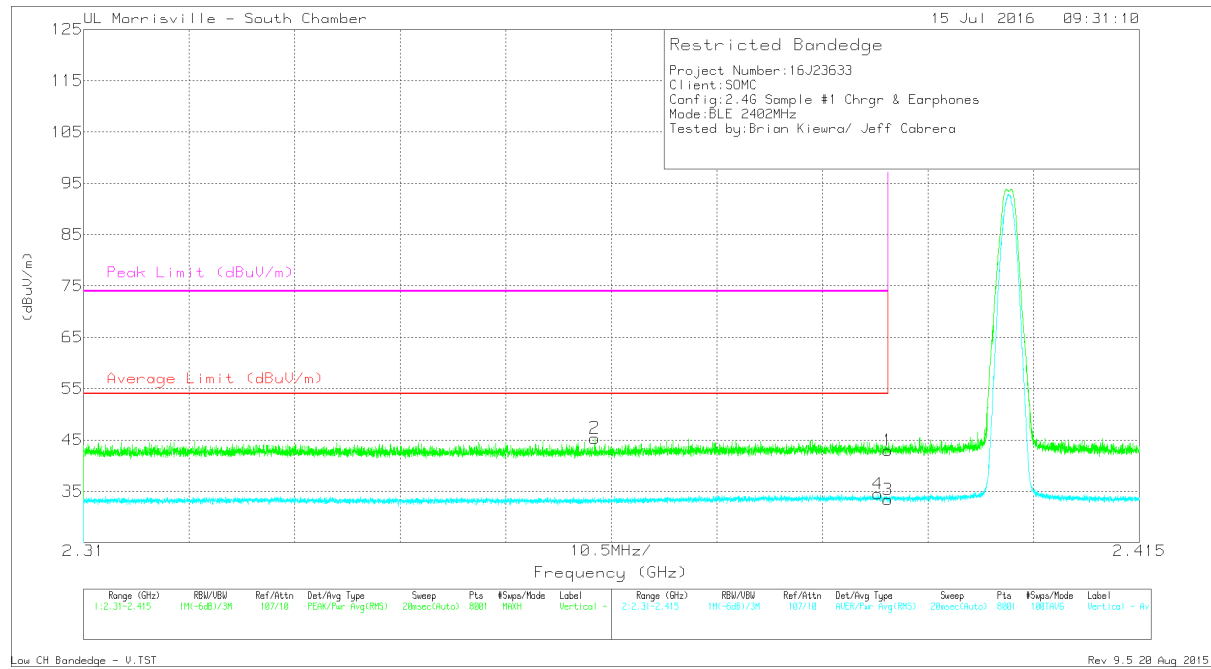
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (dB/m)	Amp/CbI /Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	33.64	Pk	32.2	-24.2	0	41.64	-	-	74	-32.36	340	374	H
2	* 2.387	36.76	Pk	32.2	-24.1	0	44.86	-	-	74	-29.14	340	374	H
3	* 2.39	25.04	RMS	32.2	-24.2	.7	33.74	54	-20.26	-	-	340	374	H
4	* 2.387	25.42	RMS	32.2	-24.1	.7	34.22	54	-19.78	-	-	340	374	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



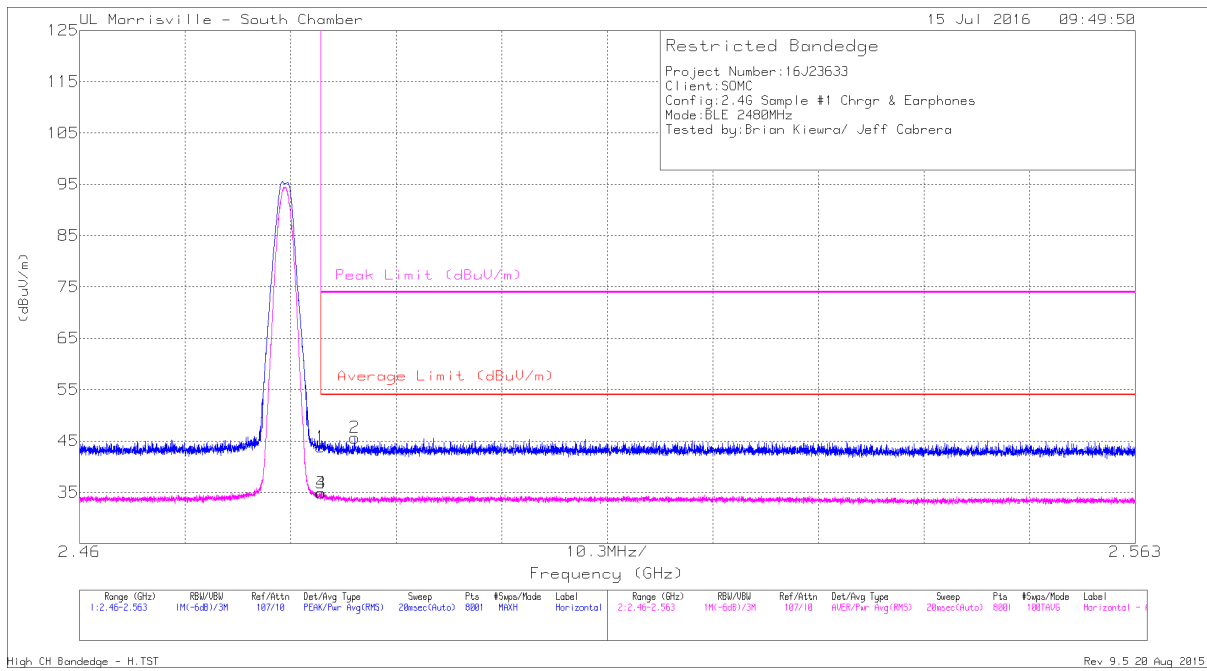
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (dB/m)	Amp/Cbl /Fitr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	34.93	Pk	32.2	-24.2	0	42.93	-	-	74	-31.07	121	399	V
2	* 2.361	37.65	PK	31.9	-24.2	0	45.35	-	-	74	-28.65	121	399	V
3	* 2.39	24.66	RMS	32.2	-24.2	.7	33.36	54	-20.64	-	-	121	399	V
4	* 2.389	25.67	RMS	32.2	-24.1	.7	34.47	54	-19.53	-	-	121	399	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

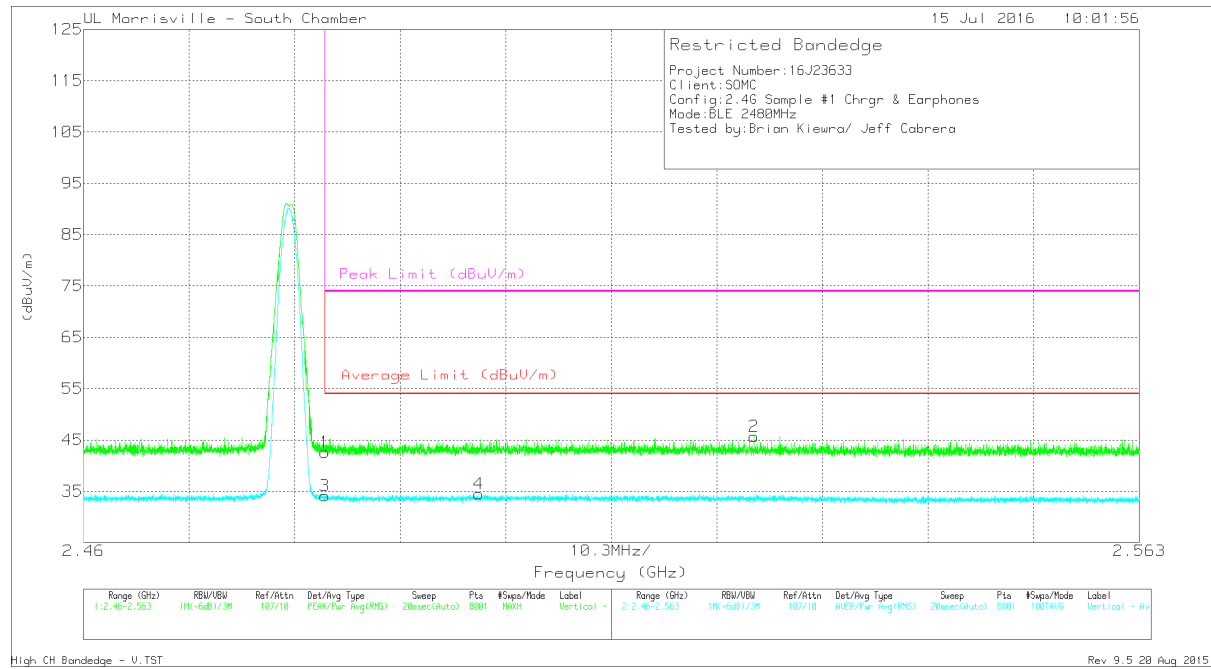
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (dB/m)	Amp/Cb I/Ftr/PA d (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	36.11	Pk	32.4	-24.7	0	43.81	-	-	74	-30.19	346	342	H
2	* 2.487	37.92	Pk	32.4	-24.7	0	45.62	-	-	74	-28.38	346	342	H
3	* 2.484	26.45	RMS	32.4	-24.7	.7	34.85	54	-19.15	-	-	346	342	H
4	* 2.484	26.47	RMS	32.4	-24.7	.7	34.87	54	-19.13	-	-	346	342	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Pk - Peak detector
 RMS - RMS detection

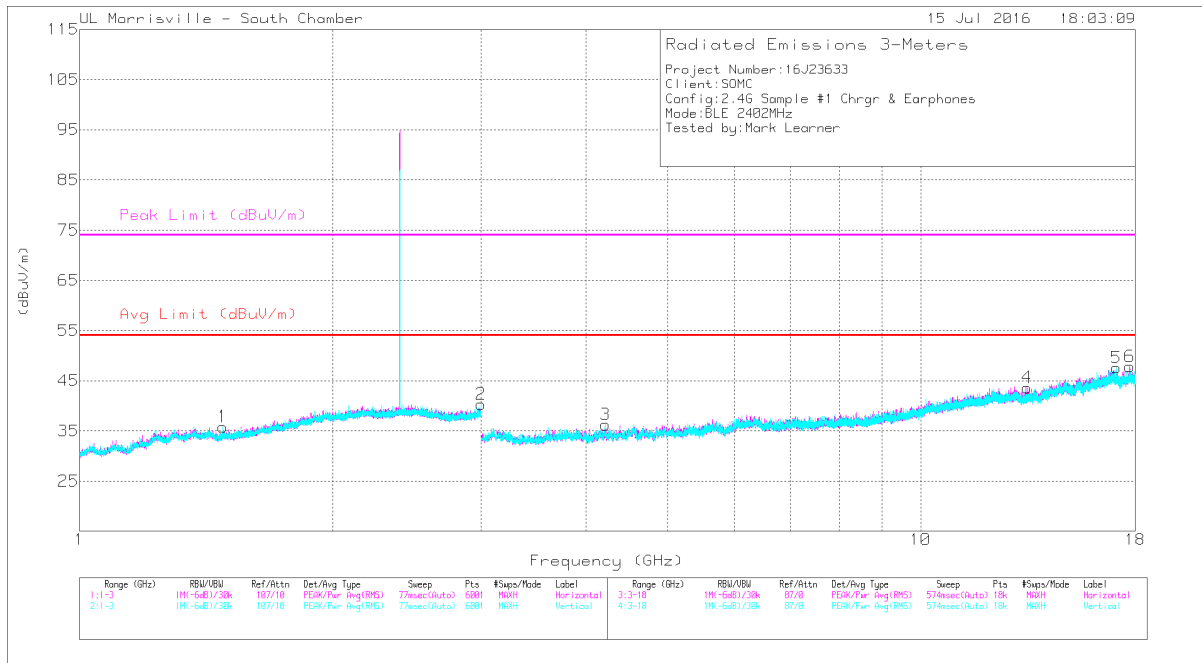
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (dB/m)	Amp/Cbl /Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	34.86	Pk	32.4	-24.7	0	42.56	-	-	74	-31.44	97	358	V
3	* 2.484	25.7	RMS	32.4	-24.7	.7	34.1	54	-19.9	-	-	97	358	V
4	* 2.499	26.07	RMS	32.5	-24.8	.7	34.47	54	-19.53	-	-	97	358	V
2	2.525	38.04	Pk	32.5	-24.9	0	45.64	-	-	74	-28.36	97	358	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Pk - Peak detector
 RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS



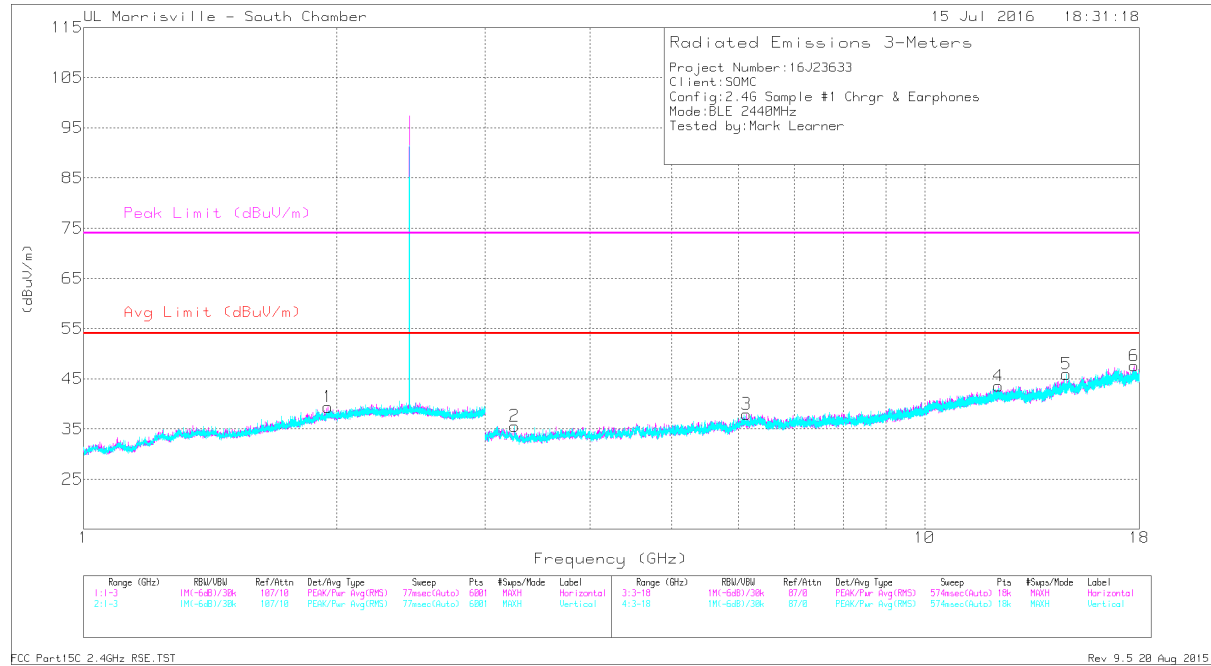
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (dB/m)	Amp/Cbl /Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.479	35.59	PK2	28.1	-22.7	0	40.99	-	-	74	-33.01	0	102	V
	* 1.481	24.32	MAv1	28	-22.7	.7	30.32	54	-23.68	-	-	0	102	V
4	* 13.385	35.09	PK2	39.1	-25.4	0	48.79	-	-	74	-25.21	0	199	H
	* 13.383	24.33	MAv1	39.1	-25.5	.7	38.63	54	-15.37	-	-	0	199	H
6	* 17.734	35.13	PK2	41.2	-22.5	0	53.83	-	-	74	-20.17	0	199	H
	* 17.732	24.08	MAv1	41.2	-22.6	.7	43.38	54	-10.62	-	-	0	199	H
3	* 4.217	40.46	PK2	33.4	-31.8	0	42.06	-	-	74	-31.94	0	199	V
	* 4.217	28.85	MAv1	33.4	-31.8	.7	31.15	54	-22.85	-	-	0	199	V
2	3	33.64	Pk	32.8	-26.1	0	40.34	-	-	-	-	0-360	102	V
5	17.088	30.18	Pk	41.3	-23.9	0	47.58	-	-	-	-	0-360	101	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (dB/m)	Amp/Cbl /Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 12.244	35.38	PK2	39	-24.9	0	49.48	-	-	74	-24.52	1	102	H
	* 12.245	23.8	MAv1	39	-25	.7	38.5	54	-15.5	-	-	1	102	H
6	* 17.739	34.58	PK2	41.2	-22.6	0	53.18	-	-	74	-20.82	1	198	H
	* 17.74	23.94	MAv1	41.2	-22.6	.7	43.24	54	-10.76	-	-	1	198	H
1	1.953	30.78	Pk	31.2	-22.6	0	39.38	-	-	-	-	0-360	199	H
2	3.252	36.09	Pk	33.2	-33.7	0	35.59	-	-	-	-	0-360	199	V
3	6.139	32.86	Pk	35.4	-30.3	0	37.96	-	-	-	-	0-360	199	H
5	14.749	31.41	Pk	39.8	-25.3	0	45.91	-	-	-	-	0-360	101	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

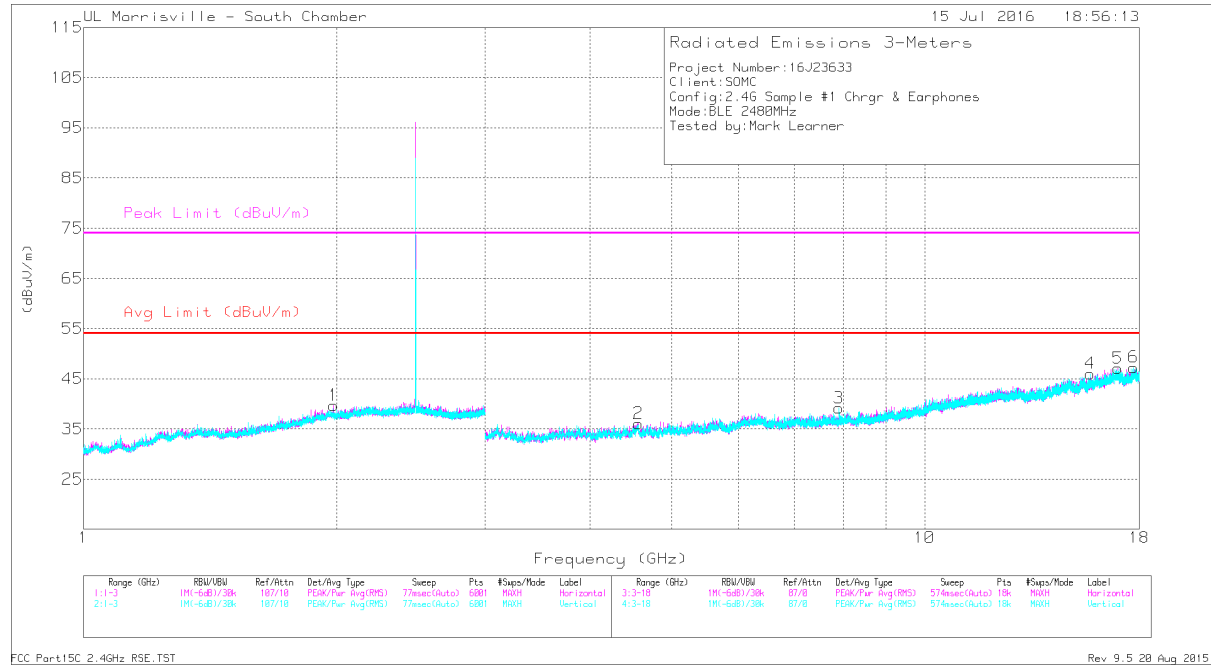
Pk - Peak detector

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

FCC Part15C 2.4GHz RSE.TST

Rev 9.5 20 Aug 2015



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 4.565	40.19	PK2	34	-32.1	0	42.09	-	-	74	-31.91	0	102	H
	* 4.563	29.32	MAv1	34	-32.1	.7	31.92	54	-22.08	-	-	0	102	H
4	* 15.742	34.28	PK2	40.3	-23.6	0	50.98	-	-	74	-23.02	0	198	V
	* 15.741	23.57	MAv1	40.3	-23.6	.7	40.97	54	-13.03	-	-	0	198	V
6	* 17.726	35.16	PK2	41.2	-22.8	0	53.56	-	-	74	-20.44	0	198	V
	* 17.728	24.15	MAv1	41.2	-22.8	.7	43.25	54	-10.75	-	-	0	198	V
1	1.982	31.31	Pk	31.2	-22.8	0	39.71	-	-	-	-	0-360	101	H
5	16.971	30.25	Pk	41.5	-24.7	0	47.05	-	-	-	-	0-360	199	H
3	7.907	31.88	Pk	35.8	-28.5	0	39.18	-	-	-	-	0-360	102	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

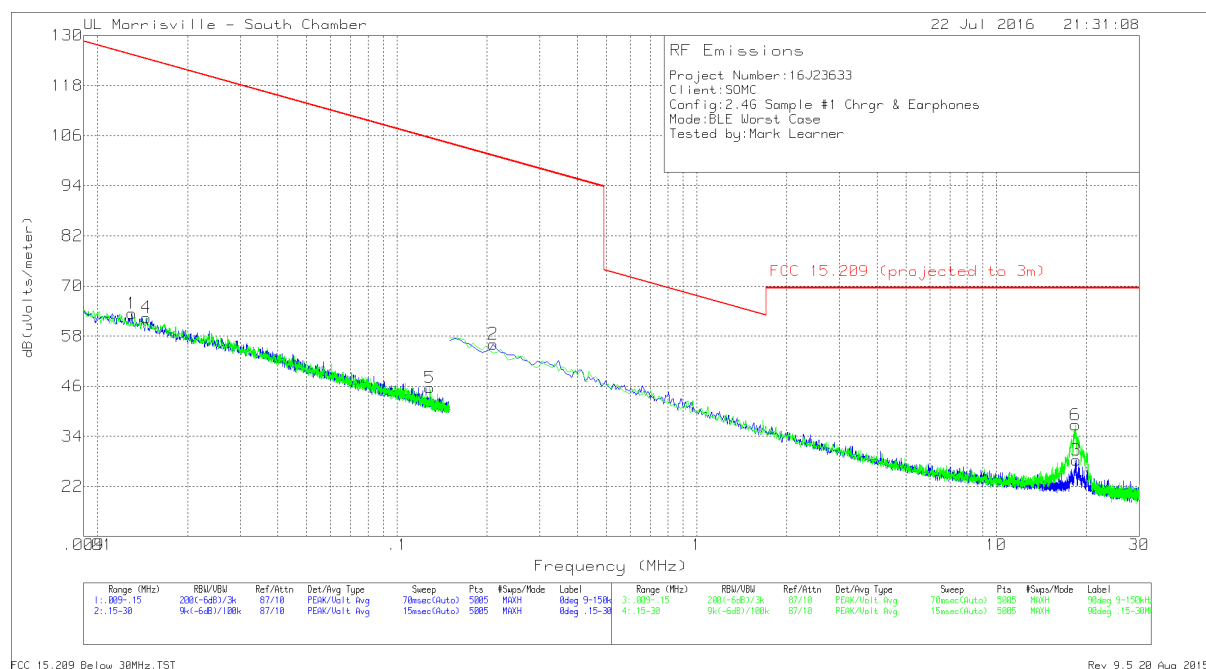
Pk - Peak detector

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

9.3. WORST-CASE BELOW 1 GHz SPURIOUS EMISSIONS 9 to 30 MHz (WORST-CASE CONFIGURATION)

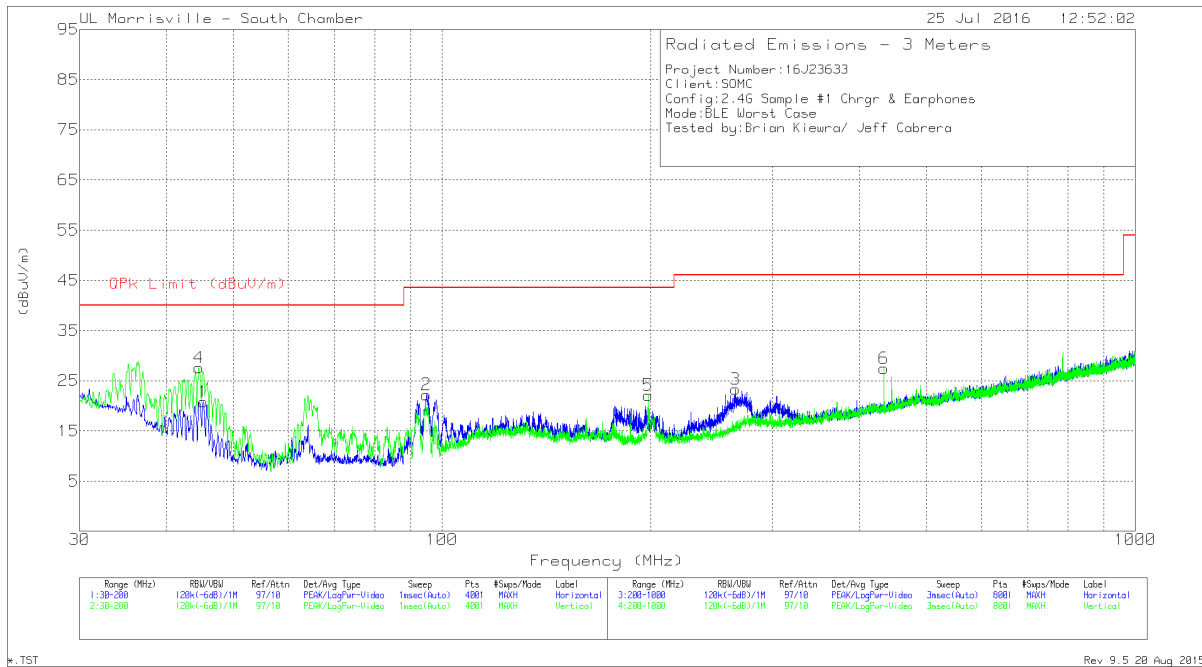
Note: All measurements were made at a test distance of 3 m. The limits in the plots and tabular data are the FCC/IC limits extrapolated from the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to the measurement distance to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the limits were 40*Log (specification distance / test distance).



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.209 (projected to 3m)	Margin (dB)	Azimuth (Degs)
1	.01303	45.54	Pk	17.8	.1	63.44	125.3	-61.86	0-360
2	.20965	44.1	Pk	11.9	.1	56.1	101.17	-45.07	0-360
3	18.53413	17.47	Pk	10.1	.7	28.27	69.54	-41.27	0-360
4	.01457	45.25	Pk	17.1	.1	62.45	124.33	-61.88	0-360
5	.12887	33.62	Pk	11.9	.1	45.62	105.4	-59.78	0-360
6	18.36711	25.91	Pk	10.1	.7	36.71	69.54	-32.83	0-360

Pk - Peak detector

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



n_TST

Rev. 9.5.20 Aug. 2015

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0074 AF (dB/m)	Amp/Cbl (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	QPK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarit y
3	* 264.9625	30.37	Qp	17.4	-29.9	0	17.87	46.02	-28.15	90	104	H
4	44.5775	44.01	Pk	15.2	-31.6	0	27.61	40	-12.39	0-360	102	V
1	45.215	37.57	Pk	14.8	-31.6	0	20.77	40	-19.23	0-360	399	H
2	94.94	40.53	Pk	12.7	-31	0	22.23	43.52	-21.29	0-360	299	H
5	198.3	35	Pk	17.3	-30.2	0	22.1	43.52	-21.42	0-360	102	V
6	433.9	35.65	Pk	20.8	-29	0	27.45	46.02	-18.57	0-360	102	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

Qp - Quasi-Peak detector

10. 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

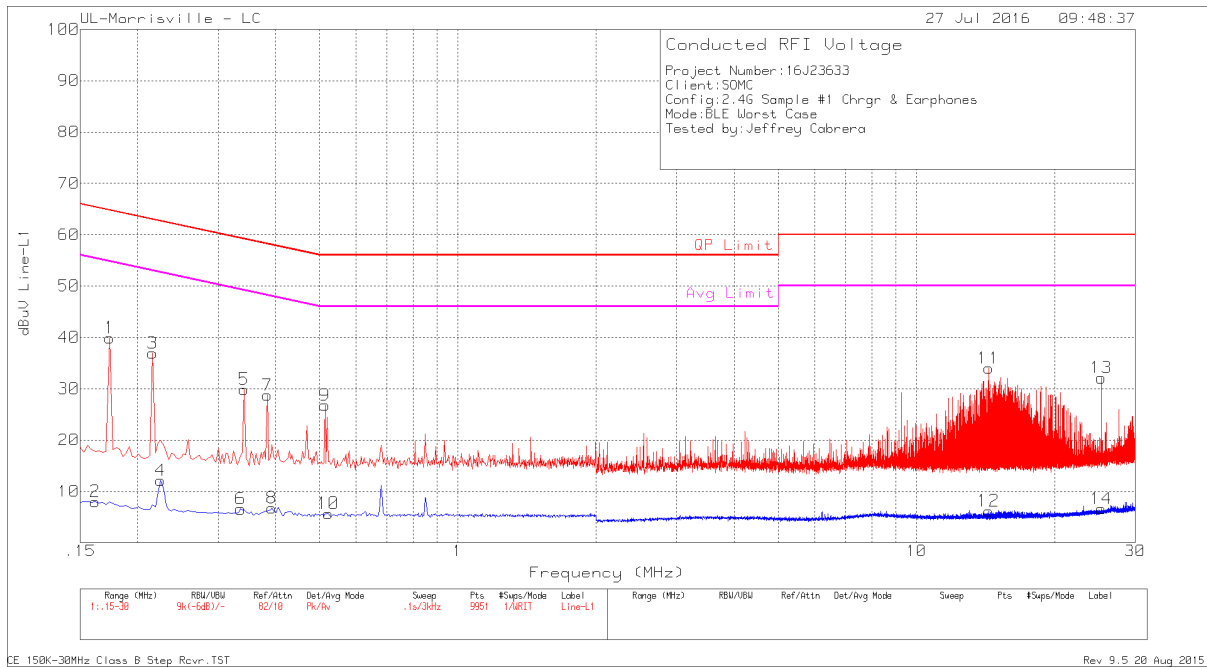
* Decreases with the logarithm of the frequency.

TEST PROCEDURE

ANSI C63.10

RESULTS

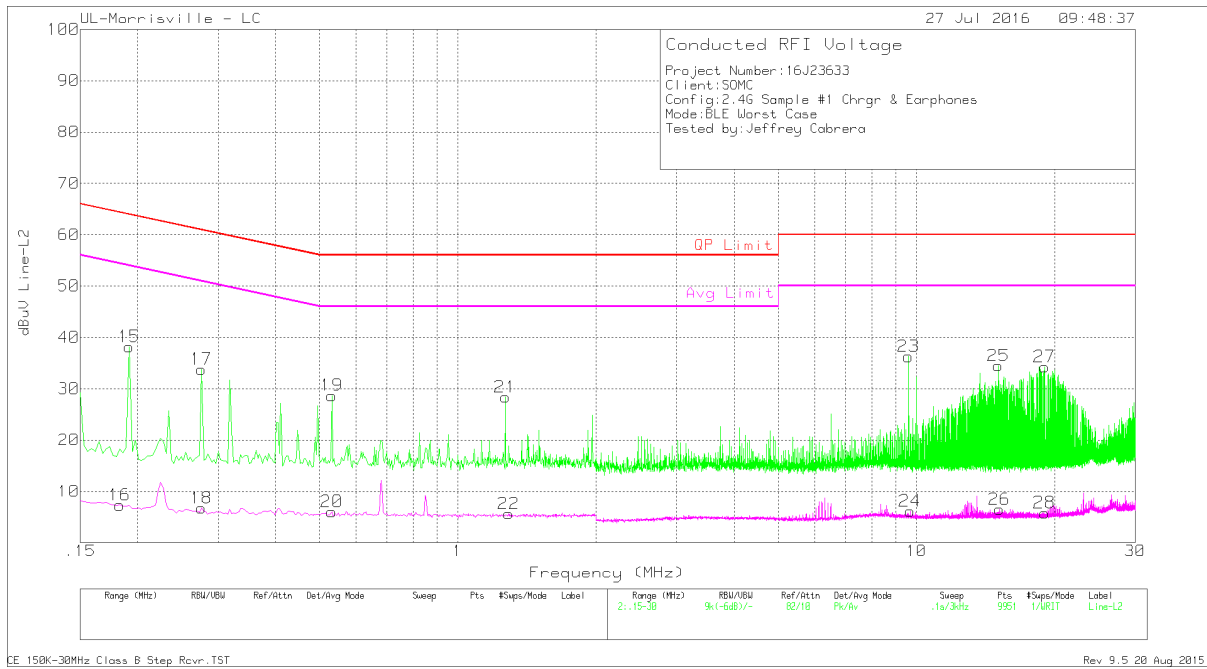
LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF [dB]	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit	Margin (dB)	Avg Limit	Margin (dB)
1	.174	29.69	Pk	.2	10	39.89	64.77	-24.88	-	-
2	.162	-2.19	Av	.2	10	8.01	-	-	55.36	-47.35
3	.216	26.8	Pk	.1	10	36.9	62.97	-26.07	-	-
4	.225	2.01	Av	.1	10	12.11	-	-	52.63	-40.52
5	.342	19.77	Pk	.1	10	29.87	59.15	-29.28	-	-
6	.336	-3.51	Av	.1	10	6.59	-	-	49.3	-42.71
7	.384	18.62	Pk	.1	10	28.72	58.19	-29.47	-	-
8	.393	-3.33	Av	.1	10	6.77	-	-	48	-41.23
9	.513	16.69	Pk	.1	10	26.79	56	-29.21	-	-
10	.522	-4.42	Av	.1	10	5.68	-	-	46	-40.32
11	14.361	23.39	Pk	.2	10.4	33.99	60	-26.01	-	-
12	14.361	-4.42	Av	.2	10.4	6.18	-	-	50	-43.82
13	25.266	21.13	Pk	.3	10.7	32.13	60	-27.87	-	-
14	25.266	-4.39	Av	.3	10.7	6.61	-	-	50	-43.39

Pk - Peak detector
 Av - Average detection

LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF [dB]	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit	Margin (dB)	Avg Limit	Margin (dB)
15	.192	28.07	Pk	.1	10	38.17	63.95	-25.78	-	-
16	.183	-2.88	Av	.2	10	7.32	-	-	54.35	-47.03
17	.276	23.68	Pk	.1	10	33.78	60.94	-27.16	-	-
18	.276	-3.35	Av	.1	10	6.75	-	-	50.94	-44.19
19	.531	18.69	Pk	0	10	28.69	56	-27.31	-	-
20	.531	-3.96	Av	0	10	6.04	-	-	46	-39.96
21	1.269	18.37	Pk	0	10	28.37	56	-27.63	-	-
22	1.29	-4.35	Av	0	10	5.65	-	-	46	-40.35
23	9.609	25.87	Pk	.1	10.3	36.27	60	-23.73	-	-
24	9.684	-4.24	Av	.1	10.3	6.16	-	-	50	-43.84
25	15.093	23.96	Pk	.1	10.4	34.46	60	-25.54	-	-
26	15.177	-4	Av	.1	10.4	6.5	-	-	50	-43.5
27	19.026	23.56	Pk	.2	10.5	34.26	60	-25.74	-	-
28	19.02	-4.88	Av	.2	10.5	5.82	-	-	50	-44.18

Pk - Peak detector
 Av - Average detection