FCC 47 CFR PART 15 SUBPART C

BLUETOOTH LOW ENERGY CERTIFICATION TEST REPORT

FOR

PORTABLE COMPUTING DEVICE

MODEL NUMBER: 1724

FCC ID: C3K1724

REPORT NUMBER: R10880568-E4AV1

ISSUE DATE: : 2015-09-25

Prepared for
MICROSOFT CORPORATION
ONE MICROSOFT WAY
REDMOND, WA 98052, U.S.A.

Prepared by
UL LLC
12 LABORATORY DR.
RESEARCH TRIANGLE PARK, NC 27709 USA
TEL: (919) 549-1400

NVLAP Lab code: 200246-0

Revision History

Ver.	Issue Date	Revisions	Revised By
1	2015-09-25	Initial Issue	Jeff Moser

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: MICROSOFT CORPORATION
ONE MICROSOFT WAY
REDMOND, WA 98052, U.S.A.

EUT DESCRIPTION: PORTABLE COMPUTING DEVICE

MODEL: 1724

SERIAL NUMBER: 012760552253 (RF4)

DATE TESTED: August 03-21, 2015

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:	Reviewed By:	Prepared By:
Francisco de Anda	Jeffrey Moser	Mark Nolting
Project Lead	EMC Program Manager	EMC Engineer
UL Verification Services Inc.	UL – Consumer Technology Division	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 and 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 Dr., Morrisville, NC 27560.

12 Laboratory Dr., RTP, NC 27709
☐ Chamber A
☐ Chamber C

2800 Suite B Perimeter Park Dr., Morrisville, NC 27560
☒ Chamber NORTH
☐ 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:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Total RF power, conducted	±0.45 dB
RF power density, conducted	±1.5 dB
Spurious emissions, conducted	±1.46 dB
Radiated Emissions (30-1000 MHz)	+/- 6.04 dB (3m)
Radiated Emissions (1-6 GHz)	+/- 5.96 dB
Radiated Emissions (6-18 GHz)	+/- 6.10 dB
Radiated Emissions (18-26 GHz)	+/- 6.81 dB
Temperature	±0.07°C
Humidity	±2.26% RH
DC and low frequency voltages	±1.27%

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a handheld computing device with 802.11 2x2, a/b/g/n/ac WLAN, Bluetooth, Bluetooth LE. This report covers the Bluetooth LE. All other technologies are covered by separate reports.

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	3.47	2.22

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an integrated antenna, with a maximum gain of 1.7 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Mte OS 1.416.0.

The test utility software used during testing was WiFi tool v2.7.4.

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 and an additional one employing its kickstand, it was determined that the Y orientation was the worst-case orientation; therefore, all final radiated testing was performed with the EUT in the Y orientation.

Data rate investigated was:

BLE: 1 Mbps.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	E545	MP-06P9HP	DoC
Laptop AC/DC adapter	Lenovo	42T4430	11S42T4430Z1ZGWE25Y1ET	DoC
Ethernet to USB Adapter	Linksys	USB300M	C8D719E76E21	N/A
EUT AC/DC adapter	Microsoft	1625	0D130C07VLN51	DoC
Ear buds	-	Generic	-	N/A

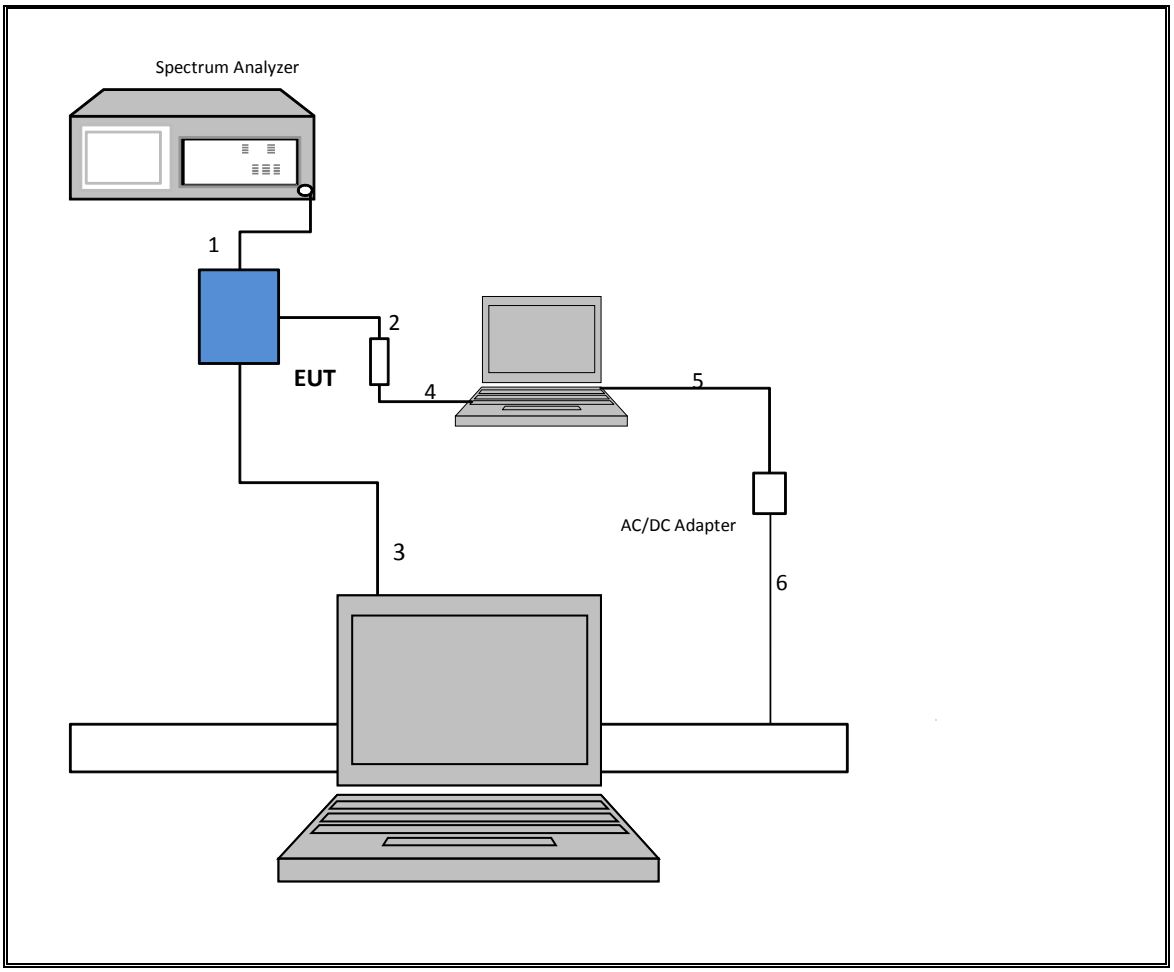
I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Antenna	1	SMA	Un-Shielded	0.3	To spectrum Analyzer
2	USB	1	USB	Shielded	0.2	To EUT
3	DC	1	DC	Un-shielded	1.8	N/A
4	Ether cable	1	RJ45- USB	Un-shielded	1	To laptop
5	DC	1	DC	Un-shielded	0.8	N/A
6	AC	1	2-Prong	Un-shielded	1.5	N/A
7	AC	1	2-Prong	Un-Shielded	0.5	N/A
8	Audio	1	3.5mm stereo	Un-Shielded	1.1	N/A

TEST SETUP- CONDUCTED PORT

The EUT was tested connected to a host Laptop via RJ45/USB cable and spectrum analyzer to antenna port. Test software exercised the EUT.

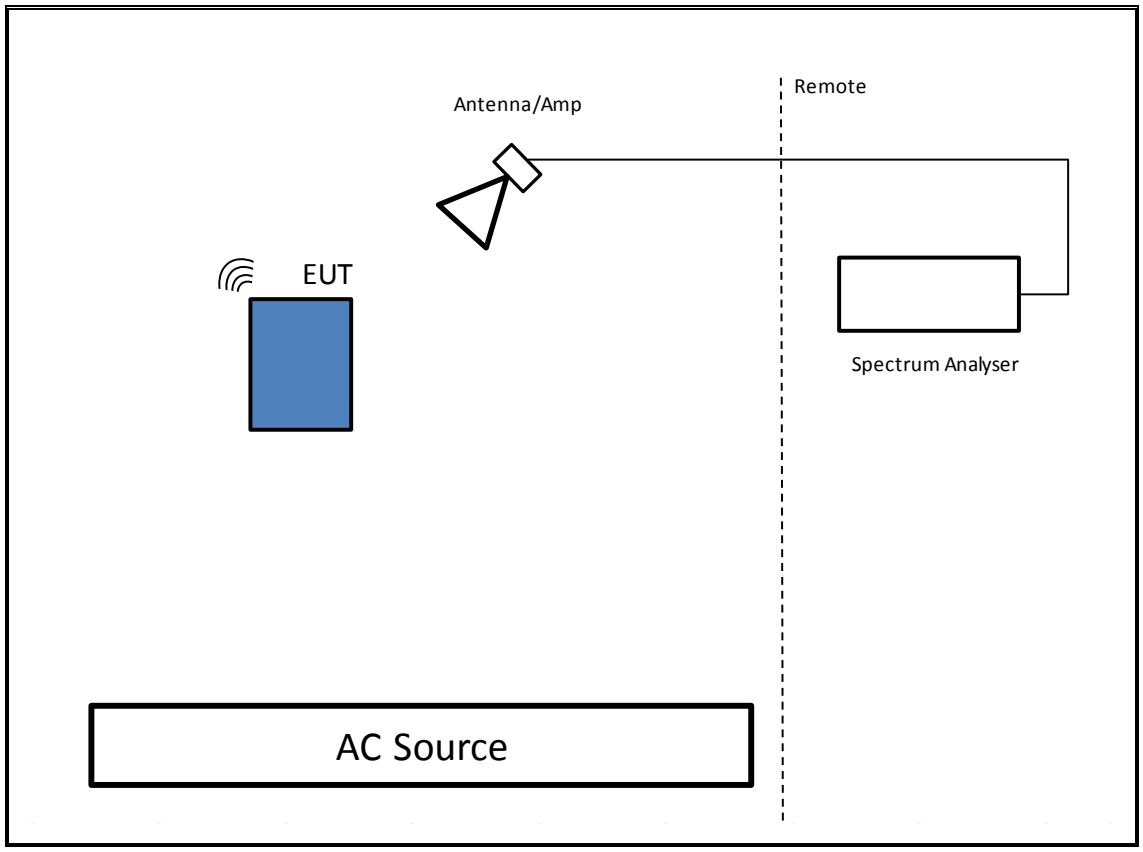
SETUP DIAGRAM



TEST SETUP- RADIATED-ABOVE 1 GHZ

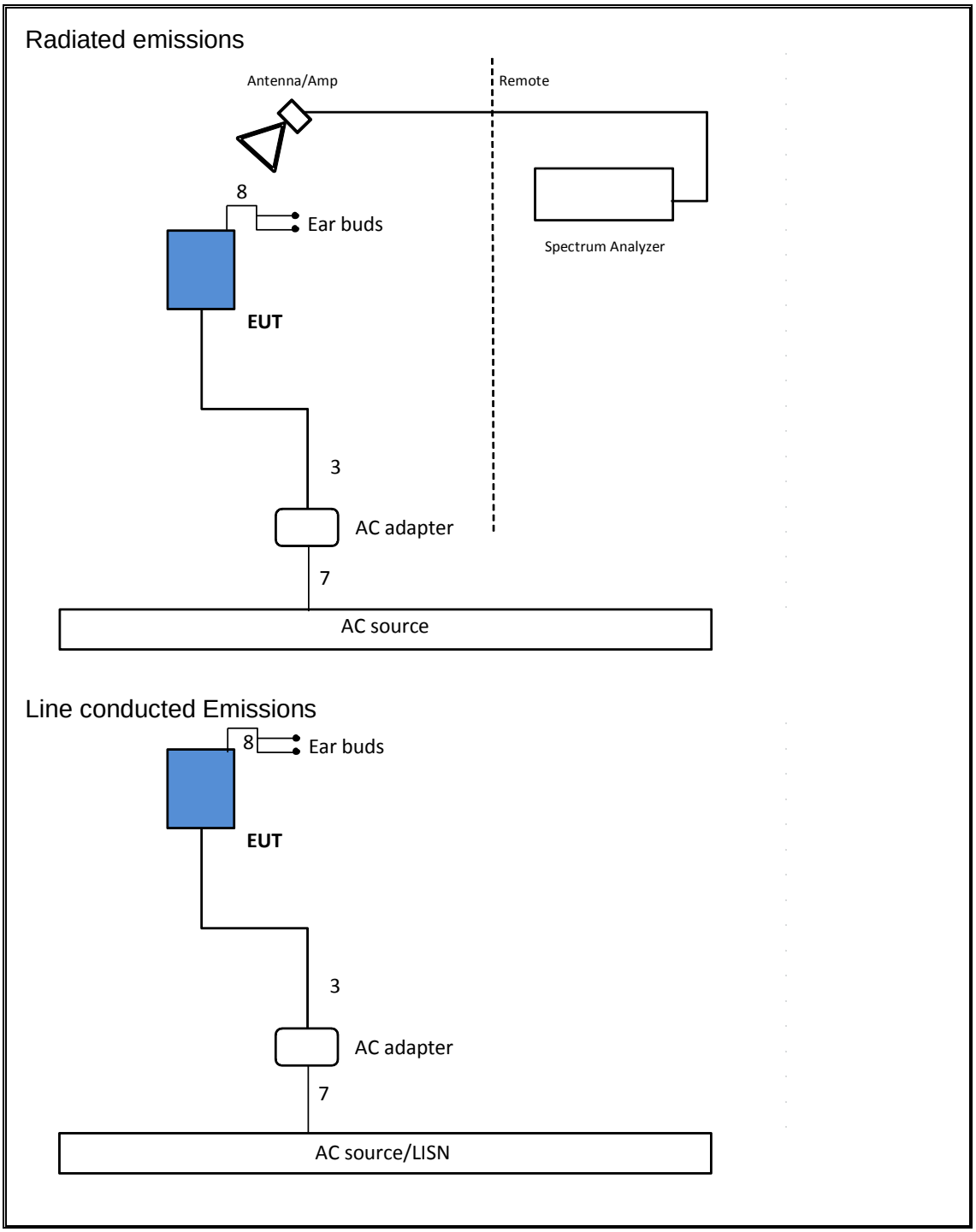
The EUT was tested battery powered. Test software exercised the EUT.

SETUP DIAGRAM



TEST SETUP - BELOW 1GHZ & AC LINE CONDUCTED TESTS

SETUP DIAGRAM



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Radiated Disturbance Emissions Test Equipment (Morrisville - North Chamber)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
AT0073	Hybrid Broadband Antenna, 30-1000MHz	Sunol Sciences Corp.	JB3	2015-06-10	2016-06-30
AT0072	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2015-02-17	2016-02-29
SAC_N_Hybrid (30-1000MHz)	Gain-Loss string for Hybrid antenna	Various	Various	2015-06-25	2016-06-30
SAC_N_Horn (1-18GHz)	Gain-Loss string for Horn antenna	Various	Various	2015-06-25	2016-06-30
AT0053	Horn Antenna, 18-26.5GHz	ARA	SWH-28 (S/N 1004)	2015-07-28	2016-07-31
	Amplifier (S/Ns 859993, 860112, 859864)	Miteq	JSD42-1800400-30-5A		
	Cable (S/N 204158-001)	Micro-coax	UFA147A-0-1181-200200		
SA0026	Spectrum Analyzer	Agilent	N9030A	2015-03-27	2016-03-31
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
43733	Temp/Humid/Pressure Meter	Cole Parmer	99760-00	2014-03-24	2016-03-24

Antenna-port Test Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Common Equipment				
T189	Spectrum Analyzer	Agilent Technologies	E4440A	2015-05-13	2016-05-31
PWM002	RF Power Meter	Keysight Technologies	N1911A	2015-06-08	2017-06-08
PWS004	Power Sensor, 50MHz to 6 GHz	Keysight Technologies	E9323A	2015-06-05	2016-06-05
43733	Temp/Humid/Pressure Meter	Cole Parmer	99760-00	2014-03-24	2016-03-24

Line Conducted Test Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
SA0021	EMI Test Receiver 9kHz-3.6GHz	Rohde & Schwarz	ESR3	2015-07-08	2016-07-31
ATA508	Transient Limiter, 0.009 to 100 MHz	Electro-Metrics	EM 7600	2015-08-03	2016-08-31
ATA509	Coaxial cable, 20 ft., BNC -male to BNC-male	UL	RG-223	2015-08-03	2016-08-31
HI0069	Temp/Humid/Pressure Meter	Cole-Parmer	99760-00	2015-07-01	2016-07-31
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
LISN002	LISN, 50-ohm/50-uH, 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50-25-2-01-550V	2014-09-04	2015-09-30

7. MEASUREMENT METHODS

6 dB BW: KDB 558074 D01 v03r03, Section 8.1.

Output Power: KDB 558074 D01 v03r03, Section 9.1.2.

Power Spectral Density: KDB 558074 D01 v03r03, Section 10.2.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v03r03, Section 11.0.

Out-of-band emissions in restricted bands: KDB 558074 D01 v03r03, Section 12.0.

Band-edge: KDB 558074 D01 v03r03, Section 13.3.2.

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME, DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

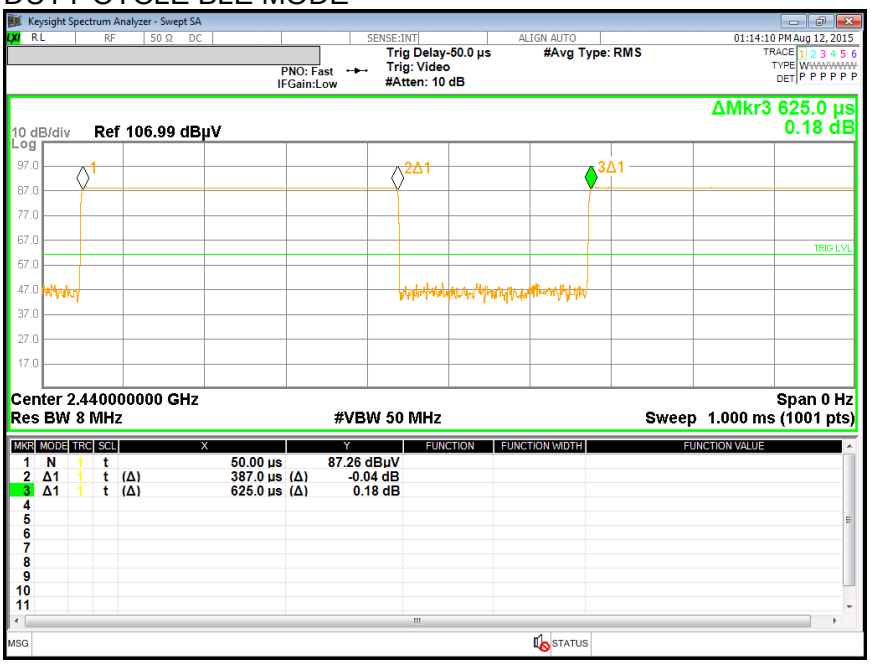
KDB 558074 Zero-Span Spectrum Analyzer Method.

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	0.387	0.625	0.619	61.89%	2.08	2.584

DUTY CYCLE PLOTS

DUTY CYCLE BLE MODE



8.2. 6 dB BANDWIDTH

LIMITS

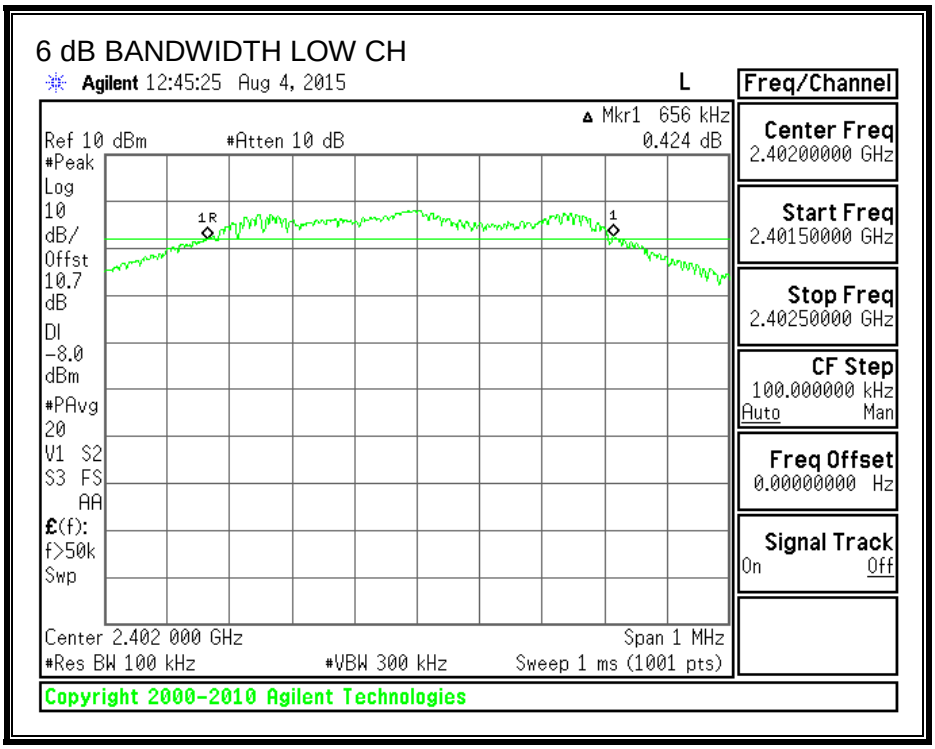
FCC §15.247 (a) (2)

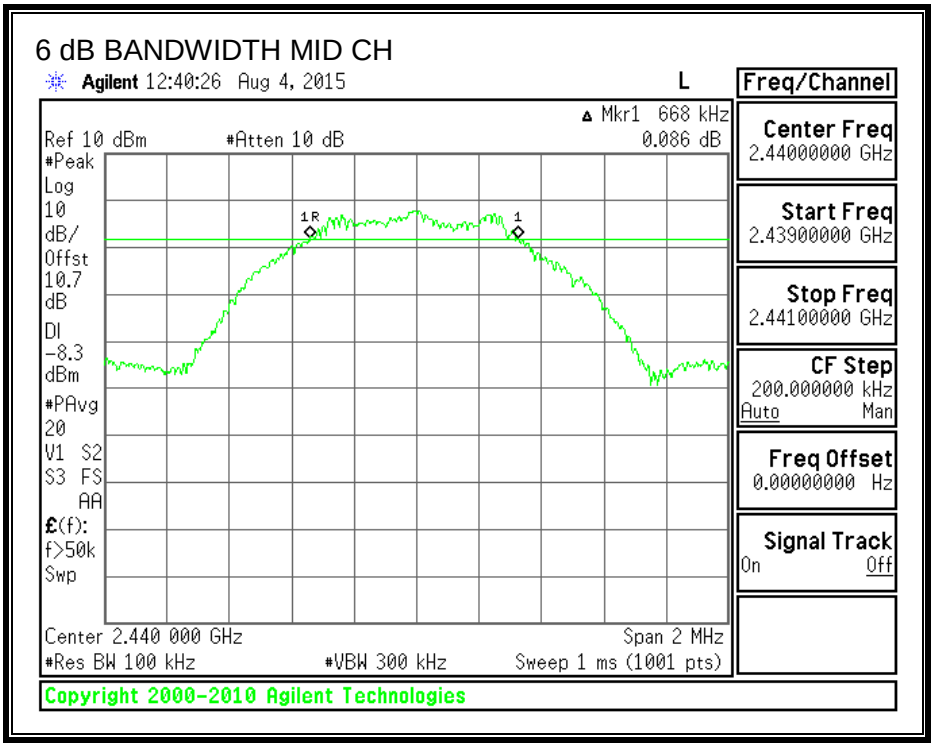
The minimum 6 dB bandwidth shall be at least 500 kHz.

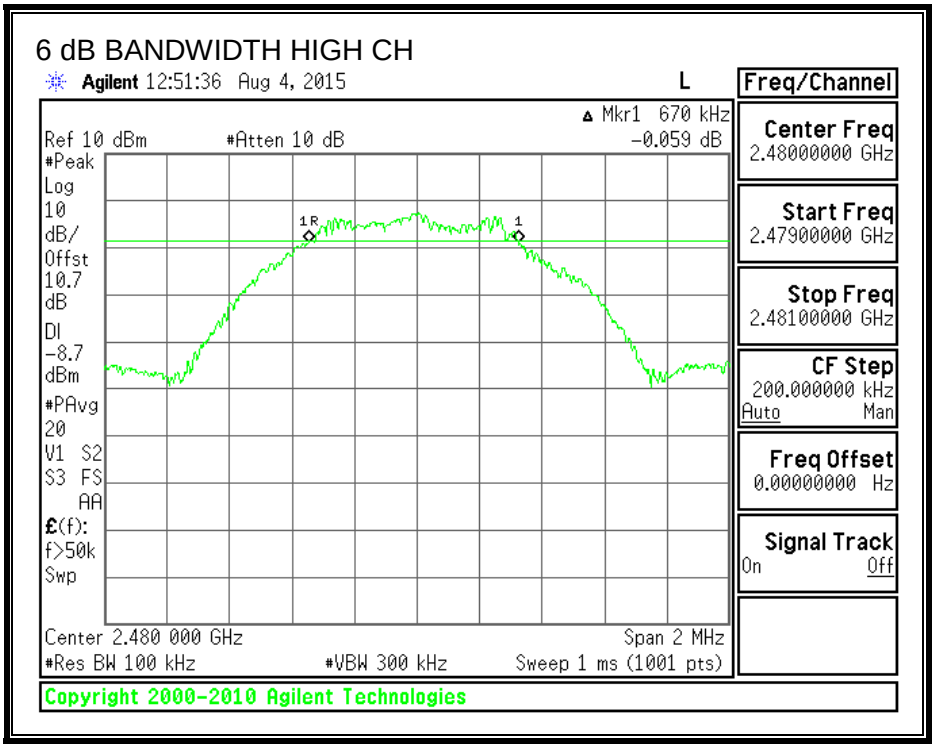
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6560	0.5
Middle	2440	0.6680	0.5
High	2480	0.6700	0.5

6 dB BANDWIDTH







8.3. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

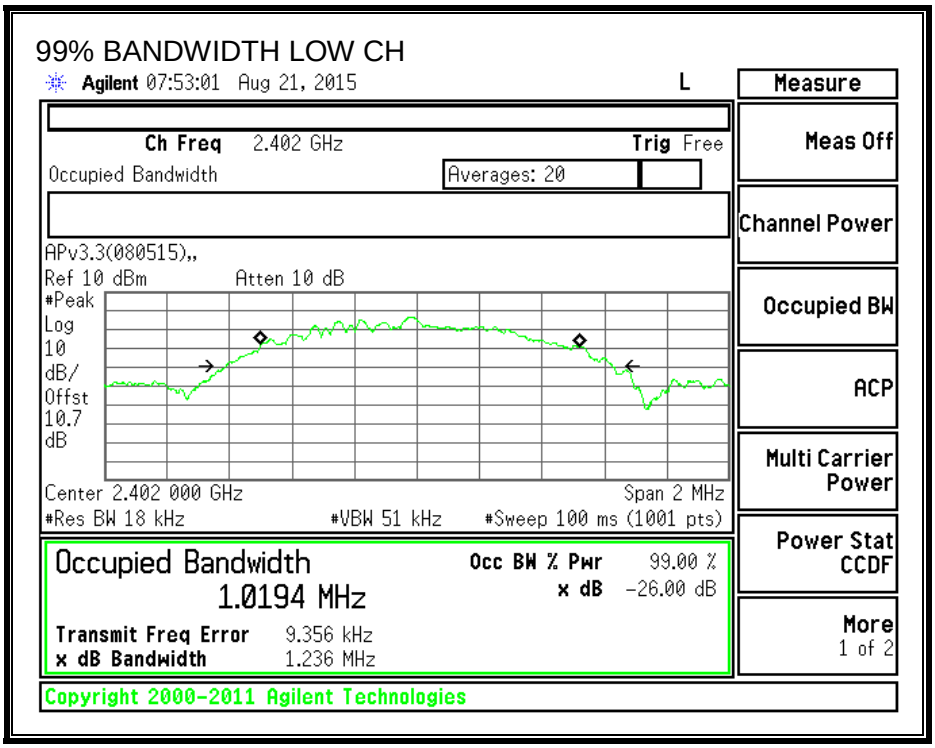
TEST PROCEDURE

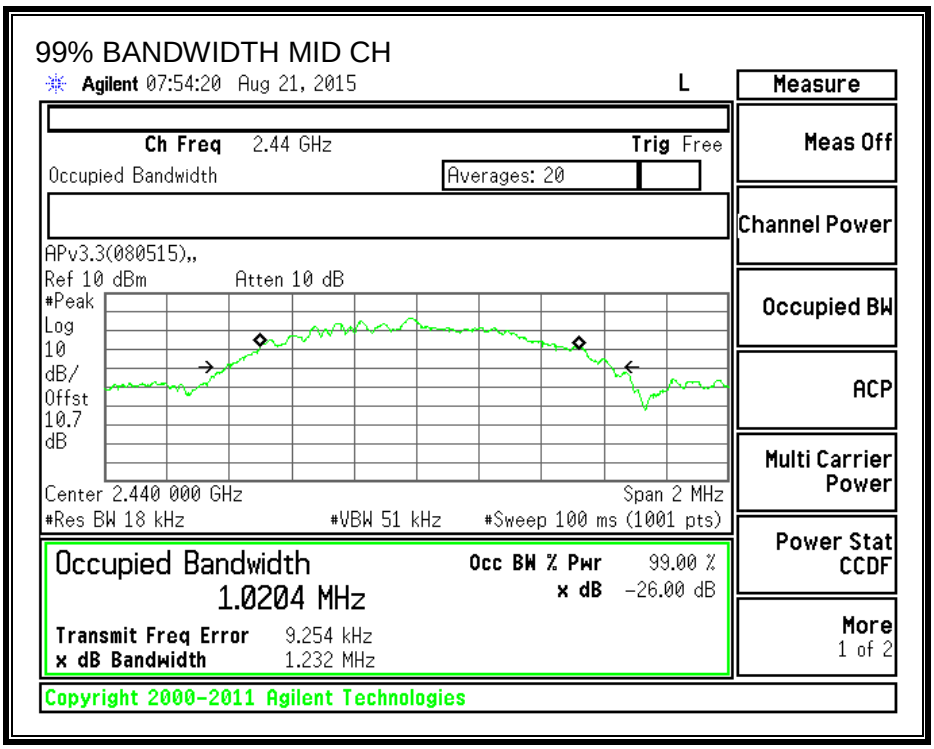
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 5% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

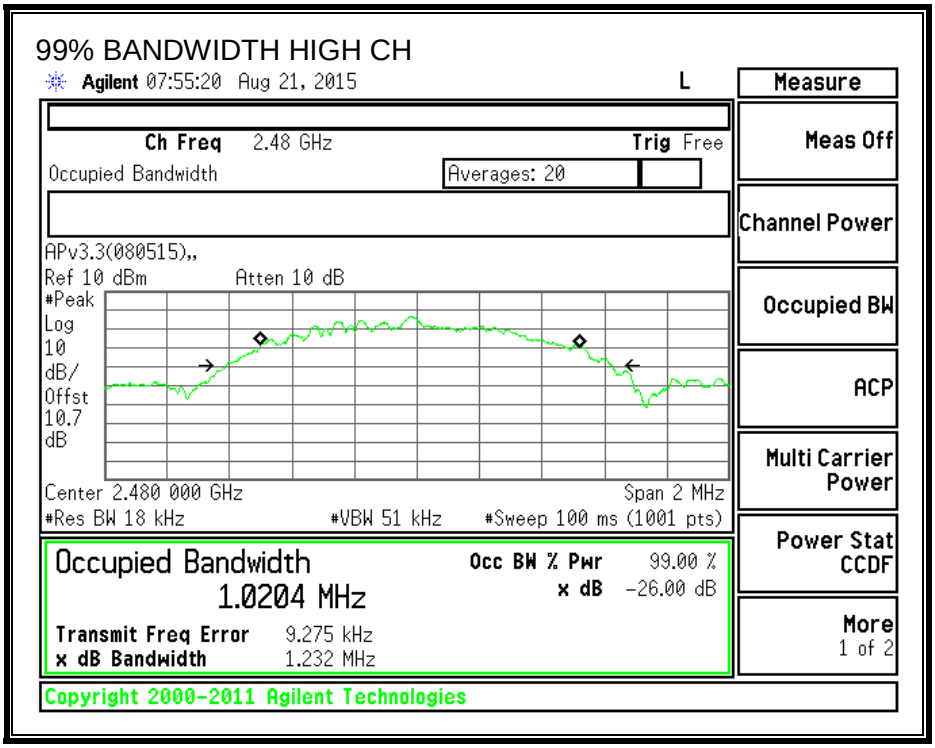
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0194
Middle	2440	1.0204
High	2480	1.0204

99% BANDWIDTH







8.4. 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.

RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	3.470	30	-26.530
Middle	2440	3.300	30	-26.700
High	2480	3.080	30	-26.920

8.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

RESULTS

The cable assembly insertion loss of 10.7 dB (including 10 dB pad and 0.7 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	2.93
Middle	2440	2.84
High	2480	2.61

8.6. POWER SPECTRAL DENSITY

LIMITS

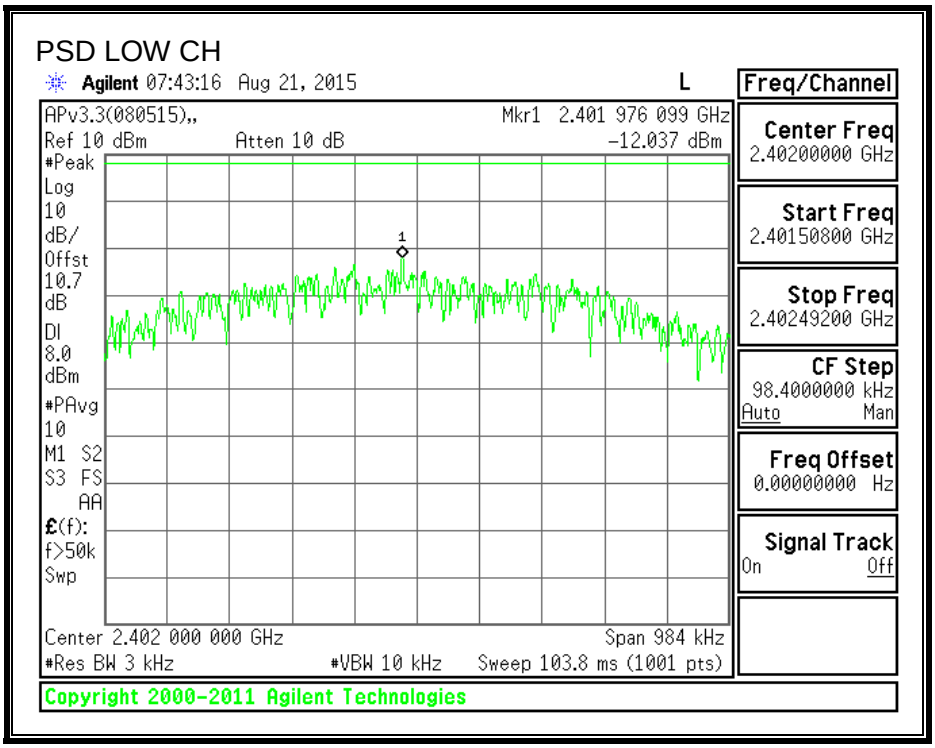
FCC §15.247 (e)

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.

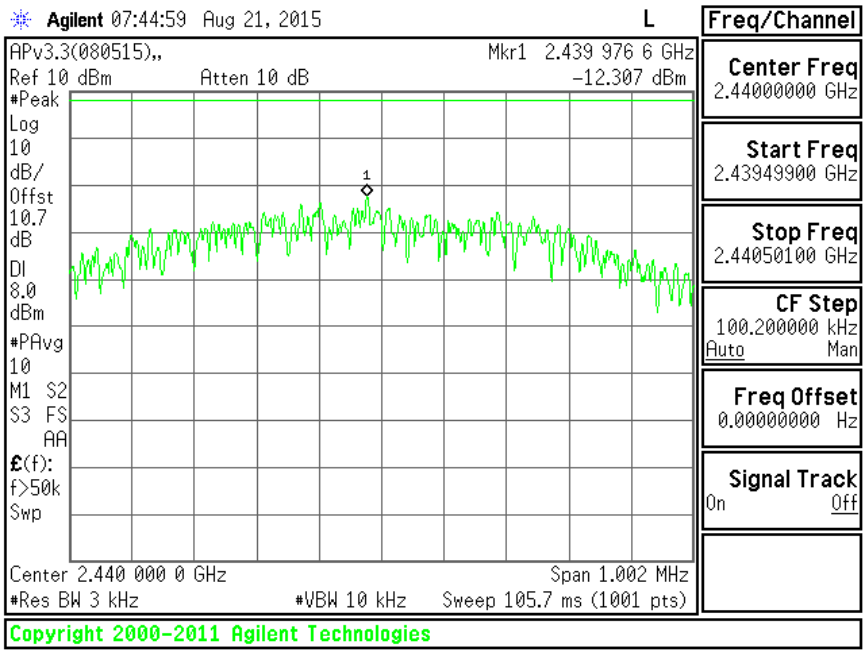
RESULTS

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-12.04	8	-20.04
Middle	2440	-12.31	8	-20.31
High	2480	-12.41	8	-20.41

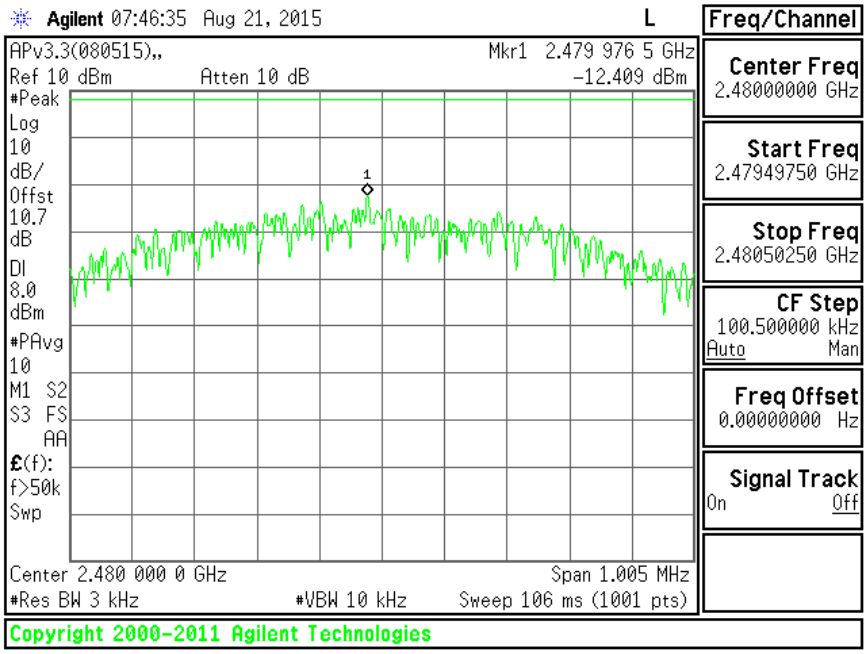
POWER SPECTRAL DENSITY



PSD MID CH



PSD HIGH CH



8.7. CONDUCTED SPURIOUS EMISSIONS

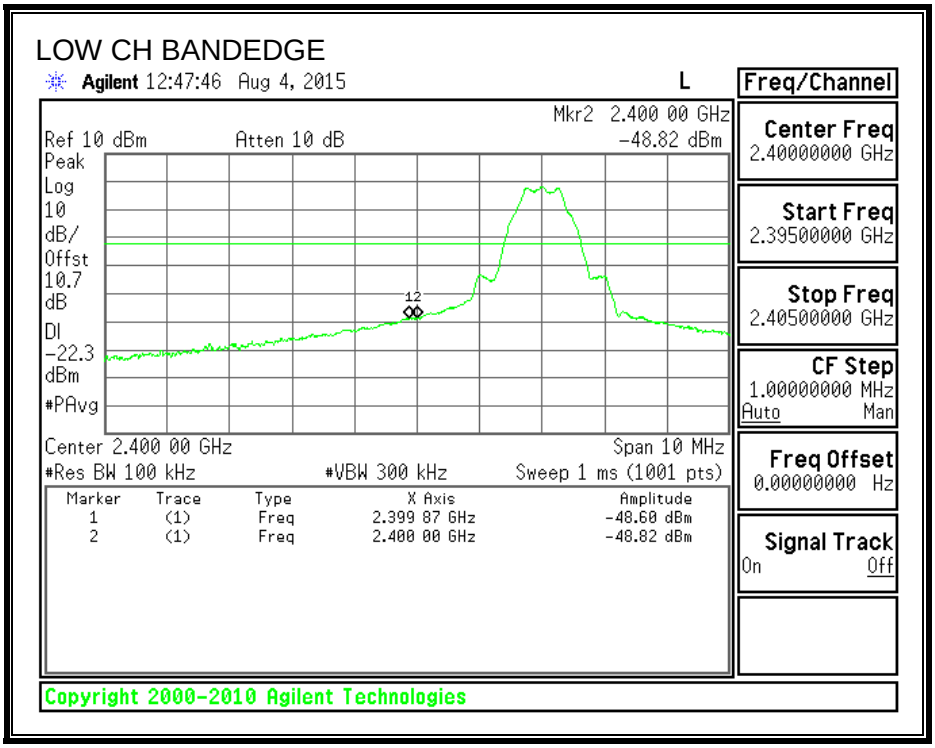
LIMITS

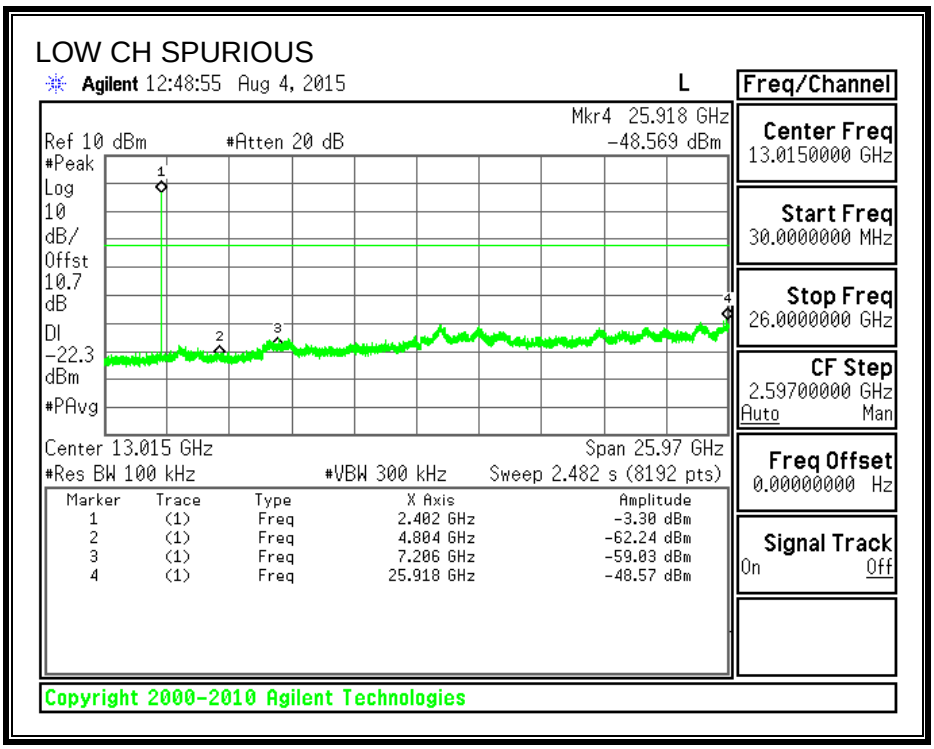
FCC §15.247 (d)

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

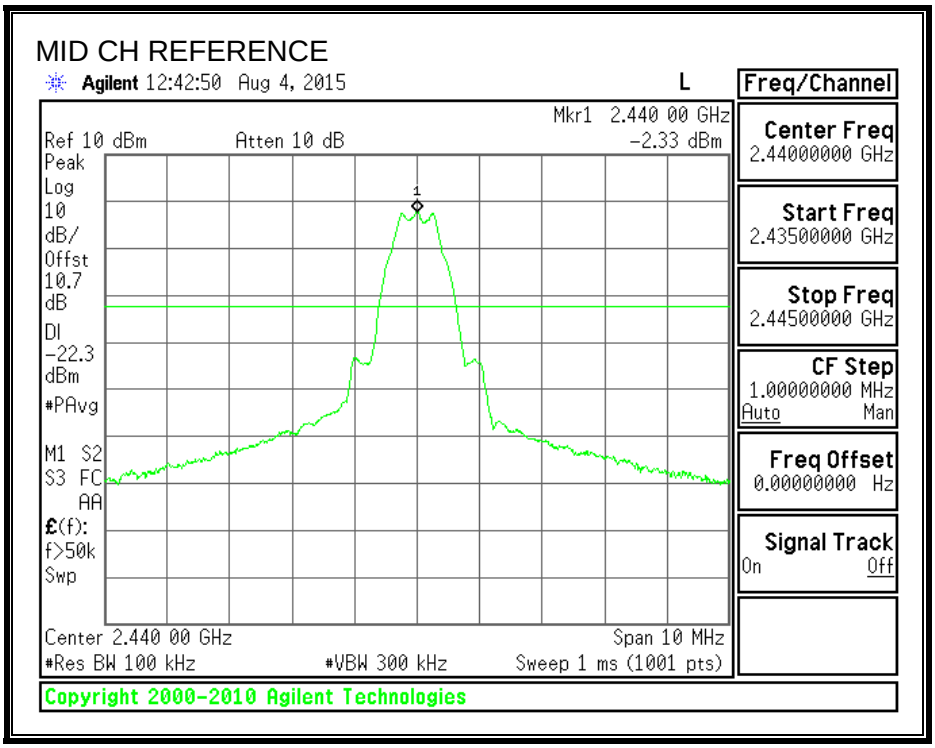
RESULTS

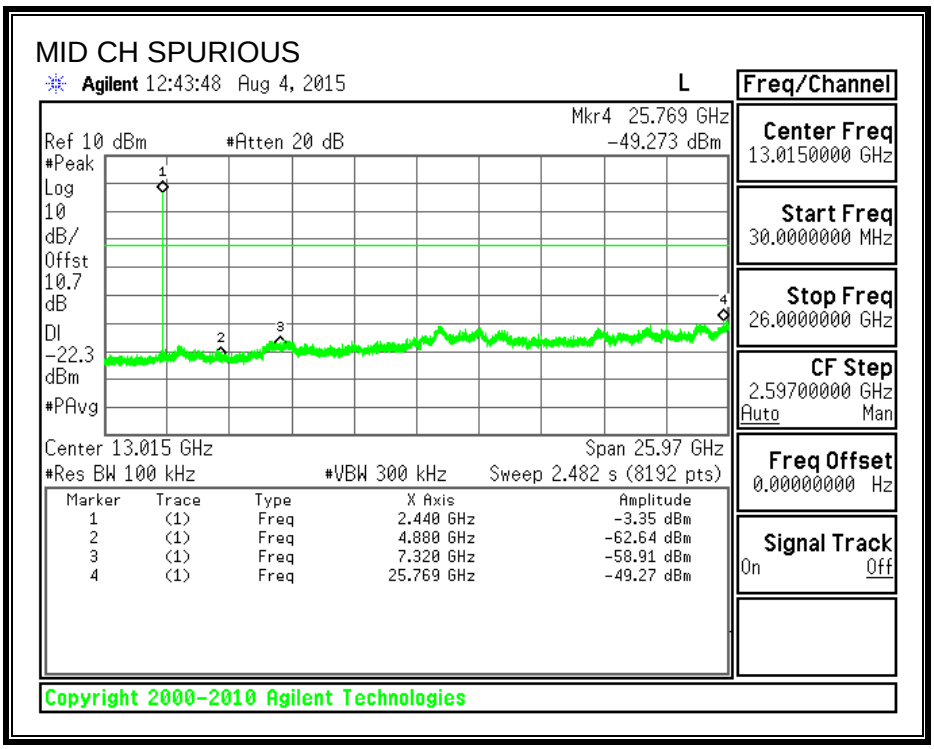
SPURIOUS EMISSIONS, LOW CHANNEL



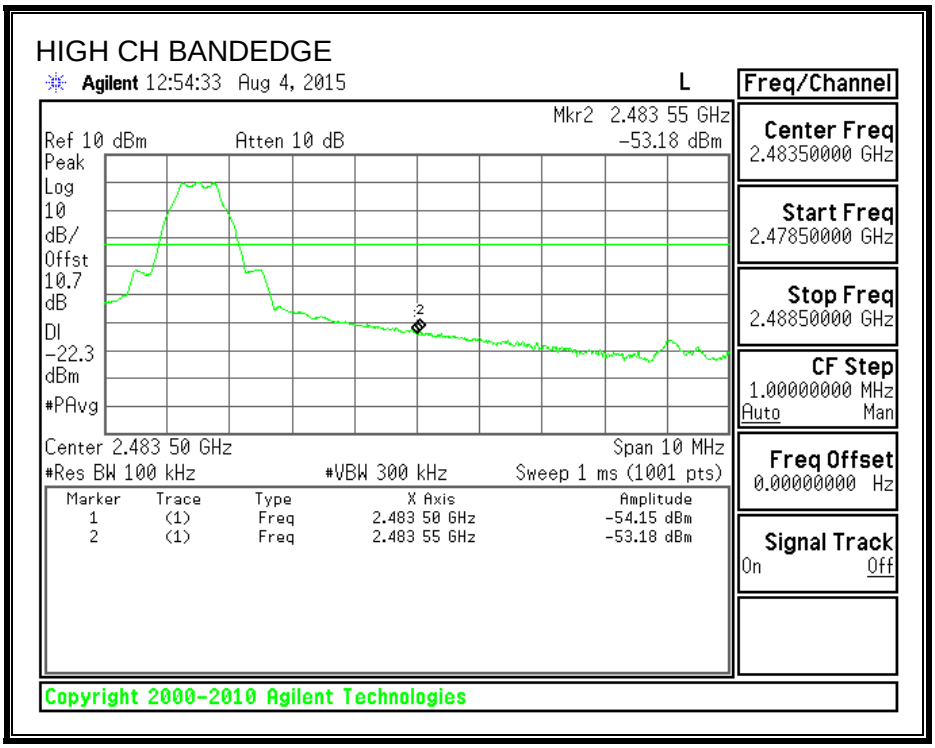


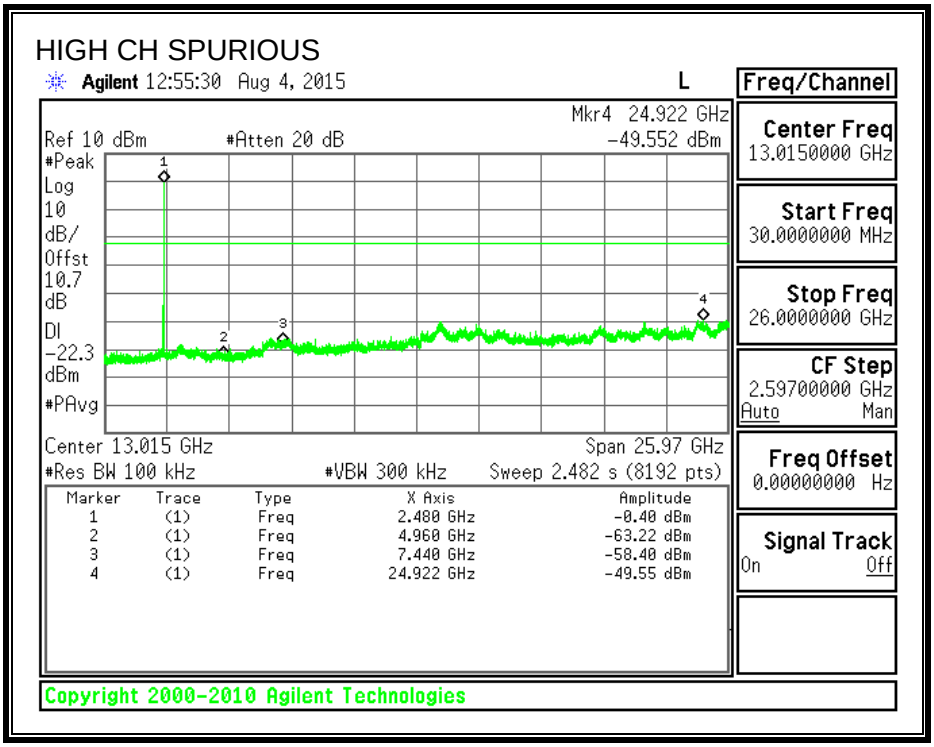
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





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
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. 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 1 MHz for peak measurements and as applicable for average measurements.

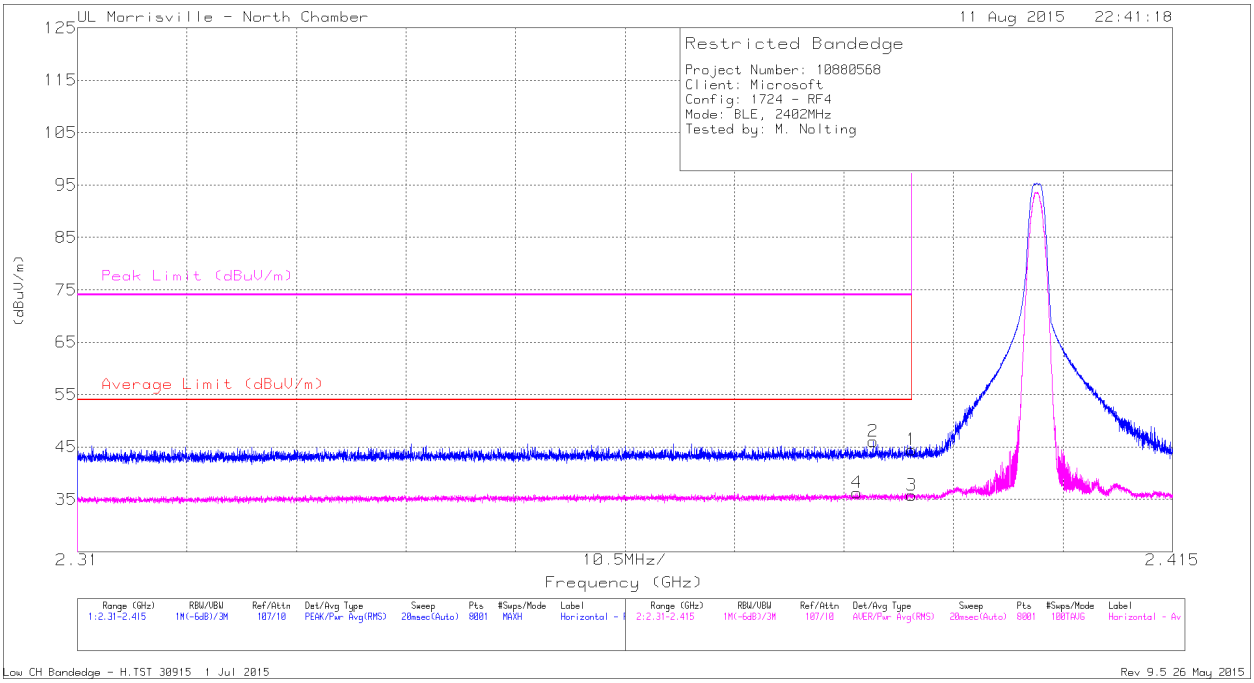
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

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. TRANSMITTER ABOVE 1 GHz

RESTRICTED BANDEDGE (LOW CHANNEL)

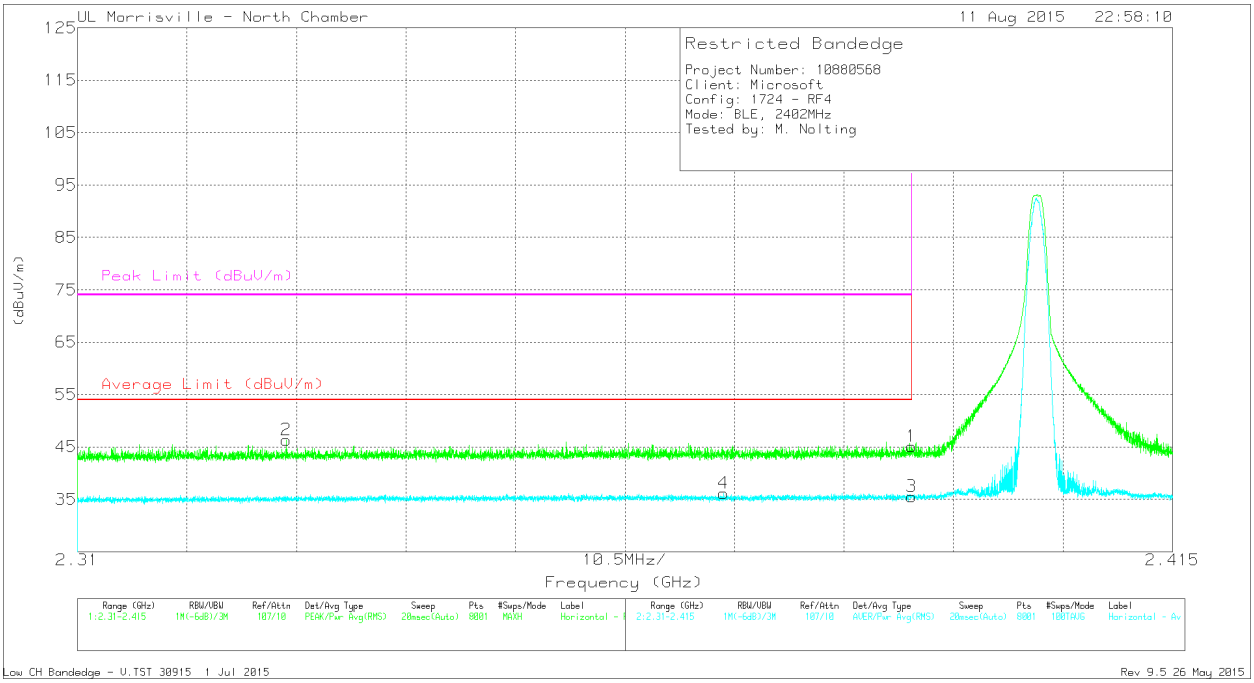
HORIZONTAL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (dB/m)	Amp/Cbl/ Fltr/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
4	* 2.385	25.82	RMS	31.9	-23.5	2.08	36.3	54	-17.7	-	-	20	118	H
2	* 2.386	37.68	Pk	31.9	-23.5	0	46.08	-	-	74	-27.92	20	118	H
1	* 2.39	36.17	Pk	31.9	-23.6	0	44.47	-	-	74	-29.53	20	118	H
3	* 2.39	25.4	RMS	31.9	-23.6	2.08	35.78	54	-18.22	-	-	20	118	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
Pk - Peak detector
RMS - RMS detection

VERTICAL

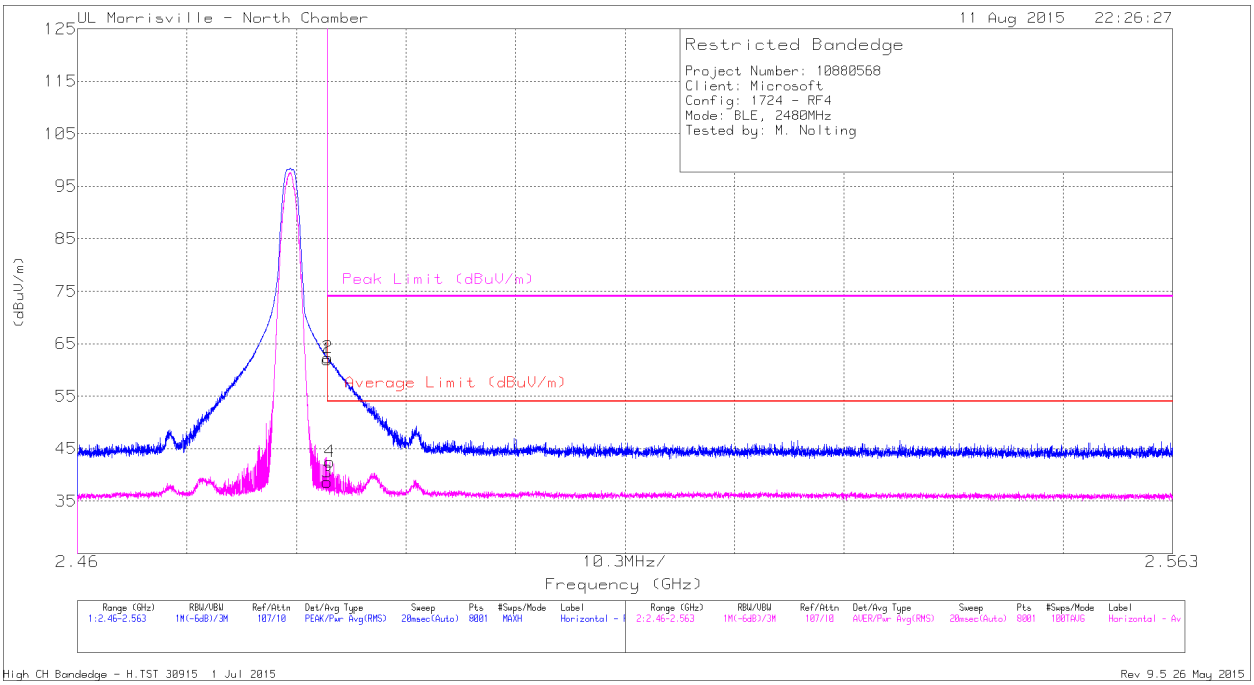


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.33	37.98	Pk	31.8	-23.5	0	46.28	-	-	74	-27.72	65	289	V
4	* 2.372	25.79	RMS	31.8	-23.5	2.08	36.17	54	-17.83	-	-	65	289	V
1	* 2.39	36.78	Pk	31.9	-23.6	0	45.08	-	-	74	-28.92	65	289	V
3	* 2.39	25.17	RMS	31.9	-23.6	2.08	35.55	54	-18.45	-	-	65	289	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
Pk - Peak detector
RMS - RMS detection

RESTRICTED BANDEDGE (HIGH CHANNEL)

HORIZONTAL



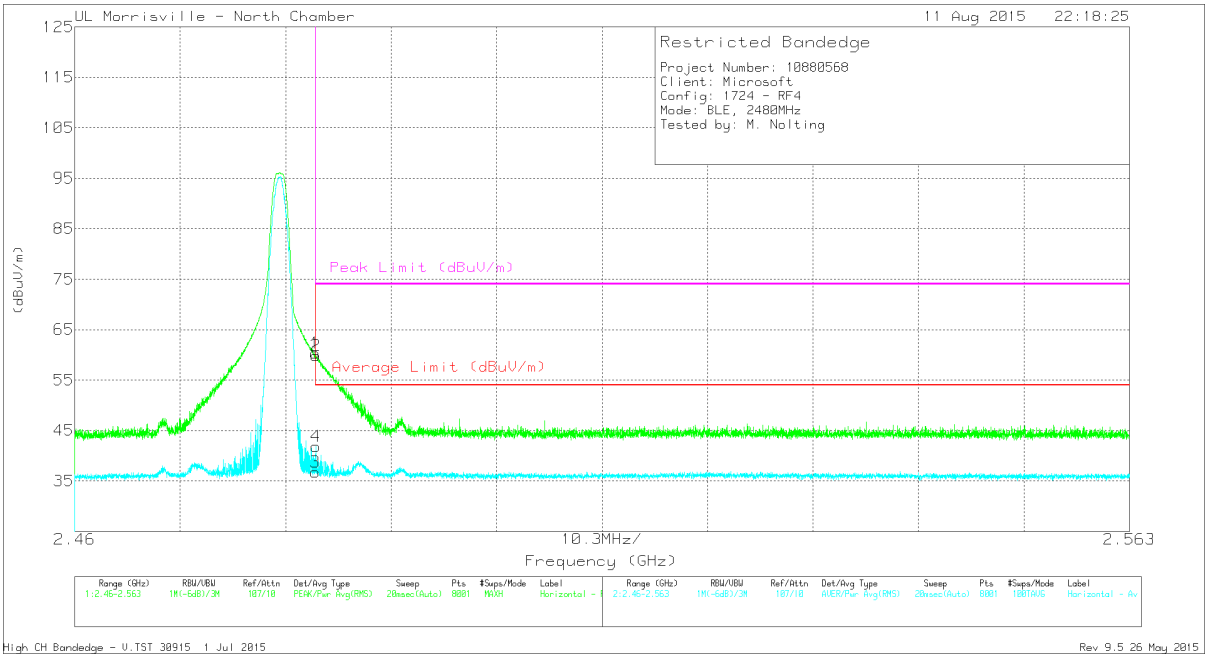
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	53.32	Pk	32.1	-23.4	0	62.02	-	-	74	-11.98	17	115	H
2	* 2.484	53.65	Pk	32.1	-23.4	0	62.35	-	-	74	-11.65	17	115	H
3	* 2.484	27.79	RMS	32.1	-23.4	2.08	38.57	54	-15.43	-	-	17	115	H
4	* 2.484	31.64	RMS	32.1	-23.4	2.08	42.42	54	-11.58	-	-	17	115	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL

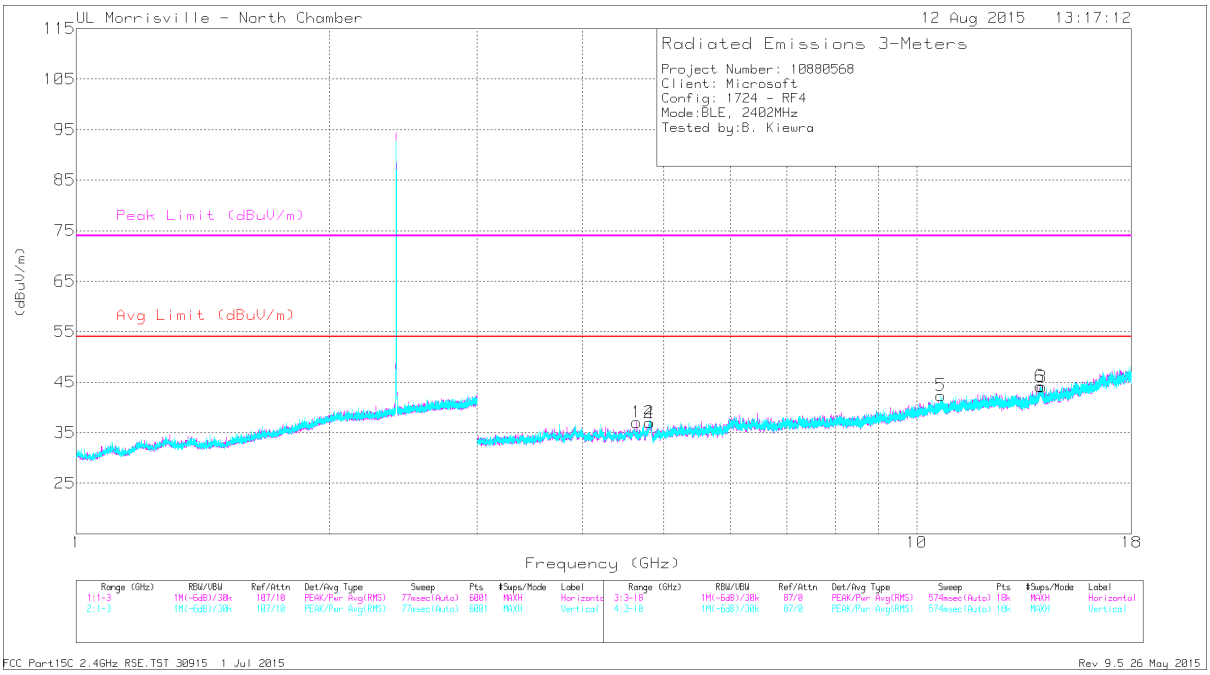


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	51.6	Pk	32.1	-23.4	0	60.3	-	-	74	-13.7	64	243	V
2	* 2.484	51.2	Pk	32.1	-23.4	0	59.9	-	-	74	-14.1	64	243	V
3	* 2.484	25.98	RMS	32.1	-23.4	2.08	36.76	54	-17.24	-	-	64	243	V
4	* 2.484	31.11	RMS	32.1	-23.4	2.08	41.89	54	-12.11	-	-	64	243	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
Pk - Peak detector
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (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
1	* 4.644	42.07	PK2	34	-31.8	0	44.27	-	-	74	-29.73	102	327	H
	* 4.644	29.75	MAv1	34	-31.8	0	31.95	54	-22.05	-	-	102	327	H
2	* 4.807	42.2	PK2	34.1	-30.7	0	45.6	-	-	74	-28.4	174	400	H
	* 4.808	30.03	MAv1	34.1	-30.7	2.08	35.51	54	-18.49	-	-	174	400	H
3	14.085	28.57	Pk	39.3	-23.8	0	44.07	-	-	74	-29.93	0-360	101	H
4	* 4.805	41.28	PK2	34.1	-30.7	0	44.68	-	-	74	-29.32	50	286	V
	* 4.807	29.91	MAv1	34.1	-30.7	2.08	35.39	54	-18.61	-	-	50	286	V
5	* 10.682	34.24	PK2	37.8	-23.3	0	48.74	-	-	74	-25.26	219	141	V
	* 10.68	22.68	MAv1	37.8	-23.3	0	37.18	54	-16.82	-	-	219	141	V
6	14.019	28.41	Pk	39.2	-23.4	0	44.21	-	-	74	-29.79	0-360	101	V

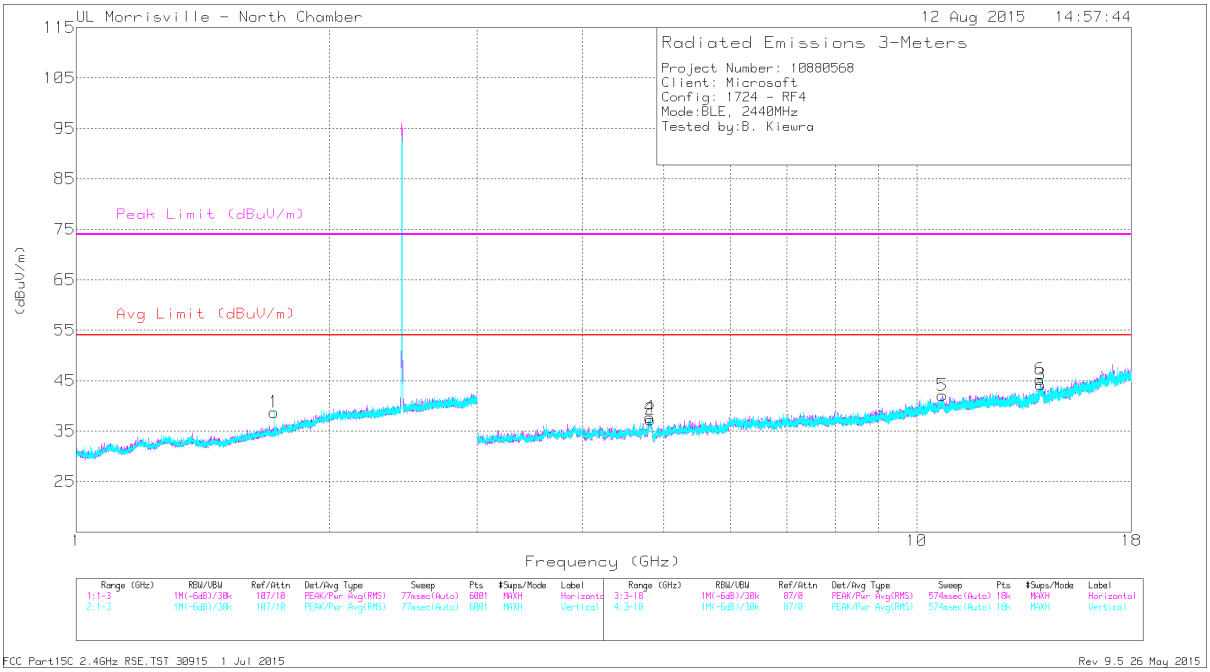
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

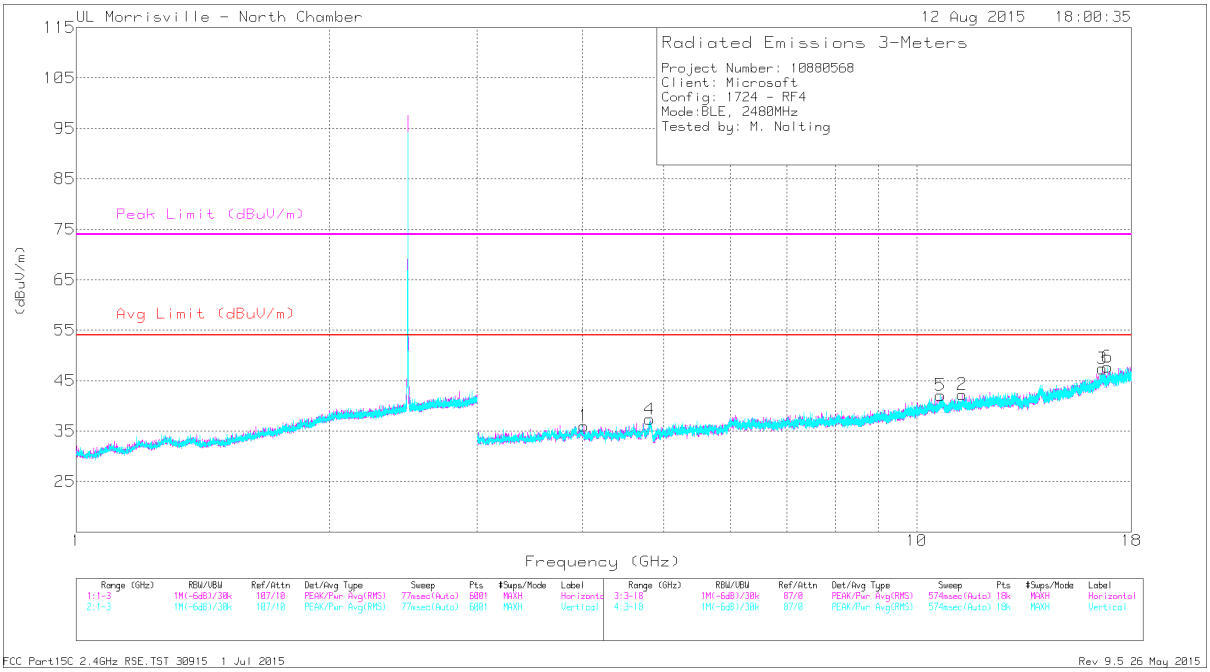
MID CHANNEL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (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	* 4.823	41.44	PK2	34.1	-30.8	0	44.74	-	-	74	-29.26	69	175	H
	* 4.825	29.7	MAv1	34.1	-30.8	0	33	54	-21	-	-	69	175	H
3	14.048	28.57	Pk	39.2	-23.5	0	44.27	-	-	74	-29.73	0-360	199	H
4	* 4.815	42.13	PK2	34.1	-30.8	0	45.43	-	-	74	-28.57	313	264	V
	* 4.816	29.74	MAv1	34.1	-30.8	0	33.04	54	-20.96	-	-	313	264	V
5	* 10.727	34.9	PK2	37.8	-23.5	0	49.2	-	-	74	-24.8	9	116	V
	* 10.724	22.91	MAv1	37.8	-23.5	0	37.21	54	-16.79	-	-	9	116	V
1	1.719	33.16	Pk	29.3	-23.7	0	38.76	-	-	74	-35.24	0-360	102	V
6	14.023	29.55	Pk	39.2	-23.5	0	45.25	-	-	74	-28.75	0-360	102	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
Pk - Peak detector
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (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
1	* 4.011	41.15	PK2	33.8	-31.5	0	43.45	-	-	74	-30.55	156	350	H
	* 4.016	29.1	MAv1	33.8	-31.6	0	31.3	54	-22.7	-	-	156	350	H
2	* 11.32	34.83	PK2	38.2	-23.2	0	49.83	-	-	74	-24.17	287	213	H
	* 11.332	22.52	MAv1	38.2	-23	0	37.72	54	-16.28	-	-	287	213	H
4	* 4.815	41.71	PK2	34.1	-30.8	0	45.01	-	-	74	-28.99	106	121	V
	* 4.817	29.78	MAv1	34.1	-30.8	0	33.08	54	-20.92	-	-	106	121	V
5	* 10.675	34.73	PK2	37.8	-23.3	0	49.23	-	-	74	-24.77	313	241	V
	* 10.661	22.93	MAv1	37.8	-23.4	0	37.33	54	-16.67	-	-	313	241	V
3	16.626	26.6	Pk	42.1	-21.3	0	47.4	-	-	74	-26.6	0-360	101	H
6	16.869	28.12	Pk	42.3	-22.7	0	47.72	-	-	74	-26.28	0-360	101	V

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

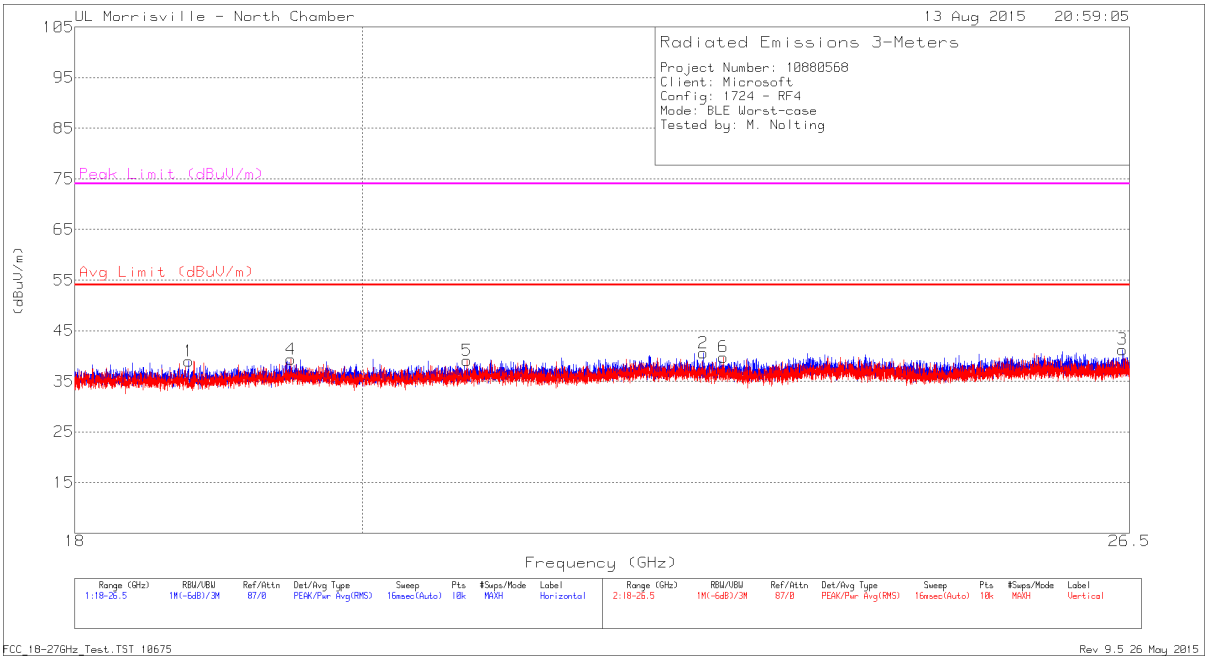
Pk - Peak detector

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

9.3. WORST-CASE ABOVE 18Hz

SPURIOUS EMISSIONS 18 TO 26GHz (WORST-CASE CONFIGURATION)

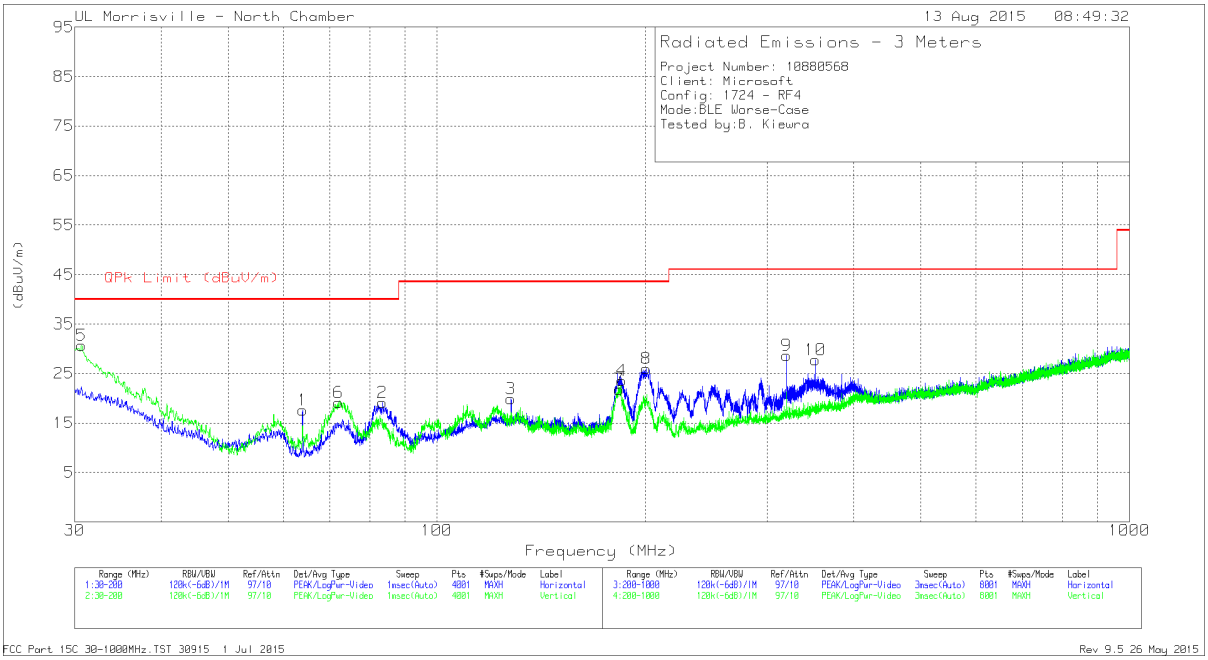


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF & G/L (dB/m)	Dist Cor (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)
1	* 18.767	42.31	Pk	6.2	-9.5	39.01	54	-14.99	74	-34.99	0-360
2	* 22.667	38.97	Pk	11.1	-9.5	40.57	54	-13.43	74	-33.43	0-360
4	* 19.487	40.81	Pk	8	-9.5	39.31	54	-14.69	74	-34.69	0-360
5	* 20.784	38.9	Pk	9.7	-9.5	39.1	54	-14.9	74	-34.9	0-360
6	* 22.834	38.29	Pk	11	-9.5	39.79	54	-14.21	74	-34.21	0-360
3	26.435	39.98	Pk	10.8	-9.5	41.28	-	-	74	-32.72	0-360

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

9.4. WORST-CASE BELOW 1 GHz

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



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF JB3 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	64	37.16	Pk	11.7	-31.2	17.66	40	-22.34	0-360	299	H
2	83.4225	38.98	Pk	11.2	-31.1	19.08	40	-20.92	0-360	299	H
3	* 128.005	32.62	Pk	17.9	-30.6	19.92	43.52	-23.6	0-360	199	H
4	184.7425	38.43	Pk	15.3	-30.2	23.53	43.52	-19.99	0-360	100	H
8	200.6	39.47	Pk	16.6	-30.1	25.97	43.52	-17.55	0-360	102	H
9	320	39.99	Pk	18	-29.4	28.59	46.02	-17.43	0-360	102	H
10	352	38.56	Pk	18.5	-29.3	27.76	46.02	-18.26	0-360	102	H
5	30.68	37.5	Pk	24.8	-31.6	30.7	40	-9.3	0-360	102	V
6	72.075	38.26	Pk	12	-31.1	19.16	40	-20.84	0-360	102	V
7	183.5738	36.74	Pk	15.3	-30.2	21.84	43.52	-21.68	0-360	102	V

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

Pk - 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

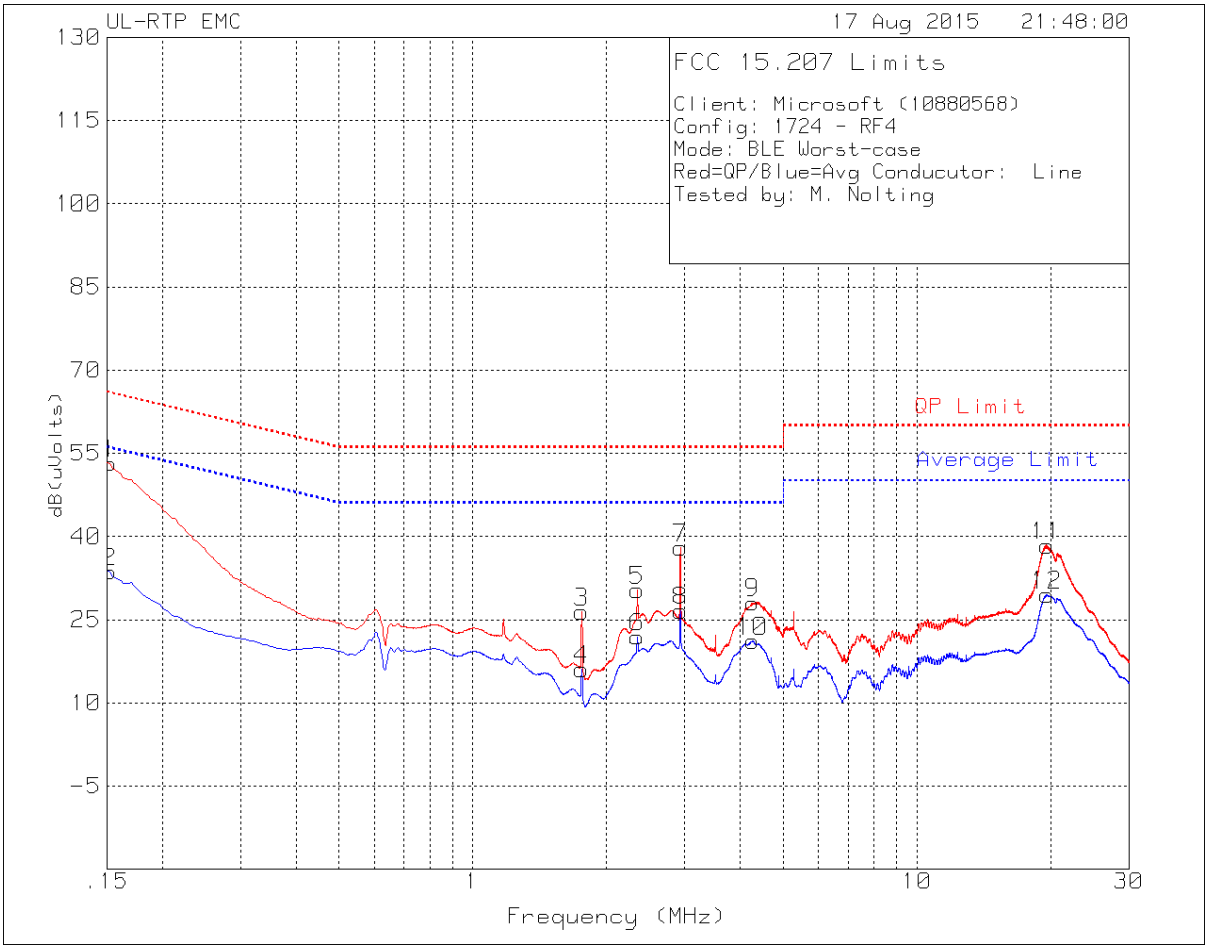
* Decreases with the logarithm of the frequency.

TEST PROCEDURE

ANSI C63.10

RESULTS

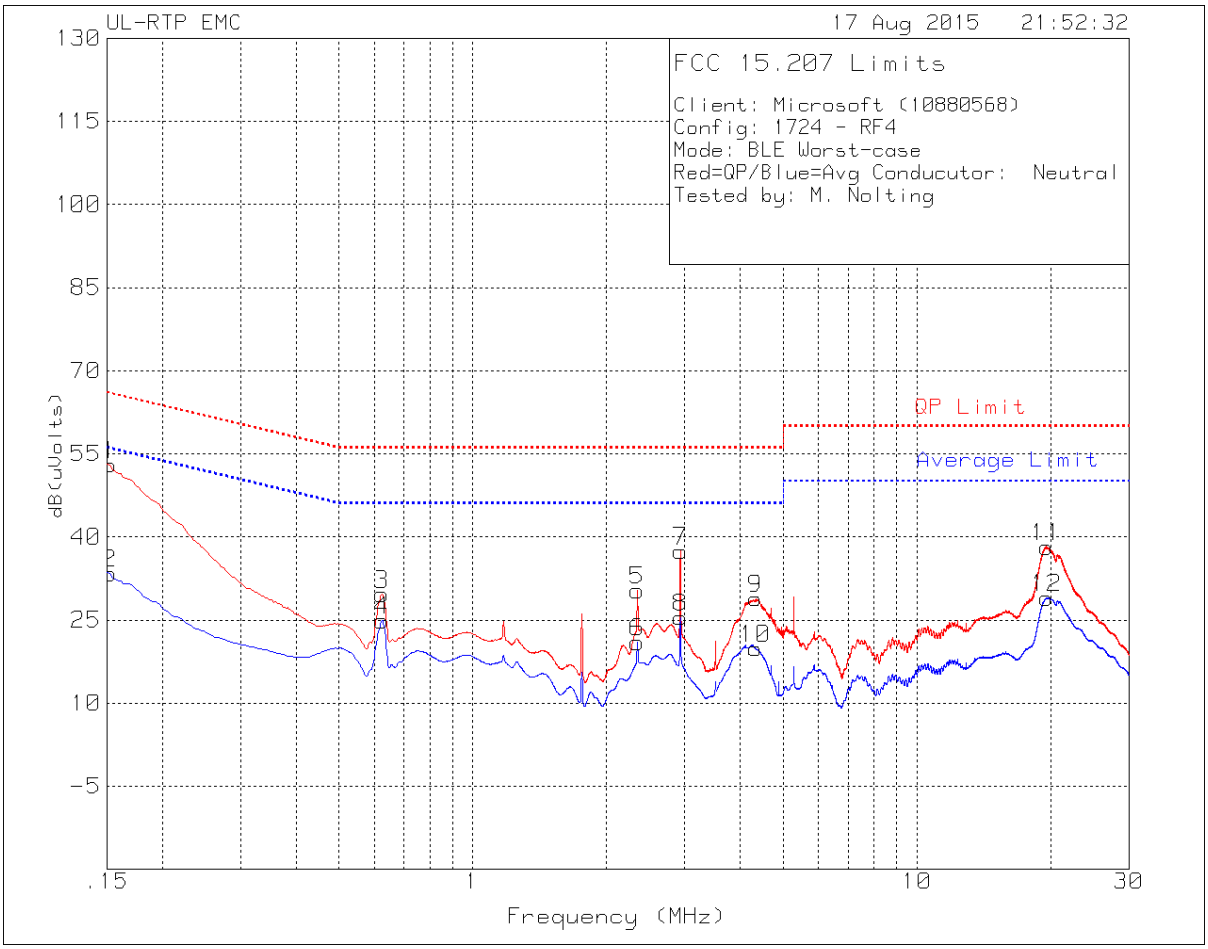
LINE 1 RESULTS



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Limiter/Cbl (dB)	Corrected Reading dB(uVolts)	QP Limit	Margin (dB)	Average Limit	Margin (dB)
1	.15225	43.5	Qp	.4	9.3	53.2	65.88	-12.68	-	-
2	.15225	23.94	Ca	.4	9.3	33.64	-	-	55.88	-22.24
3	1.75875	16.99	Qp	0	9.4	26.39	56	-29.61	-	-
4	1.75875	6.64	Ca	0	9.4	16.04	-	-	46	-29.96
5	2.346	20.9	Qp	0	9.4	30.3	56	-25.7	-	-
6	2.346	12.5	Ca	0	9.4	21.9	-	-	46	-24.1
7	2.93325	28.57	Qp	0	9.4	37.97	56	-18.03	-	-
8	2.93325	17.22	Ca	0	9.4	26.62	-	-	46	-19.38
9	4.26525	18.56	Qp	.1	9.4	28.06	56	-27.94	-	-
10	4.26525	11.63	Ca	.1	9.4	21.13	-	-	46	-24.87
11	19.59	28.53	Qp	.2	9.6	38.33	60	-21.67	-	-
12	19.599	19.65	Ca	.2	9.6	29.45	-	-	50	-20.55

Qp - Quasi-Peak detector
Ca - CISPR average detection

LINE 2 RESULTS



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Limiter/Cbl (dB)	Corrected Reading dB(uVolts)	QP Limit	Margin (dB)	Average Limit	Margin (dB)
1	.15225	43.34	Qp	.4	9.3	53.04	65.88	-12.84	-	-
2	.15225	23.75	Ca	.4	9.3	33.45	-	-	55.88	-22.43
3	.62475	20.14	Qp	.1	9.4	29.64	56	-26.36	-	-
4	.62475	15.39	Ca	.1	9.4	24.89	-	-	46	-21.11
5	2.346	20.94	Qp	0	9.4	30.34	56	-25.66	-	-
6	2.346	11.63	Ca	0	9.4	21.03	-	-	46	-24.97
7	2.93325	28.02	Qp	0	9.4	37.42	56	-18.58	-	-
8	2.93325	16.07	Ca	0	9.4	25.47	-	-	46	-20.53
9	4.33275	19.39	Qp	.1	9.4	28.89	56	-27.11	-	-
10	4.33275	10.36	Ca	.1	9.4	19.86	-	-	46	-26.14
11	19.56525	28.36	Qp	.2	9.6	38.16	60	-21.84	-	-
12	19.56975	19.19	Ca	.2	9.6	28.99	-	-	50	-21.01

Qp - Quasi-Peak detector
Ca - CISPR average detection