



**FCC CFR47 PART 15 SUBPART C**

**CERTIFICATION TEST REPORT**

**FOR**

**10.1" TABLET WITH LTE/CELLULAR AND WLAN RADIO WITH BLUETOOTH**

**MODEL NUMBER: TP00043A**

**FCC ID: PU5-TP00043ASF**

**REPORT NUMBER: 12U14463**

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<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** WISTRON CORPORATION  
21F, 88, SEC. 1, HSIN TAI WU RD., HSICHIH  
TAIPEI HSIEN 221, TAIWAN R.O.C

**EUT DESCRIPTION:** 10.1" TABLET WITH LTE/CELLULAR AND WLAN RADIO WITH  
BLUETOOTH

**MODEL:** TP00043ASF

**SERIAL NUMBER:** NON-SERIALIZED PROTOTYPE

**DATE TESTED:** 2012-10-01 to 2012-10-04

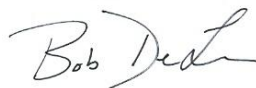
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards, using test results reported in the test report documents referenced below and/or documentation furnished by the applicant. All indications of Pass/Fail in this report are opinions expressed by UL LLC based on interpretations of these calculations. The results show that the equipment 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 by the referenced documents. 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 By:

Tested By:



Bob DeLisi  
WiSE Principle Engineer  
UL LLC

Mike Antola  
WiSE Project Lead  
UL LLC

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 1285 Walt Whitman Rd. Melville, NY 11747, USA.

UL Melville is accredited by NVLAP, Laboratory Code 100255-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/1002550.htm>.

## 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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamplifier Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

### 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	± 3.3 dB
Radiated Disturbance, 30 to 1000 MHz	± 4.00 dB

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

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT is a Bluetooth transceiver which utilizes 802.11abgn 1x1 + BT4.0.

The radio module is manufactured by Broadcom, model BCM94330LGA.

### 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	Basic GFSK	8.02	6.34
2402 - 2480	Enhanced 8PSK	8.21	6.62

Note: Output power measurements are peak power measurements and used to confirm the device was operating within expected tolerances (+/- 0.5dB) of the power during original tests

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna, with a maximum gain of 1.88 dBi in the 2.4GHz band and 0.17 dBi in the 5GHz band.

-----  
Wistron NeWeb Corporation

Main Antenna : 25.90ADN.001 PIFA Antenna Gain: 1.88  
Aux Antenna : 25.90ADP.001 PIFA Antenna Gain: 0.17  
-----

## 5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Broadcom version 5.93.97.48.

The test utility software used during testing was Broadcom BT test mode tool, Win8DUTApp utility.

## 5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power.

## 5.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Headphone	---	---	---	---
Mouse	Dell	M-UK	---	---

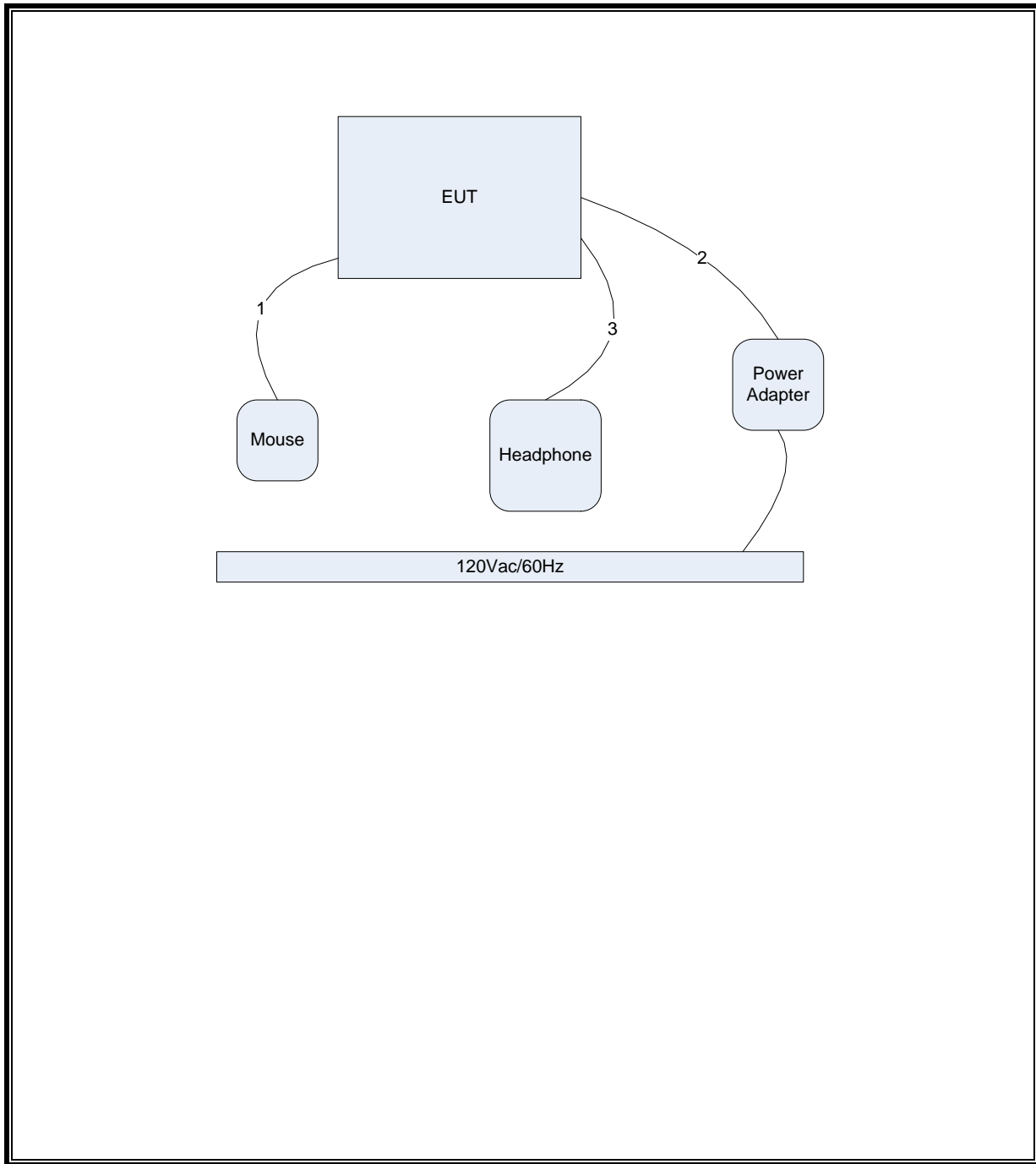
### I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	USB	1	USB	USB	<3M	
2	Micro-USB	1	USB	USB	<3M	
3	Headphone	1	Phono	Phono	<3M	

### TEST SETUP

The EUT is a stand-alone device. Test software exercised the radio module.

**SETUP DIAGRAM FOR TESTS**





## 6. TEST AND MEASUREMENT EQUIPMENT

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

Radiated Emissions					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
30-1000MHz					
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	2012-01-30	2013-01-30
Bicon Antenna	Schaffner	VBA6106A	54	2012-04-10	2013-04-10
Log-P Antenna	Schaffner	UPA6109	44067	2012-05-16	2013-05-16
Switch Driver	HP	11713A	ME7A-627	N/A	N/A
System Controller	Sunol Sciences	SC99V	44396	N/A	N/A
Camera Controller	Panasonic	WV-CU254	44395	N/A	N/A
RF Switch Box	UL	1	44398	N/A	N/A
Measurement Software	UL	Version 9.5	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2010-12-07	2012-12-07
Multimeter	Fluke	83III	ME5B-305	2012-02-01	2013-02-28
Above 1GHz (Band Optimized System)					
EMI Receiver	Rohde & Schwarz	ESIB40	34968	2012-03-06	2013-03-06
Horn Antenna (1-2 GHz)	ETS	3161-01	51442	2008-03-28	See * below
Horn Antenna (2-4 GHz)	ETS	3161-02	48107	2007-09-27	See * below
Horn Antenna (4-8 GHz)	ETS	3161-03	48106	2007-09-27	See * below
Horn Antenna (8-12 GHz)	ETS	3160-07	8933	2008-11-24	See * below
Horn Antenna (12-18 GHz)	ETS	3160-08	8932	2007-09-27	See * below
Horn Antenna (18-26.5 GHz)	ETS	3160-09	8947	2007-09-26	See * below
Signal Path Controller	HP	11713A	50250	N/A	N/A
Gain Controller	HP	11713A	50251	N/A	N/A
RF Switch / Preamp Fixture	UL	BOMS1	50249	N/A	N/A
System Controller	UL	BOMS2	50252	N/A	N/A
Measurement Software	UL	Version 9.5	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2010-12-07	2012-12-07
Multimeter	Fluke	83III	ME5B-305	2012-02-01	2013-02-28
<p>* - Note: As allowed by the calibration standard ANSI C63.4 Section 4.4.2, standard gain horns need only a one-time calibration. Only if physical damage occurs will the horn antenna require re-calibration.</p> <p>* Gain standard horn antennas (sometimes called standard gain horn antennas) need not be calibrated beyond that which is provided by the manufacturer unless they are damaged or deterioration is suspected, or they are used at a distance closer than <math>2D^2/\lambda</math>. Gain standard horn antennas have gains that are fixed by their dimensions and dimensional tolerances.</p>					

Conducted Emissions					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
Conducted Emissions – GP 1					
EMI Receiver	Rohde & Schwarz	ESCI 7	75141	2012-01-05	2013-01-05
LISN	Solar	9252-50-R-24-BNC	ME5A-636	2012-02-03	2013-02-28
Switch Driver	HP	11713A	44397	N/A	N/A
RF Switch Box	UL	4	44404	N/A	N/A
Measurement Software	UL	Version 9.5	44736	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734	2012-03-13	2014-03-13
Multimeter	Fluke	83III	ME5B-305	2012-02-01	2013-02-28

## 7. RADIATED TEST RESULTS

### 7.1. LIMITS AND PROCEDURE

#### LIMITS

FCC §15.205 and §15.209

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

#### TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 1 kHz\* 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 the 2.4 GHz band.

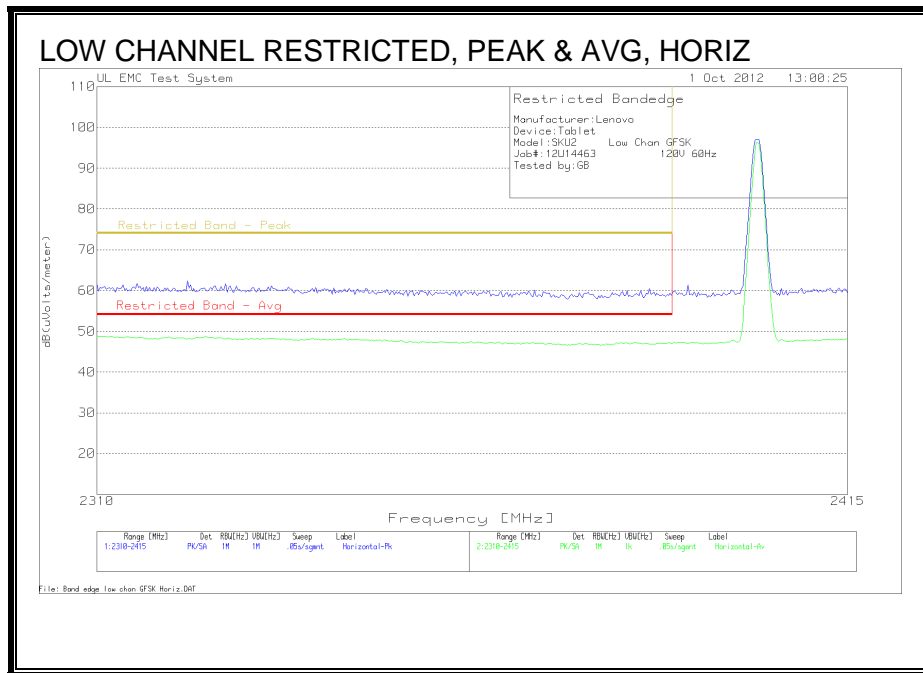
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

\*- Based on the measured duty cycle of the product.

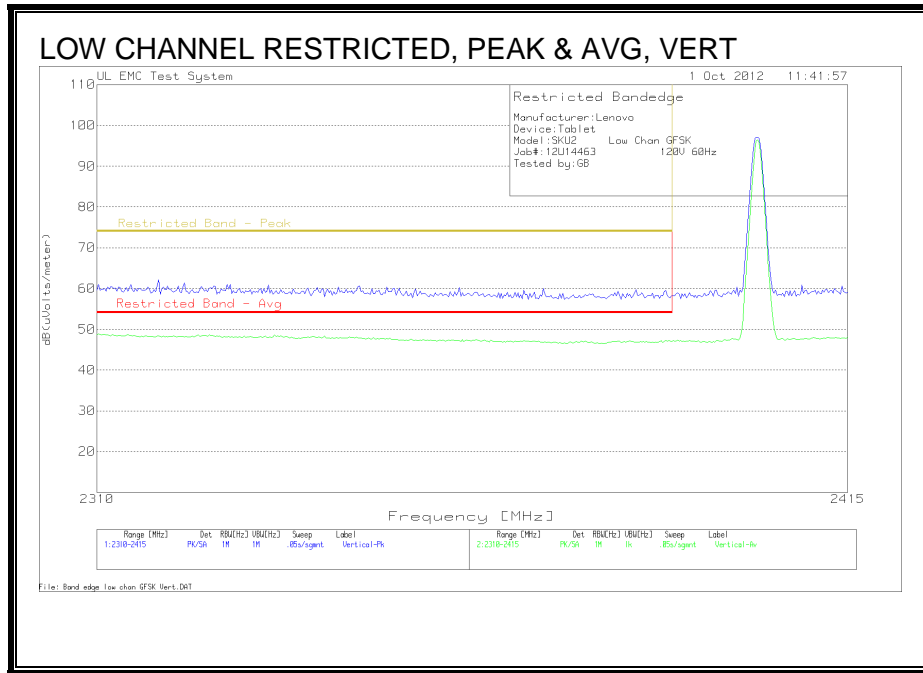
## 7.2. TRANSMITTER ABOVE 1 GHz

### 7.2.1. BASIC DATA RATE GFSK MODULATION

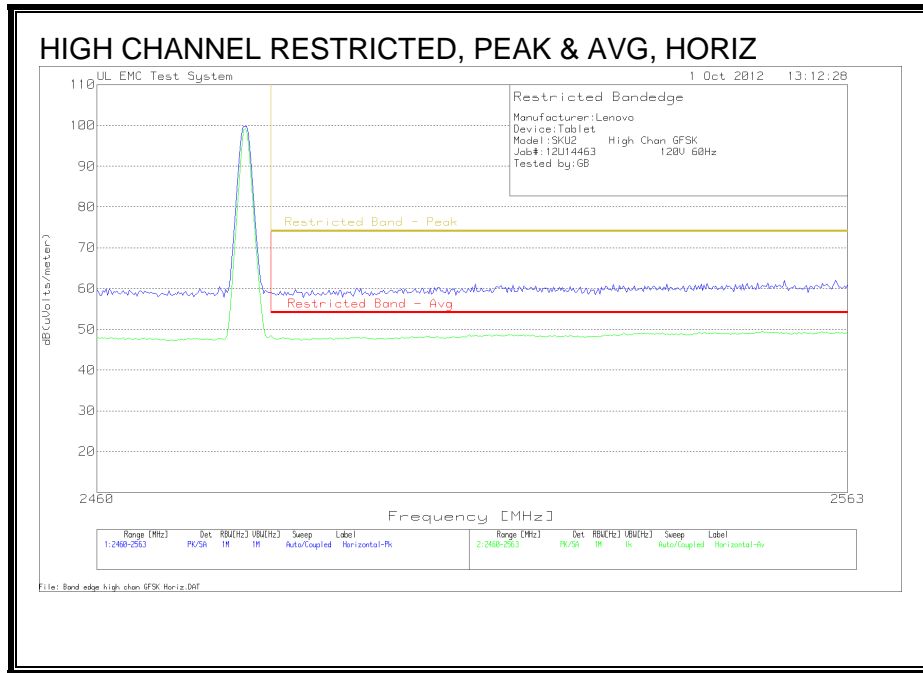
#### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



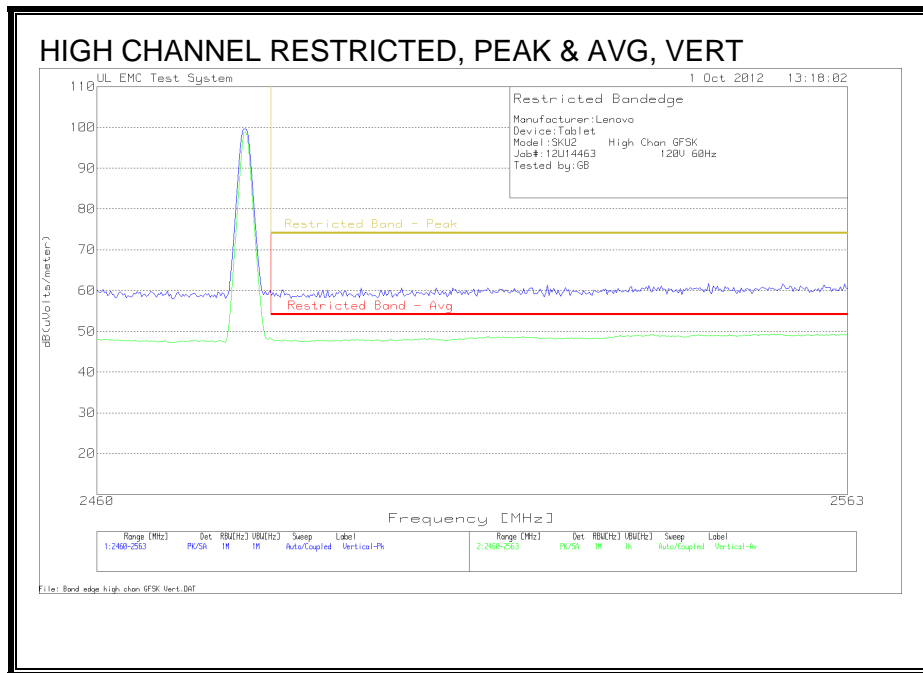
**RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**



**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**



**RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**



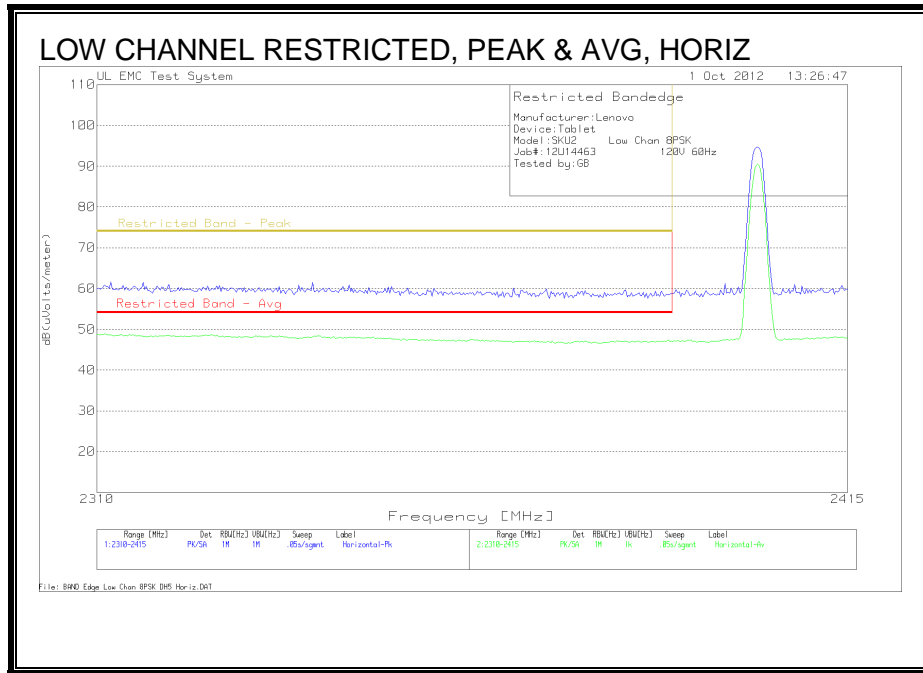
**HARMONICS AND SPURIOUS EMISSIONS**

Manufacturer:Lenovo												
Device:Tablet												
Model:SKU2 GFSK Mode												
Job#:12U14463 120V 60Hz												
Tested by:GB												
<b>Low Channel - 2402MHz</b>												
Test Frequency	Meter Reading	Detector	AF-48106 [dB]	BOMS Factor [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin	FCC Part 15 Subpart C Peak	Margin	Azimuth [Degs]	Height [cm]	Polarity
4803.6593	59.97	PK	27.1	-52.7	34.37	54	-19.63	74	-39.63	297	301	Horz
4803.8297	63.27	PK	27.1	-52.7	37.67	54	-16.33	74	-36.33	96	187	Vert
<b>Mid Channel - 2441MHz</b>												
Test Frequency	Meter Reading	Detector	AF-48106 [dB]	BOMS Factor [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin	FCC Part 15 Subpart C Peak	Margin	Azimuth [Degs]	Height [cm]	Polarity
4882.4509	62.7	PK	27.2	-52.5	37.4	54	-16.6	74	-36.6	112	143	Horz
4881.9198	63.87	PK	27.2	-52.5	38.57	54	-15.43	74	-35.43	17	237	Vert
<b>High Channel - 2480MHz</b>												
Test Frequency	Meter Reading	Detector	AF-48106 [dB]	BOMS Factor [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin	FCC Part 15 Subpart C Peak	Margin	Azimuth [Degs]	Height [cm]	Polarity
4960.0551	64.67	PK	27.3	-52.34	39.63	54	-14.37	74	-34.37	113	184	Horz
4960.0551	66.1	PK	27.3	-52.34	41.06	54	-12.94	74	-32.94	31	232	Vert
PK - Peak detector (Maximized)												
Note: No other emissions detected above the system noise floor.												

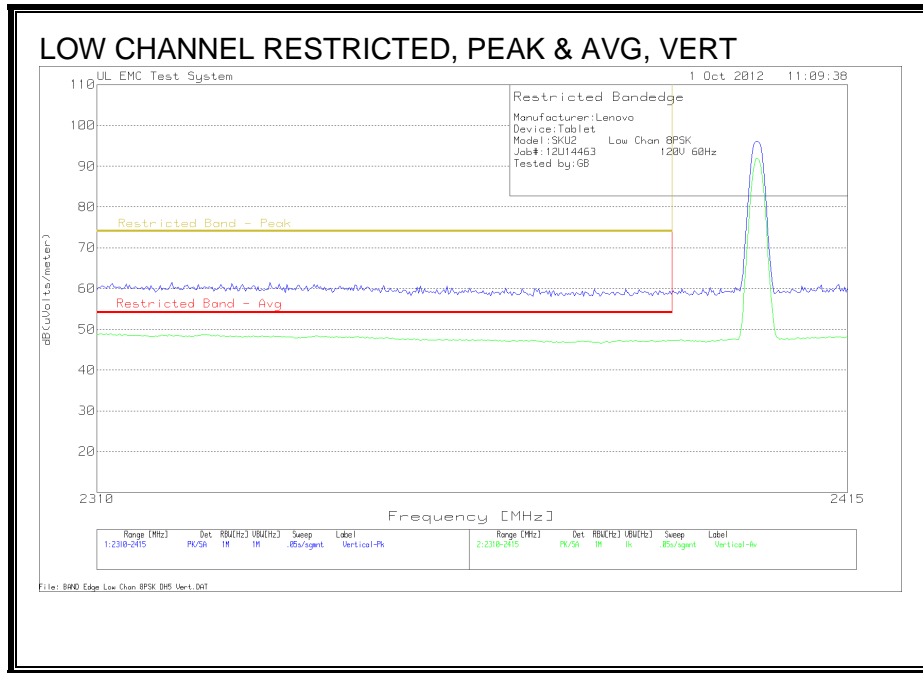


## 7.2.2. ENHANCED DATA RATE 8PSK MODULATION

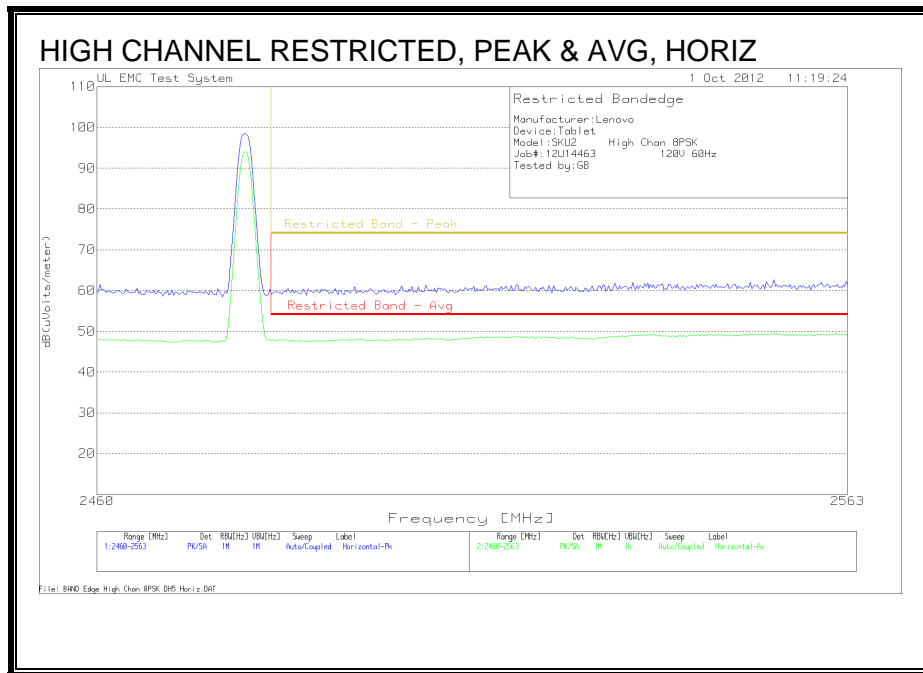
### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



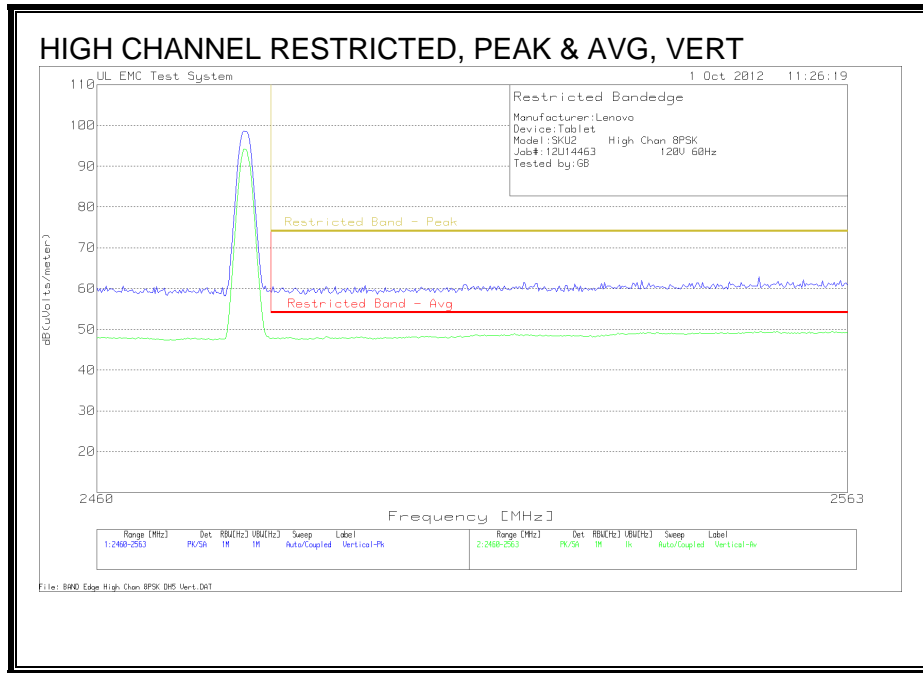
**RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**



**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**



**RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**

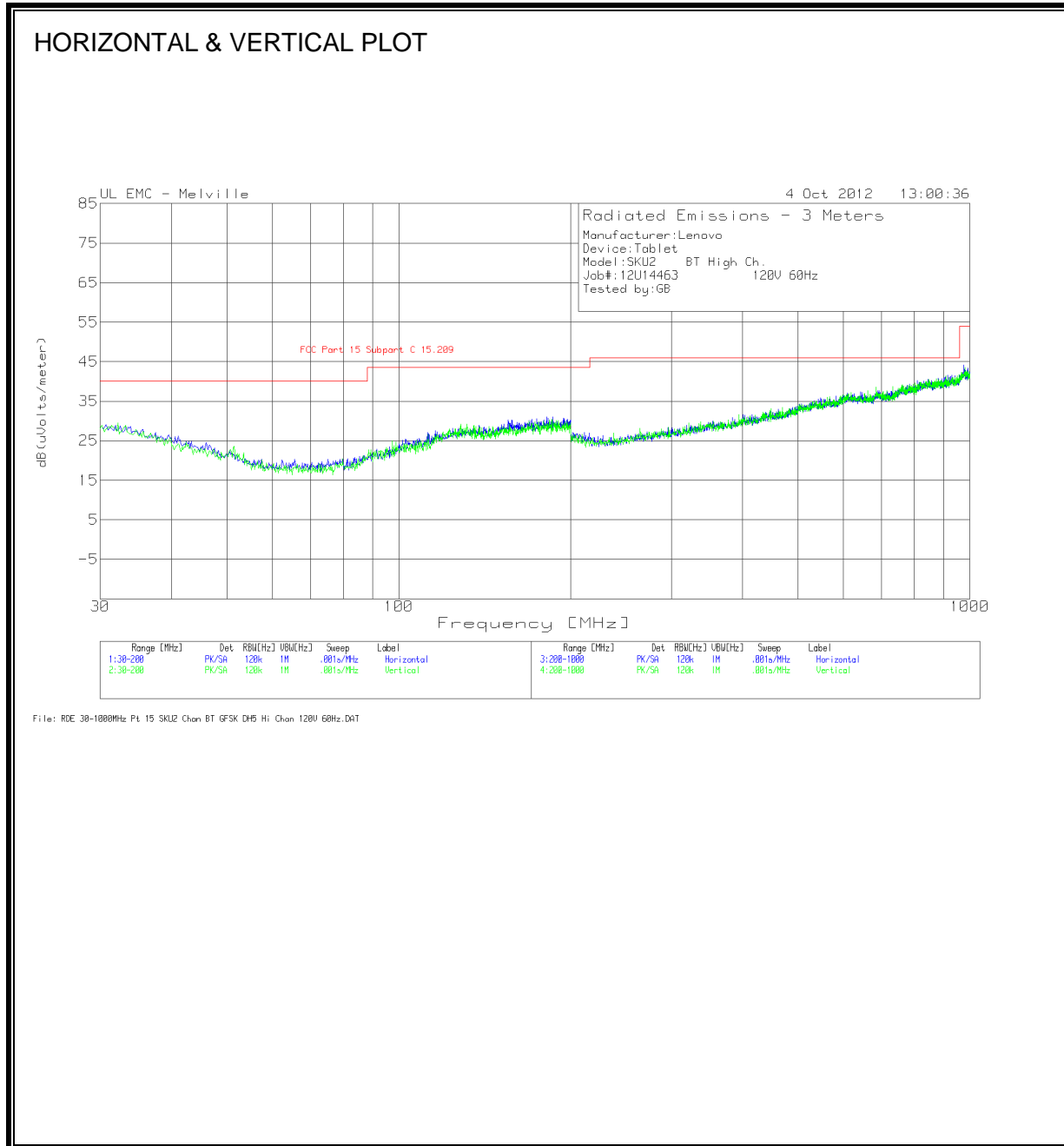


**HARMONICS AND SPURIOUS EMISSIONS**

Manufacturer:Lenovo												
Device:Tablet												
Model:SKU2 8PSK Mode												
Job#:12U14463 120V 60Hz												
Tested by:GB												
<b>Low Channel - 2402MHz</b>												
			AF-48106	BOMS		FCC Part 15		FCC Part 15		Azimuth	Height	
Test Frequency	Meter Reading	Detector	[dB]	Factor [dB]	dB(uVolts/meter)	Subpart C	Margin	Subpart C	Margin	[Degs]	[cm]	Polarity
4804.1002	62.8	PK	27.1	-52.69	37.21	15.209	54	74	-36.79	108	204	Horz
4804.1002	62.66	PK	27.1	-52.69	37.07	15.209	54	74	-36.93	227	110	Vert
<b>Mid Channel - 2441MHz</b>												
			AF-48106	BOMS		FCC Part 15		FCC Part 15		Azimuth	Height	
Test Frequency	Meter Reading	Detector	[dB]	Factor [dB]	dB(uVolts/meter)	Subpart C	Margin	Subpart C	Margin	[Degs]	[cm]	Polarity
4882.0311	63.44	PK	27.2	-52.5	38.14	15.209	54	74	-35.86	235	274	Horz
4882.0311	63.46	PK	27.2	-52.5	38.16	15.209	54	74	-35.84	20	136	Vert
<b>High Channel - 2480MHz</b>												
			AF-48106	BOMS		FCC Part 15		FCC Part 15		Azimuth	Height	
Test Frequency	Meter Reading	Detector	[dB]	Factor [dB]	dB(uVolts/meter)	Subpart C	Margin	Subpart C	Margin	[Degs]	[cm]	Polarity
4960.02	62.69	PK	27.3	-52.34	37.65	15.209	54	74	-36.35	251	180	Horz
4960.0281	53.5	PK	27.3	-52.34	28.46	15.209	54	74	-45.54	307	313	Vert
PK - Peak detector (Maximized)												
Note: No other emissions detected above the system noise floor.												

### 7.3. WORST-CASE BELOW 1 GHz

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



**HORIZONTAL & VERTICAL DATA**

Manufacturer:Lenovo											
Device:Tablet											
Model:SKU2 BT High Ch.											
Job#:12U14463 120V 60Hz											
Tested by:GB											
Horizontal 30 - 200MHz											
			AF-54	GL-3M		FCC Part 15					
Test Frequency	Meter Reading	Detector	(dB)	(dB)	dB(uVolts/meter)	Subpart C	Margin	Azimuth	Height		Polarity
31.8719	11.45	PK	16.9	0.5	28.85	15.209	40	-11.15	0	100	Horz
Vertical 30 - 200MHz											
			AF-54	GL-3M		FCC Part 15					
Test Frequency	Meter Reading	Detector	(dB)	(dB)	dB(uVolts/meter)	Subpart C	Margin	Azimuth	Height		Polarity
32.2122	12.24	PK	16.8	0.5	29.54	15.209	40	-10.46	255	100	Vert
Horizontal 200 - 1000MHz											
			AF-44067	GL-3M		FCC Part 15					
Test Frequency	Meter Reading	Detector	(dB)	(dB)	dB(uVolts/meter)	Subpart C	Margin	Azimuth	Height		Polarity
914.3572	15.23	PK	22.8	3.5	41.53	15.209	46	-4.47	180	300	Horz
931.1656	14.91	PK	23.1	3.5	41.51	15.209	46	-4.49	29	100	Horz
Vertical 200 - 1000MHz											
			AF-44067	GL-3M		FCC Part 15					
Test Frequency	Meter Reading	Detector	(dB)	(dB)	dB(uVolts/meter)	Subpart C	Margin	Azimuth	Height		Polarity
907.954	15.06	PK	22.8	3.5	41.36	15.209	46	-4.64	330	200	Vert
957.5788	14.85	PK	23.3	3.6	41.75	15.209	46	-4.25	57	100	Vert
Horizontal 200 - 1000MHz											
			AF-44067	GL-3M		FCC Part 15					
Test Frequency	Meter Reading	Detector	(dB)	(dB)	dB(uVolts/meter)	Subpart C	Margin	Azimuth	Height		Polarity
931.155	8.94	QP	23.1	3.5	35.54	15.209	46	-10.46	280	318	Horz
914.354	8.84	QP	22.8	3.5	35.14	15.209	46	-10.86	179	291	Horz
Vertical 200 - 1000MHz											
			AF-44067	GL-3M		FCC Part 15					
Test Frequency	Meter Reading	Detector	(dB)	(dB)	dB(uVolts/meter)	Subpart C	Margin	Azimuth	Height		Polarity
907.954	8.78	QP	22.8	3.5	35.08	15.209	46	-10.92	24	153	Vert
957.578	9.04	QP	23.3	3.6	35.94	15.209	46	-10.06	283	330	Vert
PK - Peak detector											
QP - Quasi-Peak detector											

## 8. 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 C63.4.

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.

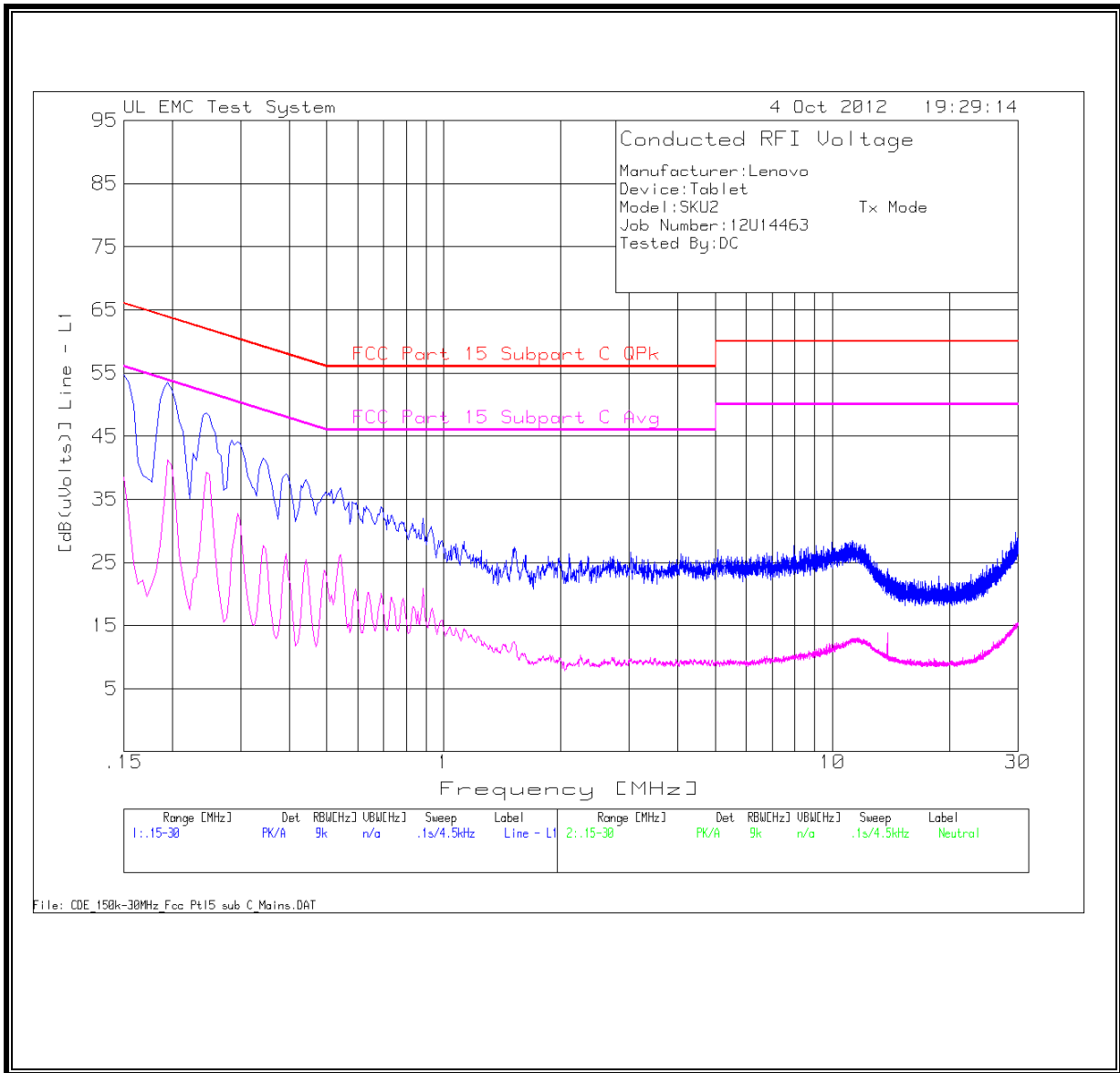
### RESULTS



**6 WORST EMISSIONS**

Manufacturer:Lenovo									
Device:Tablet									
Model:SKU2 Tx Mode									
Job Number:12U14463									
Tested By:DC									
Line - L1 .15 - 30MHz									
Test Frequency	Meter Reading	Detector	LISN 5A636 L1		FCC Part 15		FCC Part 15		
			[dB]	[dB(uVolts)]	Subpart C QPk	Margin	Subpart C Avg	Margin	
0.1545	43.42	PK	10.1	53.52	65.8	-12.28	55.8	-2.28	
0.1545	22.07	Av	10.1	32.17	65.8	-33.63	55.8	-23.63	
0.195	43.38	PK	10.1	53.48	63.8	-10.32	53.8	-0.32	
0.195	31.13	Av	10.1	41.23	63.8	-22.57	53.8	-12.57	
0.249	38.09	PK	10.1	48.19	61.8	-13.61	51.8	-3.61	
0.249	28.73	Av	10.1	38.83	61.8	-22.97	51.8	-12.97	
0.294	34.06	PK	10.1	44.16	60.4	-16.24	50.4	-6.24	
0.294	22.69	Av	10.1	32.79	60.4	-27.61	50.4	-17.61	
0.3435	31.48	PK	10	41.48	59.1	-17.62	49.1	-7.62	
0.3435	17.73	Av	10	27.73	59.1	-31.37	49.1	-21.37	
0.4425	28.01	PK	10.1	38.11	57	-18.89	47	-8.89	
0.4425	15.4	Av	10.1	25.5	57	-31.5	47	-21.5	
Neutral .15 - 30MHz									
Test Frequency	Meter Reading	Detector	LISN 5A636 L2		FCC Part 15		FCC Part 15		
			[dB]	[dB(uVolts)]	Subpart C QPk	Margin	Subpart C Avg	Margin	
0.1725	52.14	PK	10.1	62.24	64.8	-2.56	54.8	7.44	
0.1725	30.38	Av	10.1	40.48	64.8	-24.32	54.8	-14.32	
0.1815	49.52	PK	10.1	59.62	64.4	-4.78	54.4	5.22	
0.1815	23.09	Av	10.1	33.19	64.4	-31.21	54.4	-21.21	
0.2355	45.9	PK	10.1	56	62.3	-6.3	52.3	3.7	
0.2355	22.55	Av	10.1	32.65	62.3	-29.65	52.3	-19.65	
0.267	42.49	PK	10.1	52.59	61.2	-8.61	51.2	1.39	
0.267	21.69	Av	10.1	31.79	61.2	-29.41	51.2	-19.41	
0.3345	38.59	PK	10.1	48.69	59.3	-10.61	49.3	-0.61	
0.3345	18.83	Av	10.1	28.93	59.3	-30.37	49.3	-20.37	
0.501	33.53	PK	10.1	43.63	56	-12.37	46	-2.37	
0.501	17	Av	10.1	27.1	56	-28.9	46	-18.9	
Neutral .15 - 30MHz									
Test Frequency	Meter Reading	Detector	LISN 5A636 L2		FCC Part 15		FCC Part 15		
			[dB]	[dB(uVolts)]	Subpart C QPk	Margin	Subpart C Avg	Margin	
0.168	37.49	QP	10.1	47.59	65.06	-17.47	55.06	-7.47	
0.186	24.36	QP	10.1	34.46	64.21	-29.75	54.21	-19.75	
0.231	25.21	QP	10.1	35.31	62.41	-27.1	52.41	-17.1	
PK - Peak detector									
QP - Quasi-Peak detector									
Av - Average detector									

**LINE 1 RESULTS**



**LINE 2 RESULTS**

