RADIATED SPURIOUS EMISSIONS PORTIONS OF FCC CFR47 PART 22H AND 24E INDUSTRY CANADA RSS-132 ISSUE 2 INDUSTRY CANADA RSS-133 ISSUE 5

CERTIFICATION TEST REPORT

FOR

10.1” TABLET WITH LTE/WWAN AND WLAN RADIO WITH BLUETOOTH

FCC MODEL NUMBER: TP00043A
IC MODEL NUMBER: TP00043AEF

FCC ID: PU5-TP00043AEF
IC: 4182A-TP00043AEF

REPORT NUMBER: 12U14468-4

ISSUE DATE: SEPTEMBER 25, 2012

Prepared for
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21F, 88, SEC. 1, HSIN TAI WU RD., HSICHIH
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Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
---	09/25/12	Initial Issue	T. Chan

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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.
EUT DESCRIPTION:	10.1" TABLET WITH LTE/WWAN AND WLAN RADIO WITH BLUETOOTH.
FCC MODEL:	TP00043A
IC MODEL:	TP00043AEF
SERIAL NUMBER:	PROTOTYPE
DATE TESTED:	SEPTEMBER 24, 2012

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 22H and 24E	Pass
IC RSS132 AND IC RSS133	Pass

Compliance Certification Services (UL CCS) 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 CCS 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 CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS 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 CCS By:

THU CHAN
ENGINEERING MANAGER
UL CCS

Tested By:

MENGISTU MEKURIA
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA-603-C, FCC CFR 47 Part 2, FCC CFR 47 Part 22, FCC CFR Part 24, RSS-132 Issue 2, and RSS-133 Issue 5.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

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
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a 10.1” Tablet featured with LTE/WWAN, WLAN and BLUETOOTH functionality. The Tablet PC is manufactured by Lenovo.

5.2. MAXIMUM OUTPUT POWER

The measured conductive peak power values were within ± 0.5 dB of the original ones.

The RF radiated measurement with maximum peak ERP / EIRP output powers are as follows:

Part 22 Cell Band			
Frequency range (MHz)	Modulation	EIRP	
		dBm	mW
826.4 - 846.6	UMTS WCDMA	24.40	275.4
	UMTS HSUPA	25.98	396.3

Part 24 PCS Band			
Frequency range (MHz)	Modulation	EIRP	
		dBm	mW
1852.4 - 1907.6	UMTS WCDMA	25.32	340.4
	UMTS HSUPA	25.98	396.3

5.3. SOFTWARE AND FIRMWARE

The EUT is linked with Agilent 8960 Communication Test Sets.

5.4. WORST-CASE CONFIGURATION AND MODE

The worst-case is EUT on the highest power. Based on Peak Power measurement investigations, the following modes should be considered as worst-case scenario for all other measurements.

Worst-case modes:

- UMTS WCDMA
- UMTS HSUPA

For the fundamental investigation, since the EUT is a portable device that has three orientations; an X, Y and Z orientations and the worst among X, Y, and Z with AC/DC adapter and headset have been investigated. After the investigation the worst case was found to be a Y-position with headset for Cell band and X-Position with an AC adapter for PCS band respectively.

5.5. DESCRIPTION OF TEST SETUP

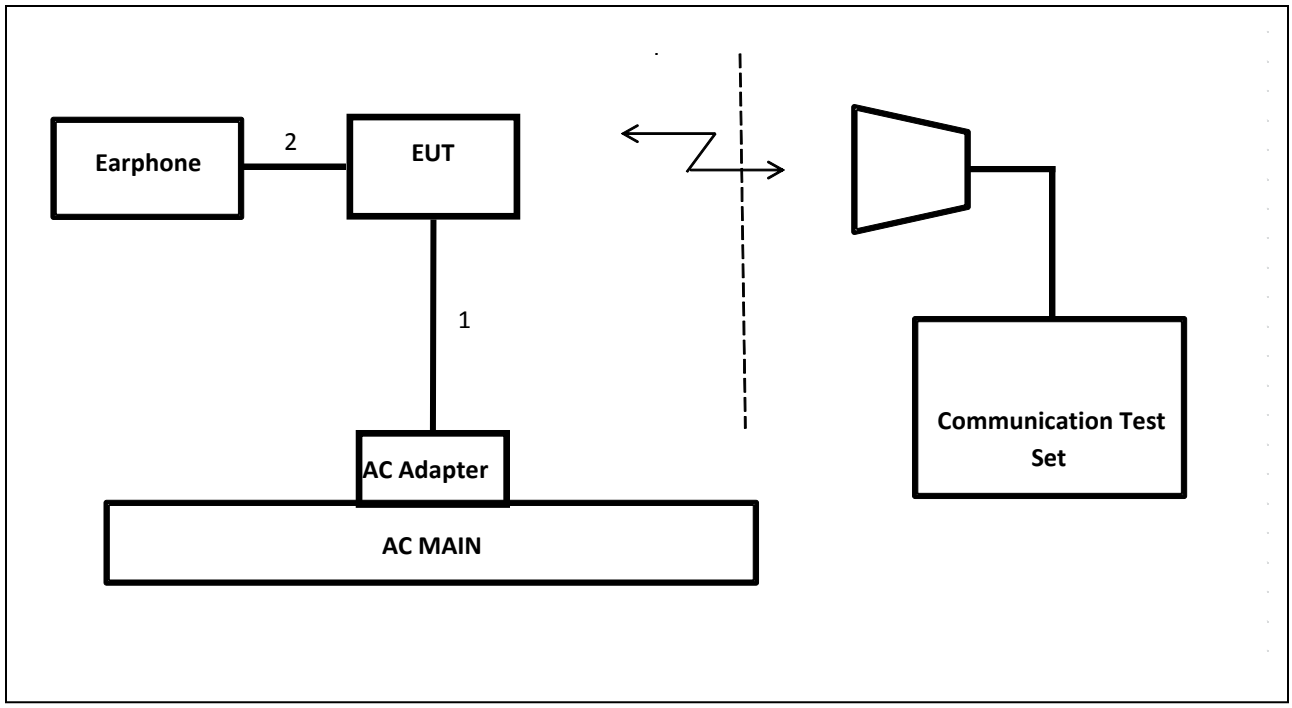
RADIATED TESTS SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	LENOVO	ADP-10AW	04MW24800J7	DoC
Headset	NA	N/A	N/A	N/A

I/O CABLES (RF Radiated Test)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	DC	1	USB	SHELDED	1.0m	N/A
2	Audio	1	Earphone	UN-SHELDED	1.0m	Mic on Cable

RADIATED SETUP



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**	**Asset**	**Cal Due**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00986	03/22/13
Antenna, Horn, 18 GHz	EMCO	3115	C00943	CNR
Antenna, Horn, 18 GHz	EMCO	3115	C00783	10/18/12
Antenna, Bilog, 30MHz-1 GHz	Sunol Sciences	JB1	C01011	03/23/13
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	11/07/12
Communications Test Set	Agilent / HP	E5515C	C01086	06/20/13
Highpass Filter, 1.5 GHz	Micro-Tronics	HPM13193	N02689	CNR
Highpass Filter, 2.7 GHz	Micro-Tronics	HPM13194	N02687	CNR
Sleeve Dipole 1880MHz	ETS	3126-1880	C01157	04/27/13
Vector signal generator, 6 GHz	Agilent / HP	E4438C	N/A	07/06/13
Antenna, Tuned Dipole 400~1000 MHz	ETS	3121C DB4	C00993	10/16/12

7. RADIATED TEST RESULTS

7.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913, §24.232
RSS132 & RSS133

LIMITS

22.913(a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

24.232(c) - Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

RSS-133 § 6.4 - Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

RSS-132 § 4.4, SRSP503 5.1.3 - The maximum ERP shall be 11.5 Watts for mobile stations.

TEST PROCEDURE

ANSI / TIA / EIA 603C Clause 2.2.17, RSS-132 and RSS-133

MODES TESTED

- UMTS WCDMA
- UMTS HSUPA

RESULTS

CELL BAND (ERP)

Mode	Channel	f (MHz)	ERP	
			dBm	mW
UMTS WCDMA	4357	826.40	**24.40**	275.42
	4408	836.60	22.32	170.61
	4458	846.60	23.88	244.34
UMTS HSUPA	4357	826.40	**25.98**	396.28
	4408	836.60	24.26	266.69
	4458	846.60	25.79	379.31

PCS BAND (EIRP)

Mode	Channel	f (MHz)	EIRP	
			dBm	mW
UMTS WCDMA	9662	1852.40	23.40	218.78
	9800	1880.00	24.77	299.92
	9938	1907.60	**25.32**	340.41
UMTS HSUPA	9662	1852.40	23.60	229.09
	9800	1880.00	25.32	340.41
	9938	1907.60	**25.98**	396.28

UMTS WCDMA850 BAND

High Frequency Substitution Measurement
Compliance Certification Services Chamber B

Company: LENOVO
Project #: 12U14468
Date: 09/24/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH HEADSET
Mode: TX, 850 MHz BAND, UMTS WCDMA MODE

Test Equipment:
Receiving: Sunol T122, and 5m Chamber B N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 1629, 4ft SMA Cable (245182002) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
824.20	24.90	V	0.5	0.0	24.40	38.5	-14.0	
824.20	18.29	H	0.5	0.0	17.79	38.5	-20.7	
836.60	22.82	V	0.5	0.0	22.32	38.5	-16.1	
836.60	18.33	H	0.5	0.0	17.83	38.5	-20.6	
848.80	24.38	V	0.5	0.0	23.88	38.5	-14.6	
848.80	18.86	H	0.5	0.0	18.36	38.5	-20.1	

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UMTS HSUPA850 BAND

High Frequency Substitution Measurement
Compliance Certification Services Chamber B

Company: LENOVO
Project #: 12U14468
Date: 09/24/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH HEADSET
Mode: TX, 850 MHz BAND, UMTS HSUPA MODE

Test Equipment:
Receiving: Sunol T122, and 5m Chamber B N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 1629, 4ft SMA Cable (245182002) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
824.20	26.48	V	0.5	0.0	25.98	38.5	-12.5	
824.20	19.59	H	0.5	0.0	19.09	38.5	-19.4	
836.60	24.76	V	0.5	0.0	24.26	38.5	-14.2	
836.60	19.94	H	0.5	0.0	19.44	38.5	-19.0	
848.80	26.29	V	0.5	0.0	25.79	38.5	-12.7	
848.80	19.41	H	0.5	0.0	18.91	38.5	-19.5	

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UMTS WCDMA1900 BAND

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: LENOVO
Project #: 12U14468
Date: 09/24/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, 1900 MHz BAND, UMTS WCDMA MODE

Test Equipment:
Receiving: Horn T59, and Camber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.852	12.1	V	0.85	8.62	19.89	33.0	-13.1	
1.852	15.8	H	0.85	8.47	23.40	33.0	-9.6	
1.880	12.3	V	0.85	8.46	19.94	33.0	-13.1	
1.880	17.3	H	0.85	8.36	24.77	33.0	-8.2	
1.908	11.7	V	0.85	8.30	19.15	33.0	-13.9	
1.908	17.9	H	0.85	8.25	25.32	33.0	-7.7	

Rev. 3.17.11

UMTS HSUPA1900 BAND

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: LENOVO
Project #: 12U14468
Date: 09/24/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, 1900 MHz BAND, UMTS HSUPA MODE

Test Equipment:
Receiving: Horn T59, and Camber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.852	12.9	V	0.85	8.62	20.68	33.0	-12.3	
1.852	16.0	H	0.85	8.47	23.60	33.0	-9.4	
1.880	13.1	V	0.85	8.46	20.72	33.0	-12.3	
1.880	17.8	H	0.85	8.36	25.32	33.0	-7.7	
1.908	12.9	V	0.85	8.30	20.38	33.0	-12.6	
1.908	18.6	H	0.85	8.25	25.98	33.0	-7.0	

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7.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917, §24.238
IC: RSS-132, RSS-133

LIMIT

§22.917 (e) and §24.238 (a): Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

IC: RSS-132, 4.5 & RSS-133, 6.5: Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

TEST PROCEDURE

For Cellular equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

For PCS equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

MODES TESTED

- UMTS WCDMA
- UMTS HSUPA

RESULTS

UMTS WCDMA850 BAND

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:	LENOVO
Project #:	12U14468
Date:	09/24/12
Test Engineer:	MENGISTU MEKURIA
Configuration:	EUT WITH HEADSET
Mode:	TX, 850 MHz BAND, UMTS WCDMA MODE

Chamber	Pre-amplifer	Filter	Limit
5m Chamber B	T145 8449B	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (826.4MHz)									
1.653	-16.5	V	3.0	35.5	1.0	-51.1	-13.0	-38.1	
2.479	-21.2	V	3.0	35.4	1.0	-55.6	-13.0	-42.6	
1.653	-14.1	H	3.0	35.5	1.0	-48.6	-13.0	-35.6	
2.479	-23.5	H	3.0	35.4	1.0	-57.9	-13.0	-44.9	
Mid Ch, (836.6MHz)									
1.673	-11.5	V	3.0	35.5	1.0	-46.0	-13.0	-33.0	
2.510	-22.1	V	3.0	35.4	1.0	-56.5	-13.0	-43.5	
1.673	-11.2	H	3.0	35.5	1.0	-45.7	-13.0	-32.7	
2.510	-23.5	H	3.0	35.4	1.0	-57.9	-13.0	-44.9	
High Ch, (846.6MHz)									
1.693	-16.1	V	3.0	35.5	1.0	-50.6	-13.0	-37.6	
2.540	-22.2	V	3.0	35.4	1.0	-56.7	-13.0	-43.7	
1.693	-13.1	H	3.0	35.5	1.0	-47.7	-13.0	-34.7	
2.540	-22.3	H	3.0	35.4	1.0	-56.7	-13.0	-43.7	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UMTS WCDMA1900 BAND

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:	LENOVO
Project #:	12U14468
Date:	09/24/12
Test Engineer:	MENGISTU MEKURIA
Configuration:	EUT WITH AC ADAPTER
Mode:	TX, 1900 MHz BAND, UMTS WCDMA MODE

Chamber	Pre-amplifer	Filter	Limit
5m Chamber B	T145 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (18524MHz)									
3.705	-16.4	V	3.0	35.4	1.0	-50.7	-13.0	-37.7	
5.557	-15.4	V	3.0	35.4	1.0	-49.8	-13.0	-36.8	
3.705	-10.9	H	3.0	35.4	1.0	-45.3	-13.0	-32.3	
5.557	-12.0	H	3.0	35.4	1.0	-46.4	-13.0	-33.4	
Mid Ch, (1880.00MHz)									
3.760	-19.5	V	3.0	35.3	1.0	-53.9	-13.0	-40.9	
5.640	-16.7	V	3.0	35.4	1.0	-51.1	-13.0	-38.1	
3.760	-19.0	H	3.0	35.3	1.0	-53.3	-13.0	-40.3	
5.640	-13.0	H	3.0	35.4	1.0	-47.4	-13.0	-34.4	
High Ch, (1907.60MHz)									
3.815	-17.3	V	3.0	35.3	1.0	-51.6	-13.0	-38.6	
5.723	-16.4	V	3.0	35.4	1.0	-50.9	-13.0	-37.9	
3.815	-18.2	V	3.0	35.3	1.0	-52.5	-13.0	-39.5	
5.723	-11.1	H	3.0	35.4	1.0	-45.5	-13.0	-32.5	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UMTS HSUPA850 BAND

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:	LENOVO
Project #:	12U14468
Date:	09/24/12
Test Engineer:	MENGISTU MEKURIA
Configuration:	EUT WITH AC ADAPTER
Mode:	TX, 1900 MHz BAND, UMTS HSUPA MODE

Chamber	Pre-amplifer	Filter	Limit
5m Chamber B	T145 8449B	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (826.4MHz)									
1.653	-16.2	V	3.0	35.5	1.0	-50.8	-13.0	-37.8	
2.479	-21.3	V	3.0	35.4	1.0	-55.7	-13.0	-42.7	
1.653	-15.5	H	3.0	35.5	1.0	-50.0	-13.0	-37.0	
2.479	-23.2	H	3.0	35.4	1.0	-57.6	-13.0	-44.6	
Mid Ch, (836.6MHz)									
1.673	-12.6	V	3.0	35.5	1.0	-47.1	-13.0	-34.1	
2.510	-20.0	V	3.0	35.4	1.0	-54.4	-13.0	-41.4	
1.673	-11.4	H	3.0	35.5	1.0	-45.9	-13.0	-32.9	
2.510	-22.5	H	3.0	35.4	1.0	-56.9	-13.0	-43.9	
High Ch, (846.6MHz)									
1.693	-17.6	V	3.0	35.5	1.0	-52.2	-13.0	-39.2	
2.540	-21.6	V	3.0	35.4	1.0	-56.0	-13.0	-43.0	
1.693	-15.1	H	3.0	35.5	1.0	-49.7	-13.0	-36.7	
2.540	-21.8	H	3.0	35.4	1.0	-56.2	-13.0	-43.2	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UMTS HSUPA1900 BAND

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: LENOVO
Project #: 12U14468
Date: 09/24/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH HEADSET
Mode: TX, 850 MHz BAND, UMTS HSUPA MODE

Chamber	Pre-amplifer	Filter	Limit
5m Chamber B	T145 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1852.40MHz)									
3.705	-15.4	V	3.0	35.4	1.0	-49.7	-13.0	-36.7	
5.557	-16.2	V	3.0	35.4	1.0	-50.6	-13.0	-37.6	
3.705	-11.5	H	3.0	35.4	1.0	-45.9	-13.0	-32.9	
5.557	-11.8	H	3.0	35.4	1.0	-46.2	-13.0	-33.2	
Mid Ch, (1880.00MHz)									
3.760	-20.6	V	3.0	35.3	1.0	-54.9	-13.0	-41.9	
5.640	-17.0	V	3.0	35.4	1.0	-51.4	-13.0	-38.4	
3.760	-19.5	H	3.0	35.3	1.0	-53.8	-13.0	-40.8	
5.640	-12.6	H	3.0	35.4	1.0	-47.0	-13.0	-34.0	
High Ch, (1907.60MHz)									
3.815	-19.3	V	3.0	35.3	1.0	-53.6	-13.0	-40.6	
5.723	-16.6	V	3.0	35.4	1.0	-51.1	-13.0	-38.1	
3.815	-18.5	H	3.0	35.3	1.0	-52.8	-13.0	-39.8	
5.723	-11.7	H	3.0	35.4	1.0	-46.2	-13.0	-33.2	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.