



Prüfbericht-Nr.: <i>Test Report No.:</i>	17045684 003	Auftrags-Nr.: <i>Order No.:</i>	164027473	Seite 1 von 15 Page 1 of 15	
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	12.12.2014		
Auftraggeber: <i>Client:</i>	Lenovo (Beijing) Limited, No.6 Chuang Ye Road, Shangdi Information Industry, Haidian District, Beijing, China				
Prüfgegenstand: <i>Test item:</i>	ThinkPad Stack Wireless Router				
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	R123				
Auftrags-Inhalt: <i>Order content:</i>	FCC approval				
Prüfgrundlage: <i>Test specification:</i>	CFR47 FCC Part 15: Subpart B Section 15.107 CFR47 FCC Part 15: Subpart B Section 15.109				
Wareneingangsdatum: <i>Date of receipt:</i>	10.03.2015	Refer to photo documents			
Prüfmuster-Nr.: <i>Test sample No.:</i>	A000152964-004, A000152964-005				
Prüfzeitraum: <i>Testing period:</i>	18.03.2015 - 06.05.2015				
Ort der Prüfung: <i>Place of testing:</i>	Accurate Technology Co., Ltd.				
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.				
Prüfergebnis*: <i>Test result*:</i>	Pass				
geprüft von / tested by: 		kontrolliert von / reviewed by: 			
22.05.2015	Tom Wang / Project Manager	27.05.2015	Sam Lin / Technical Certifier		
Datum <i>Date</i>	Name / Stellung <i>Name / Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name / Stellung <i>Name / Position</i>	Unterschrift <i>Signature</i>
Sonstiges / Other: This report is for JBP equipment class.					
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>			Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet					
Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested					
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>					

TEST SUMMARY

5.1.1 CONDUCTED EMISSION

RESULT: Passed

6.1.1 RADIATED EMISSION

RESULT: Passed

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1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:
Appendix A: Test Results

2. Test Sites

2.1 Test Facilities

Accurate Technology Co., Ltd.
(FCC Registration No.: 752051 and IC Registered Test Sites number: 5077A-2)
F1, Bldg A, Changyuan New Material Port, Keyuan Rd., Science & Industry Park, Nanshan District, Shenzhen, 518057, P.R. China

The tests at the test site have been conducted under the supervision of a TÜV engineer.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until
Conducted emissions				
Test Receiver	Rohde & Schwarz	ESCS30	100307	Jan.11, 2016
L.I.S.N.	Schwarzbeck	NLSK8126	8126431	Jan.11, 2016
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100305	Jan.11, 2016
Radiated emissions				
Spectrum Analyzer	Rohde&Schwarz	FSV40	101495	Jan.11, 2016
Test Receiver	Rohde& Schwarz	ESR	101817	Jul. 30, 2016
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan.15, 2016
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan.15, 2016
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan.15, 2016
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan.15, 2016
RF Switching Unit+PreAMP	Compliance Direction	RSU-M2	38322	Jan.10, 2016
Pre-Amplifier	Rohde&Schwarz	CBLU1183540-01	3791	Jan.10, 2016
Pre-Amplifier	Agilent	8447D	294A10619	Jan.11, 2016

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO/IEC 17025 are:

Table 2: Measurement Uncertainty

Items		Extended Uncertainty
CE	Disturbance Voltage (dBuV)	U=2.78dB, k=2, $\sigma=95\%$
RE (30-1000MHz)	Field strength (dBuV/m)	U=4.24dB, k=2, $\sigma=95\%$
RE (above 1000MHz)	Field strength (dBuV/m)	U=5.18dB, k=2, $\sigma=95\%$

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached in this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The Accurate Technology Co., Ltd. facility located at F1, Bldg A, Changyuan New Material Port, Keyuan Rd., Science & Industry Park, Nanshan District, Shenzhen, 518057, P.R. China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3. General Product Information

3.1 Product Function and Intended Use

The EUT is ThinkPad Stack Wireless Router. It supports 802.11 a/b/g/n/ac wireless technologies. The EUT supports the following functions:

- Wireless access in the 2.4GHz band or 5GHz band
- Internet access through an RJ-45 network cable
- Internet access through an external 3G or 4G network card (USB port)
- Remote access to the hard disk drive if it is stacked to the router
- Remote access to a USB storage device if it is connected to the router

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 3: Information of EUT

Technical Specification	Value
Kind of Equipment:	ThinkPad Stack Wireless Router
Type Designation:	R123
FCC ID:	A5MR123
IC:	5903G-R123
Type of Equipment:	Class B digital equipment
Operating Voltage:	DC 5.2V via marketed AC/DC adapter
Operating Temperature Range:	-5°C to 40°C

Table 4: Marketed AC/DC adapter

Description	Manufacturer	Model	S/N	Rating
AC/DC adapter	Lite-On Technology Corporation	PA-110-17IN	45N0530	Input: AC 100-240V, 50/60Hz, 0.3A MAX. Output: DC 5.2V, 2A

3.3 Independent Operation Modes

The basic operation modes are:

- A. Connect to PC
- B. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Bill of Material	- Circuit Diagram
- PCB Layout	- Instruction Manual
- Photo Document	- Rating Label

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5&6.

4.3 Special Accessories and Auxiliary Equipment

Table 5: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N	Rating
Laptop PC	Lenovo	X200	L3-ANW2G	--
PC	DELL	DMC	HZXLM1	--
LCD Monitor	DELL	E178FPC	N/A	--
Keyboard	DELL	SK-8110	LR86682	--
Mouse	DEL	M071KC	410042355	--
Printer	Canon	BJC-1000SP	N/A	--
Printer	HP	HP Laserjet 1015	CNFG030424	--

4.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test

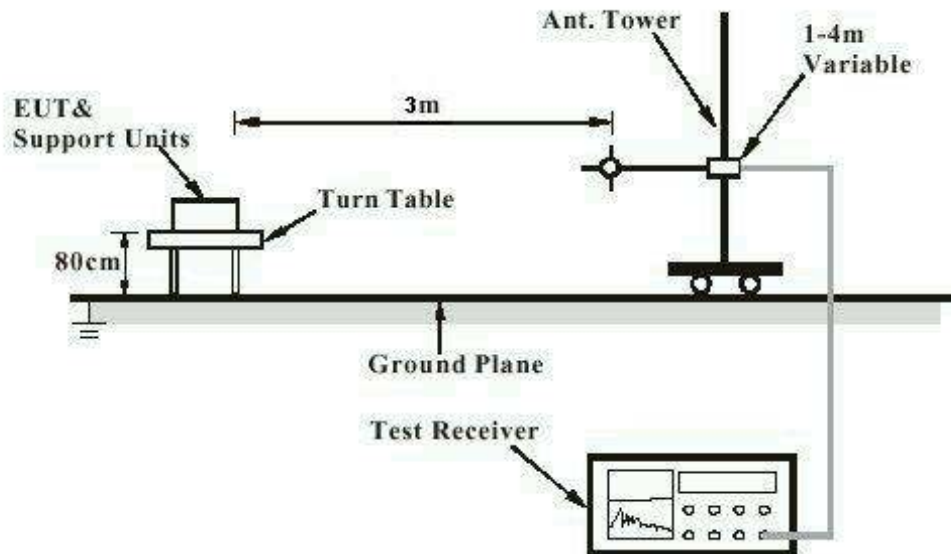
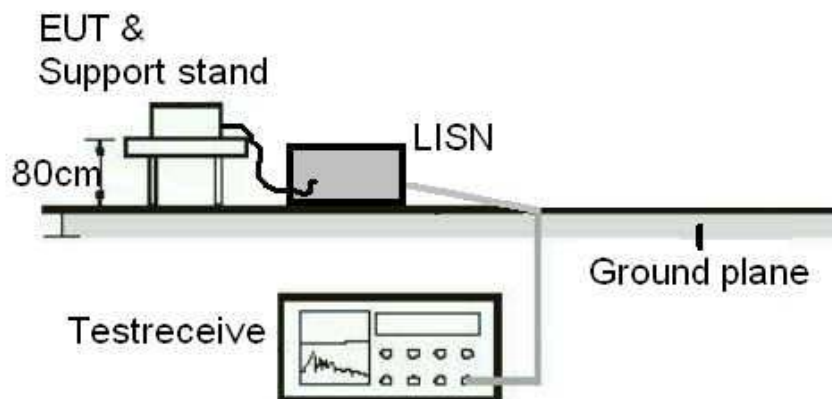


Diagram of Measurement Equipment Configuration for Conduction Measurement



5. Test Results EMISSION

5.1 Emission in the Frequency Range up to 30 MHz

5.1.1 Conducted Emission

RESULT: **Passed**

Date of testing	:	2015-03-18 to 2015-05-06
Test specification	:	CFR Title47 Part15 Subpart B Section 15.107(b) ICES-003 Issue 5
Frequency range	:	0.15 – 30MHz
Classification	:	Class B
Test procedure	:	ANSI C63.4:2009
Kind of test site	:	Shielded room

Test setup

Input Voltage	:	AC 120V, 60Hz
Operation mode	:	A
Ambient temperature	:	23°C
Relative humidity	:	48%
Atmospheric pressure	:	101 kPa

Refer to attached Appendix A for details.

6. Emission in the Frequency Range above 30 MHz

6.1.1 Radiated Emission

RESULT: **Passed**

Date of testing : 2015-03-18 to 2015-05-06
Test standard : CFR Title47 Part15 Subpart B Section 15.109(b)
ICES-003 Issue 5
Frequency range : 30 - 1000MHz, 1- 6GHz
Classification : Class B
Test procedure : ANSI C63.4:2009
Kind of test site : 3m Chamber & 10m Chamber

Test setup

Input Voltage : AC 120V, 60Hz
Operation mode : A
Ambient temperature : 23°C
Relative humidity : 48%
Atmospheric pressure : 101 kPa

Refer to attached Appendix A for details.

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Appendix A

Test Results of Radiated Emissions and Conducted Emissions

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Produkte
Products

Appendix A.1: Test Results of Radiated Emissions



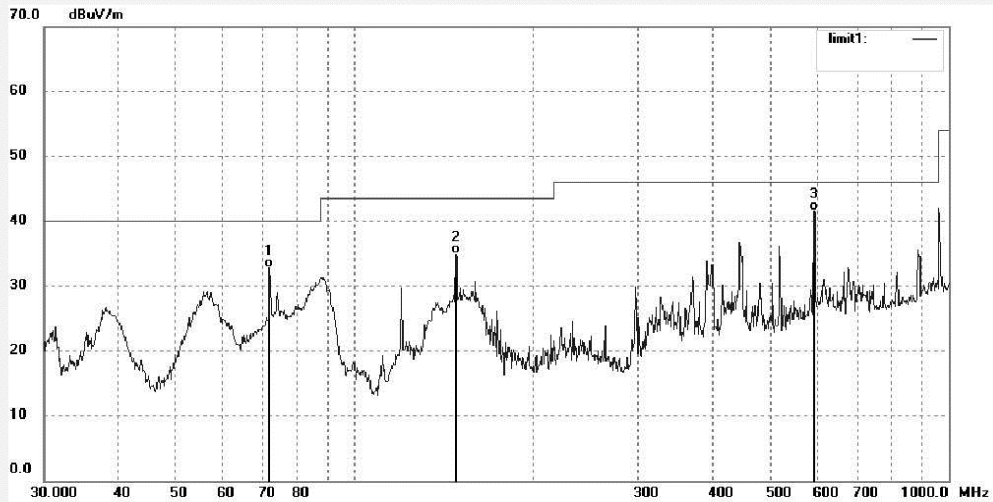
ACCURATE TECHNOLOGY CO., LTD.

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 2# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: lenovo #843	Polarization: Vertical
Standard: FCC Class B 3M Radiated	Power Source: AC 120V/60Hz
Test item: Radiation Test	Date: 15/04/25/
Temp.(C)/Hum.(%) 23 C / 48 %	Time:
EUT: ThinkPad Stack Wireless Access Point	Engineer Signature:
Mode: Communicate with PC	Distance: 3m
Model: R123	
Manufacturer: Lenovo	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	71.8319	49.21	-16.34	32.87	40.00	-7.13	QP			
2	147.9214	50.15	-15.19	34.96	43.50	-8.54	QP			
3	593.0497	44.62	-3.03	41.59	46.00	-4.41	QP			

Produkte
 Products



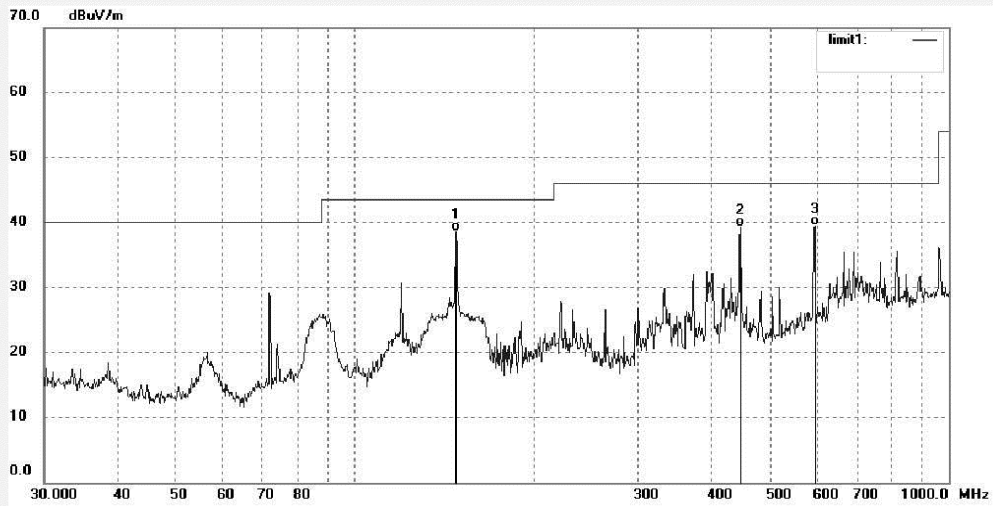
ACCURATE TECHNOLOGY CO., LTD.

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
 Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 2# Chamber
 Tel:+86-0755-26503290
 Fax:+86-0755-26503396

Job No.: lenovo #844	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: AC 120V/60Hz
Test item: Radiation Test	Date: 15/04/25/
Temp.(C)/Hum.(%) 23 C / 48 %	Time:
EUT: ThinkPad Stack Wireless Access Point	Engineer Signature:
Mode: Communicate with PC	Distance: 3m
Model: R123	
Manufacturer: Lenovo	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	147.9214	53.79	-15.19	38.60	43.50	-4.90	QP			
2	446.4141	45.09	-5.84	39.25	46.00	-6.75	QP			
3	595.1327	42.43	-3.02	39.41	46.00	-6.59	QP			

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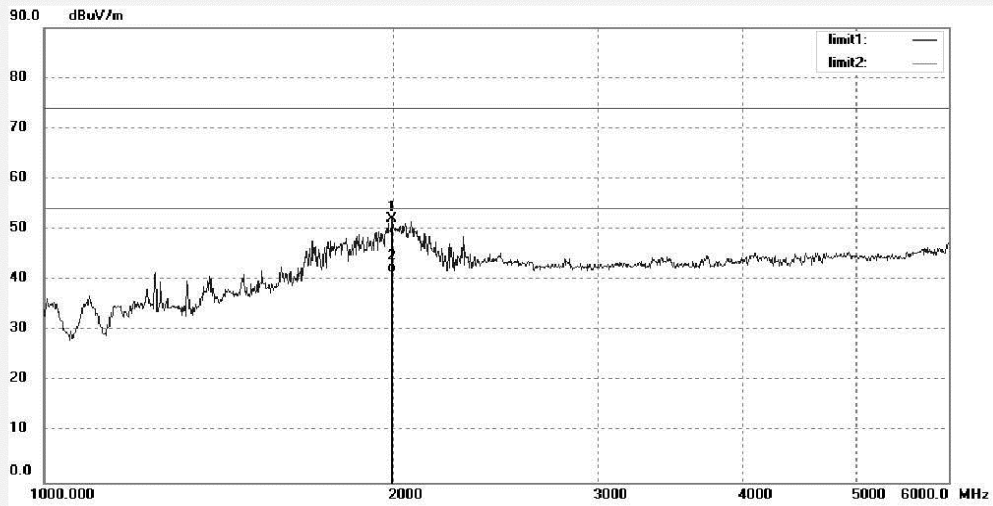
ACCURATE TECHNOLOGY CO., LTD.

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 2# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: lenovo #871	Polarization: Vertical
Standard: FCC Class B 3M Radiated	Power Source: AC 120V/60Hz
Test item: Radiation Test	Date: 15/04/27/
Temp.(C)/Hum.(%) 23 C / 48 %	Time:
EUT: ThinkPad Stack Wireless Access Point	Engineer Signature:
Mode: Communicate with PC	Distance: 3m
Model: R123	
Manufacturer: Lenovo	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1993.371	61.10	-9.04	52.06	74.00	-21.94	peak			
2	1993.371	50.53	-9.04	41.49	54.00	-12.51	AVG			

Produkte
 Products



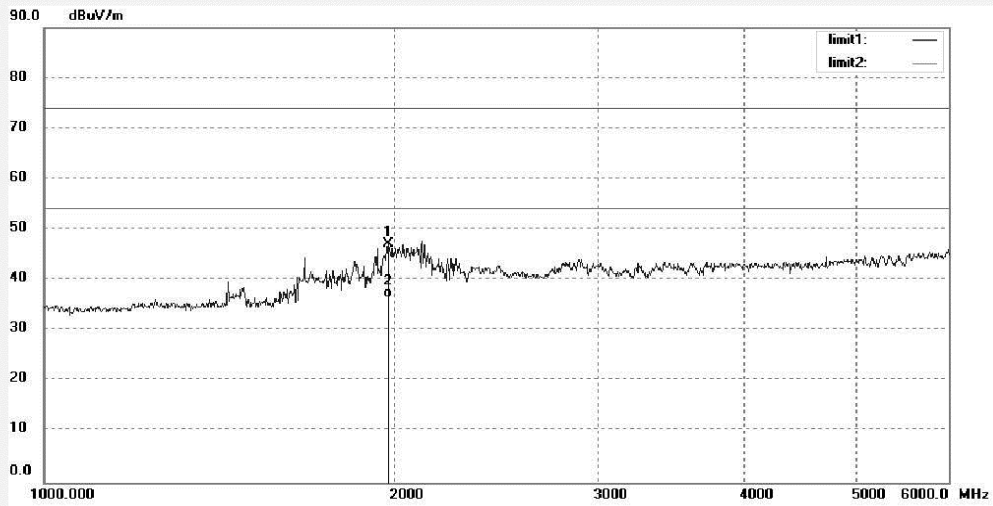
ACCURATE TECHNOLOGY CO., LTD.

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
 Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 2# Chamber
 Tel:+86-0755-26503290
 Fax:+86-0755-26503396

Job No.: lenovo #872	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: AC 120V/60Hz
Test item: Radiation Test	Date: 15/04/27/
Temp.(C)/Hum.(%) 23 C / 48 %	Time:
EUT: ThinkPad Stack Wireless Access Point	Engineer Signature:
Mode: Communicate with PC	Distance: 3m
Model: R123	
Manufacturer: Lenovo	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1975.593	56.32	-9.15	47.17	74.00	-26.83	peak			
2	1975.593	45.75	-9.15	36.60	54.00	-17.40	AVG			

Appendix A.2: Test Results of Conducted Emissions

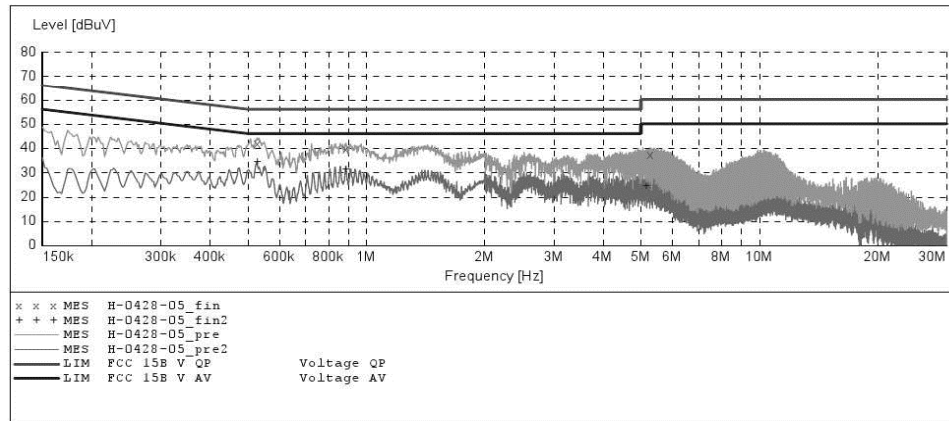
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15 B

EUT: ThinkPad Stack Wireless Access Point M/N:R123
 Manufacturer: Lenovo
 Operating Condition: Communicate with PC
 Test Site: 1#Shielding Room
 Operator: LAN
 Test Specification: L 120V/60Hz
 Comment: Mains Port
 Start of Test: 2015-4-28 /

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Frequency 150.0 kHz
 Stop Frequency 30.0 MHz
 Step Width 4.5 kHz
 Detector QuasiPeak
 Meas. Time 1.0 s
 IF Bandw. 9 kHz
 Transducer NSLK8126 2008
 Average



MEASUREMENT RESULT: "H-0428-05_fin"

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.528000	41.80	11.5	56	14.2	QP	L1	GND
0.888000	39.60	11.6	56	16.4	QP	L1	GND
5.280500	37.00	11.8	60	23.0	QP	L1	GND

MEASUREMENT RESULT: "H-0428-05_fin2"

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.528000	34.20	11.5	46	11.8	AV	L1	GND
0.888000	30.90	11.6	46	15.1	AV	L1	GND
5.154500	24.20	11.8	50	25.8	AV	L1	GND

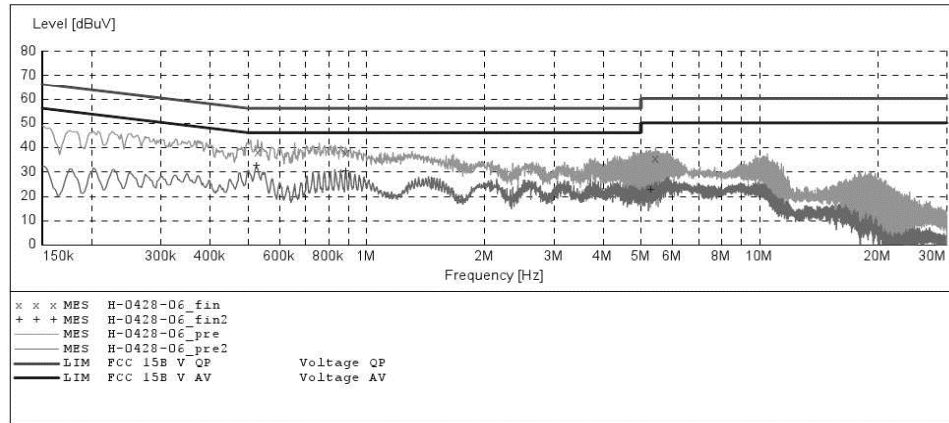
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15 B

EUT: ThinkPad Stack Wireless Access Point M/N:R123
 Manufacturer: Lenovo
 Operating Condition: Communicate with PC
 Test Site: 1#Shielding Room
 Operator: LAN
 Test Specification: N 120V/60Hz
 Comment: Mains Port
 Start of Test: 2015-4-28 /

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average



MEASUREMENT RESULT: "H-0428-06_fin"

2015-4-28

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.530000	37.90	11.5	56	18.1	QP	N	GND
0.886000	37.50	11.6	56	18.5	QP	N	GND
5.442500	35.40	11.8	60	24.6	QP	N	GND

MEASUREMENT RESULT: "H-0428-06_fin2"

2015-4-28

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.526000	32.30	11.5	46	13.7	AV	N	GND
0.886000	30.00	11.6	46	16.0	AV	N	GND
5.289500	22.20	11.8	50	27.8	AV	N	GND