

Prüfbericht-Nr.: <i>Test report no.:</i>	CN24K6P0 002	Auftrags-Nr.: <i>Order no.:</i>	168473368	Seite 1 von 19 Page 1 of 19
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2024-03-11	
Auftraggeber: <i>Client:</i>	Primax Electronics Ltd. No. 669, Ruey Kuang Road, Neihsu, Taipei, Taiwan			
Prüfgegenstand: <i>Test item:</i>	Lenovo EOS 2.4G Dongle Gen3			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	DGRFPDO (Trademark: Lenovo)			
Auftrags-Inhalt: <i>Order content:</i>	Test Report			
Prüfgrundlage: <i>Test specification:</i>	FCC CFR Title 47, Part 15, Subpart C, Section 15.249 RSS-210 Issue 10 December 2019 RSS-Gen Issue 5 March 2019			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2024-04-28	Please refer to Photo Document		
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003705468-004~010 A003705468-038~044			
Prüfzeitraum: <i>Testing period:</i>	2024-05-03 - 2024-05-10			
Ort der Prüfung: <i>Place of testing:</i>	Refer to section 2.1			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: <i>tested by:</i>	genehmigt von: <i>authorized by:</i>		Hardy Suo	
Datum: <i>Date:</i>	Ausstellungsdatum: <i>Issue date:</i>			
	2024-05-15	2024-05-15		
Stellung / Position:	Sachverständige(r)/Expert	Stellung / Position:	Sachverständige(r)/Expert	
Sonstiges / <i>Other:</i>	FCC ID: EMJDDGRFPDO IC: 4251A-DDGRFPDO HVIN: DGRFPDO			
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:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
* Legend:	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 above mentioned 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>				

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Anmerkungen
Remarks

1	Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben. Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden. <i>The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i>
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4	Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019. <i>The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.</i>

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Test Summary

5.1.1 ANTENNA REQUIREMENT

RESULT: Pass

5.1.2 FIELD STRENGTH OF FUNDAMENTAL AND HARMONICS

RESULT: Pass

5.1.3 20dB AND 99% BANDWIDTH

RESULT: Pass

5.1.4 BAND EDGE

RESULT: Pass

5.1.5 CONDUCTED EMISSION ON AC MAINS

RESULT: Pass

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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

Appendix B: Photographs of the Test Set-up

2 Test Sites

2.1 Test Facilities

1. TÜV Rheinland (Shenzhen) Co., Ltd.

No. 362 Huanguan Road Middle, Longhua District, 518110, Shenzhen, P. R. China.

A2LA Certificate Number: 5162.01

FCC Accreditation Designation No.: CN1260

ISED wireless device testing laboratory: 25069

2. Audix Technology (Shenzhen) Co., Ltd.

No. 6, Kefeng Road, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China

FCC OET Designation: CN5022

ISED Company Number: 5183A and CAB identifier: CN0034

NVLAP Lab. Code: 200372-0

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

TÜV Rheinland (Shenzhen) Co., Ltd.

Radio Spectrum Testing (TS8997)					
Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. until
Signal Analyzer	R&S	FSV 40	101441	2023-07-26	2024-07-25
OSP	R&S	OSP 150	101017	2023-11-14	2024-11-13
Control PC	DELL	OptiPlex 7050	FTJZ9P2	N/A	N/A
Test Software	R&S	WMS32 (V11.00.00)	N/A	N/A	N/A
Power Meter	R&S	NRP2	107105	2023-11-14	2024-11-13
Wideband Power Sensor	R&S	NRP-Z81	105677	2023-07-26	2024-07-25
Shielding Room 8#	Albatross	SR8	APC17151-SR8	2021-06-22	2024-06-22
Unwanted Emission Testing (TS9975)					
Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. until
EMI Test Receiver	R&S	ESR 7	102021	2023-07-26	2024-07-25
Signal Analyzer	R&S	FSV 40	101439	2023-07-26	2024-07-25
System Controller Interface	R&S	SCI-100	S10010038	N/A	N/A
Filterbank	R&S	Wlan	100759	2023-07-26	2024-07-25
OSP	R&S	OSP 120	102040	N/A	N/A
Pre-amplifier	R&S	SCU08F1	08320031	2023-07-26	2024-07-25

Amplifier	R&S	SCU-18F	180070	2023-07-26	2024-07-25
Amplifier	R&S	SCU40A	100475	2023-07-26	2024-07-25
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	2022-08-07	2024-08-06
Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	2022-08-07	2024-08-06
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	2022-08-28	2024-08-27
Active Loop Antenna	Schwarzbeck	FMZB 1513	302	2022-08-07	2024-08-06
Test software	R&S	EMC32 (V10.60.10)	N/A	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NV9P2	N/A	N/A
3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	2021-06-22	2024-06-22

Audix Technology (Shenzhen) Co., Ltd.
Conducted Emission

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	1# Shielding Room	AUDIX	N/A	N/A	Nov.09,22	3 Year
2	EMI Test Receiver	Rohde & Schwarz	ESCI	100842	Mar.16,24	1 Year
3	L.I.S.N.#1	Rohde & Schwarz	ENV216	102160	Jun.25,23	1 Year
4	L.I.S.N.#2	Kyoritsu	KNW-407	8-1628-5	Mar.16,24	1 Year
5	RF Cable	Eastsheep	RG223	190424	Sep.15,23	1Year
6	Terminator	Hubersuhner	50Ω	No.1	Mar.16,24	1 Year
7	Test Software	AUDIX	e3	6.100913a	N/A	N/A

Note: N/A means Not applicable.

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

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Table 2: Measurement Uncertainty

TÜV Rheinland (Shenzhen) Co., Ltd.

Parameter	Uncertainty (k=2)
RF output power, conducted	± 0.99 dB
Occupied Channel Bandwidth	± 2.08 %
RF power density, conducted	± 0.99 dB
Unwanted Emissions, conducted	± 0.89 dB
All emissions, radiated	± 4.17 dB

Audix Technology (Shenzhen) Co., Ltd.

Parameter	Uncertainty (k=2)
Uncertainty for Conduction Emission test in No. 1 Conduction	± 2.6 dB (150kHz to 30MHz)

2.6 Location of Original Data

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

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at No. 362 Huanguan Road Middle, Longhua District, 518110, Shenzhen, P. R. China. is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

The Audix Technology (Shenzhen) Co., Ltd. Test facility located at No. 6, Kefeng Road, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, 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 a Lenovo EOS 2.4G Dongle Gen3, which support 2.4GHz wireless technology.

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

3.2 Ratings and System Details

Table 3: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment:	Lenovo EOS 2.4G Dongle Gen3
Type Designation:	DGRFPDO
Trademark:	Lenovo
FCC ID:	EMJDDGRFPDO
IC:	4251A-DDGRFPDO
HVIN:	DGRFPDO
Operating Voltage:	PC USB Operated
Operating Temperature Range:	0 °C ~ +50 °C
Technical Specification of 2.4GHz	
Frequency Range:	2403 MHz to 2473 MHz
Type of Modulation:	GFSK
Channel Number:	5 channels (2403 / 2433 / 2440 / 2447 / 2473 MHz)
Antenna Type:	PCB Layout Antenna
Antenna Gain:	1.83 dBi (Provided by the Client)

3.3 Independent Operation Modes

The basic operation modes are:

- A. 2.4GHz transmitting mode
 - 1. Low channel
 - 2. Middle channel
 - 3. High channel
- B. On, Normal operation mode
- C. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- | | |
|----------------------------------|-------------------------|
| - Application Form | - Operation Description |
| - FCC/IC Label and Location Info | - Block Diagram |
| - Schematics | - PCB Layout |

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

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. All tests were performed according to the procedures in ANSI C63.10: 2013.

According to clause 3.1, all tests were performed on model DGRFPDO in this report.

Table 4: Test Channel and Frequency of 2.4GHz

Mode	Test Channels (MHz)	Remark
Transmitting	L/M/H: 2403MHz, 2440MHz, 2473MHz	--

4.3 Special Accessories and Auxiliary Equipment

Table 5: Auxiliary Equipment Used during Test

Description	Manufacturer	Model	S/N
Laptop	Lenovo	T480	PF-16A6N8

No.	Description	ACS No.	Manufacturer	Model	Serial Number
1	Notebook	---	DELL	Latitude 7400	---
2	HDD	ACS-EMC-HDD40	WD	WD My Book Studio	WXA1E63CEMW P7
3	Headphone	ACS-EMC-EP05	OVANN	0V-T880V	---
4	Keyboard	---	Lenovo	KBRFEK71	---
5	Mouse	---	Lenovo	MORFPDO	---

4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

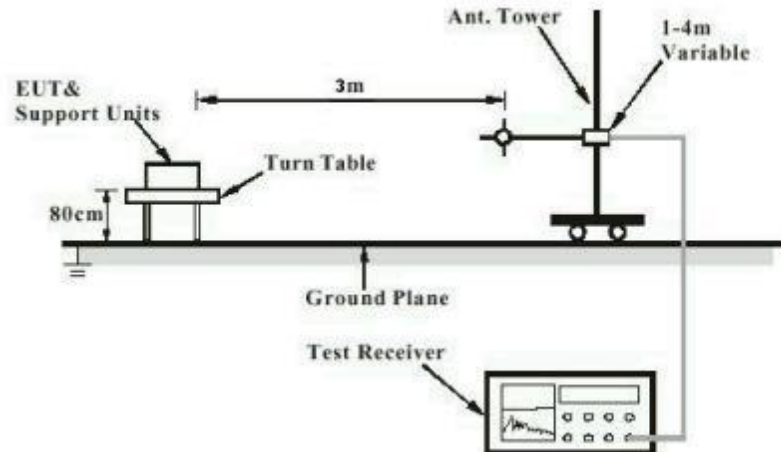


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

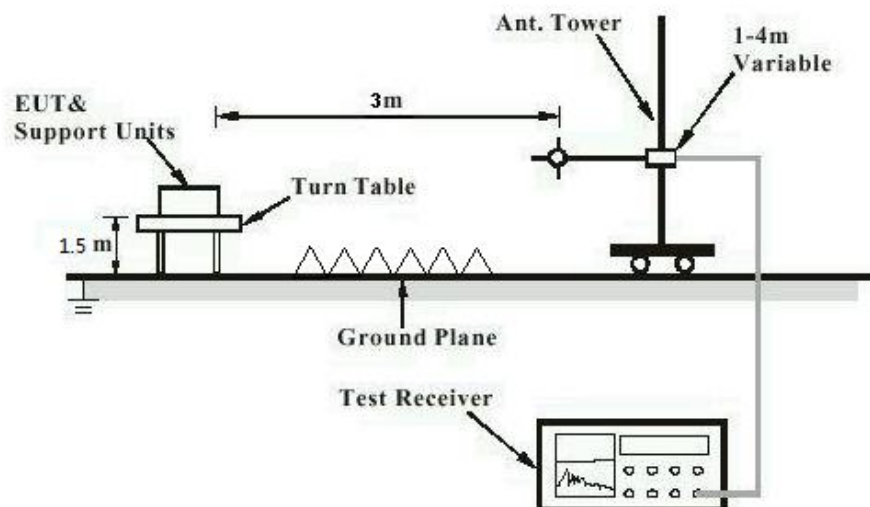


Diagram of Measurement Configuration for Conducted Transmitter Measurement

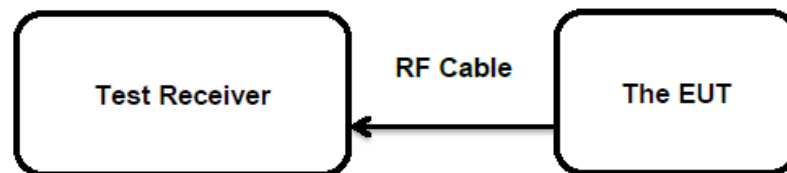
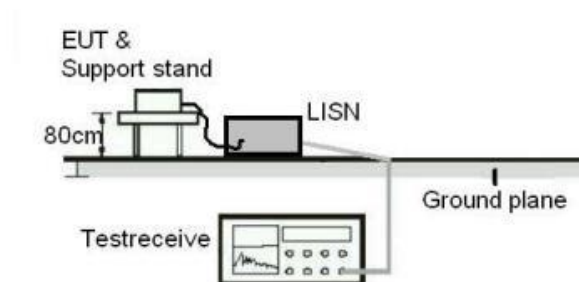


Diagram of Measurement Configuration for Mains Conduction Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:

Pass

Test Specification

Test standard : FCC Part 15.203
RSS-Gen Section 6.8

According to the manufacturer declared, the EUT has a PCB layout antenna, the gain of antenna is 1.83 dBi, which that permanent attachment and no consideration of replacement.

Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

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5.1.2 Field strength of fundamental and harmonics

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.249(a) (d) (e) RSS-210 Section B.10
Basic standard	: ANSI C63.10: 2013
Limits	: FCC Part 15.249(a) (d) (e) & 15.209(a) RSS-210 Section B.10 (a) & (b) RSS-Gen Section 8.9
Kind of test site	: 3m Semi-anechoic Chamber

Test Setup

Date of testing	: 2024-05-10
Input voltage	: PC USB Operated
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: Refer to test result
Relative humidity	: Refer to test result
Atmospheric pressure	: 101 kPa

Note: Testing was carried out within frequency range 9kHz to the tenth harmonics. Only the worst case spurious emissions configuration of the each mode were reported.

For the measurement records, refer to the appendix A.

5.1.3 20dB and 99% Bandwidth

RESULT: Pass

Test Specification

Test standard	: FCC Part 15.215(c) RSS-Gen Section 6.7
Basic standard	: ANSI C63.10: 2013
Limits	: Within assigned band
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2024-05-10
Input voltage	: PC USB Operated
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 24 °C
Relative humidity	: 52 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix A.

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5.1.4 Band Edge

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.249(a) (d) (e) & 15.209 & 15.205 RSS-210 Section B.10 (a) & (b) RSS-Gen Section 8.9 & 8.10
Basic standard	: ANSI C63.10: 2013
Limits	: FCC Part 15.249(a) (d) (e) & 15.209 & 15.205 RSS-Gen Table 5 & 7
Kind of test site	: 3m Semi-anechoic Chamber

Test Setup

Date of testing	: 2024-05-10
Input voltage	: PC USB Operated
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: Refer to test result
Relative humidity	: Refer to test result
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix A.

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5.1.5 Conducted Emission on AC Mains

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.207(a) RSS-Gen Section 8.8
Basic standard	: ANSI C63.10: 2013
Frequency range	: 0.15 – 30MHz
Limits	: FCC Part 15.207(a) RSS-Gen Table 4
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2024-05-03
Input voltage	: PC USB Operated (PC input voltage 120Vac, 60Hz)
Operation mode	: B
Ambient temperature	: 23.9 °C
Relative humidity	: 53 %
Atmospheric pressure	: 101.5 kPa

For the measurement records, refer to the appendix A.

6 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix B.

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