

Prüfbericht-Nr.: Test report no.:	CN211LF3 001	Auftrags-Nr.: Order no.:	168309425	Seite 1 von 21 Page 1 of 21
Kunden-Referenz-Nr.: Client reference no.:	N/A	Auftragsdatum: Order date:	2021-03-12	
Auftraggeber: Client:	UNI-TREND TECHNOLOGY (CHINA) CO.,LTD. No 6, Gong Ye Bei 1st Road, Songshan Lake National High-Tech Industrial Development Zone, Dongguan City, Guangdong Province, China			
Prüfgegenstand: Test item:	Bluetooth adaptor			
Bezeichnung / Typ-Nr.: Identification / Type no.:	UT-D07B (Trademark: UNI-T)			
Auftrags-Inhalt: Order content:	FCC & IC approval			
Prüfgrundlage: Test specification:	CFR47 FCC Part 15: Subpart C Section 15.247 RSS-247 Issue 2 February 2017 CFR47 FCC Part 15: Subpart C Section 15.209 RSS-Gen Issue 5 March 2019 CFR47 FCC Part 15: Subpart B Section 15.109 ICES-003 Issue 7 October 2020			
Wareneingangsdatum: Date of sample receipt:	2021-03-16	Please refer to Photo Document		
Prüfmuster-Nr.: Test sample no.:	A003014223-003-005			
Prüfzeitraum: Testing period:	2021-03-16 – 2021-04-15			
Ort der Prüfung: Place of testing:	Refer to section 2.1			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von: tested by:	 Signed by: Jackson Yang		genehmigt von: authorized by:	 Signed by: Winnie Hou
Datum: Date:	2021-04-21		Ausstellungsdatum: Issue date:	2021-04-21
Stellung / Position:	Project Engineer		Stellung / Position:	Technical Certifier
Sonstiges / Other:	FCC ID: 2APMK-UTD07B			
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:		Prüfmuster vollständig und unbeschädigt Test item complete and undamaged		
* 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. 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.				

Test Summary

5.1.1 ANTENNA REQUIREMENT

RESULT: Pass

5.1.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER

RESULT: Pass

5.1.3 CONDUCTED POWER SPECTRAL DENSITY

RESULT: Pass

5.1.4 6dB BANDWIDTH

RESULT: Pass

5.1.5 99% BANDWIDTH

RESULT: Pass

5.1.6 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 kHz BANDWIDTH

RESULT: Pass

5.1.7 RADIATED SPURIOUS EMISSION

RESULT: Pass

5.1.8 RADIATED EMISSION

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: Photographs of the Test Set-up

Appendix B: Test Results of Bluetooth Low energy

Appendix C: Test Results of FCC 15B & ICES-003

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.

CNAS Registration No.: L3080

FCC Registration No.: 694916

ISED wireless device testing laboratory: 25069

2. TUV Rheinland (Guangdong) Ltd.

No.199 Kezhu Road, Guangzhou Science City, Guangzhou 510663, Guangdong Province P.R. China

CNAS Registration No.: L2903

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. until
Signal Analyzer	R&S	FSV 40	101441	2021-08-10
OSP	R&S	OSP 150	101017	2021-12-10
Control PC	DELL	OptiPlex 7050	FTJZ9P2	N/A
Test Software	R&S	WMS32 (V11.00.00)	N/A	N/A
Power Meter	R&S	NRP2	107105	2021-12-10
Wideband Power Sensor	R&S	NRP-Z81	105677	2021-09-10
Shielding Room 8#	Albatross	SR8	APC17151-SR8	2021-07-23
Unwanted Emission Testing (TS9975)				
Equipment	Manufacturer	Model	Serial No.	Cal. until
EMI Test Receiver	R&S	ESR 7	102021	2021-08-11
Signal Analyzer	R&S	FSV 40	101439	2021-08-10
System Controller Interface	R&S	SCI-100	S10010038	N/A
Filterbank	R&S	Wlan	100759	2021-08-10
OSP	R&S	OSP 120	102040	N/A
Pre-amplifier	R&S	SCU08F1	08320031	2021-08-10
Amplifier	R&S	SCU-18F	180070	2021-08-10
Amplifier	R&S	SCU40A	100475	2021-09-10
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	2022-08-08

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Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	2022-08-08
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	2022-08-08
Active Loop Antenna	Schwarzbeck	FMZB 1513	302	2022-09-13
Wideband Ridged Horn Antenna (12-18 GHz)	Steatite	QMS-00208	18313	2021-09-02
Test software	R&S	EMC32 (V10.60.10)	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NV9P2	N/A
3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	2021-07-06

TUV Rheinland (Guangdong) Ltd.

Radiated Emission (3m chamber)				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
EMI Test Receiver	Rohde&Schwarz	ESCI 3	100216	2022-03-05
Trilog-Broadband Antenna	Schwarzbeckmess-elektronik	VULB9168	684	2021-08-21
Double-Ridged Horn Antenna	Rohde & Schwarz	HF907	102552	2022-06-06
EMI Test Receiver	Rohde&Schwarz	ESR7	102110	2021-04-09
Spectrum Analyzer	Rohde & Schwarz	FSP30	100286	2021-11-05
Electrostatic Discharge (ESD)				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
ESD Gun	TESEQ	NSG 437	615	2021-06-28
Radio Frequency Electromagnetic Field (RS)				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Signal Generator	Rohde&Schwarz	SMB100A	115613	2022-03-05
Power Meter	Rohde&Schwarz	NRX	100863	2022-03-05
Average Power Sensor	Rohde&Schwarz	NRP6A	101980	2022-03-05
Average Power Sensor	Rohde & Schwarz	NRP6A	101981	2022-03-05
Antenna	Amplifier Research	AT1080	0320070	2023-03-15
RF 1-6GHz Amplifier	Milmega	AS0860B-100-100	1085687	2022-01-15
Broad-band Horn Antenna	BBHA 9120 J	Rohde & Schwarz	00176	2023-03-15

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.

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-7}$
RF Power (conducted)	± 2.5 dB
Radiated Emission of Transmitter, valid up to 26.5 GHz	± 6 dB
Radiated Emission of Receiver, valid up to 26.5 GHz	± 6 dB
Radiated Emission (3m SAC), 30MHz to 1000MHz	± 5.34 dB
Radiated Emission (3m SAC), above 1000MHz	± 4.56 dB
Temperature	± 1 °C
Humidity	± 5 %
Voltage (DC)	± 1 %
Voltage (AC, <10kHz)	± 2 %

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A & B & C 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.

3 General Product Information

3.1 Product Function and Intended Use

The EUTs is a Bluetooth adaptor, which support Bluetooth LE wireless technology.

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

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment	Bluetooth adaptor
Type Designation	UT-D07B
Trademark	UNI-T
FCC ID	2APMK-UTD07B
Operating Voltage	DC 3.0V via non-rechargeable battery (2* AAA)
Testing Voltage	DC 3.0V by battery
Technical Specification of Bluetooth (BLE)	
Frequency Range	2402 MHz to 2480 MHz
Type of Modulation	GFSK(BT_LE)
Channel Number	40 channels
Data Rate	1 Mbps, 2Mbps
Channel Separation	2 MHz
Antenna Type	PCB Layout Antenna
Antenna Gain	0 dBi

Table 3: RF Channel and Frequency of Bluetooth (BLE)

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

3.3 Independent Operation Modes

The basic operation modes are:

- A. On, Bluetooth Low Energy transmitting mode
 - 1) Low Channel
 - 2) Middle Channel
 - 3) High Channel
- B. On, BT mode
- C. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Application Form

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 & ANSI C63.4: 2014.

According to clause 3.1, all tests were performed on model UT-D07B in this report.

4.3 Special Accessories and Auxiliary Equipment

Table 4: Auxiliary Equipment Used during Test

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

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)

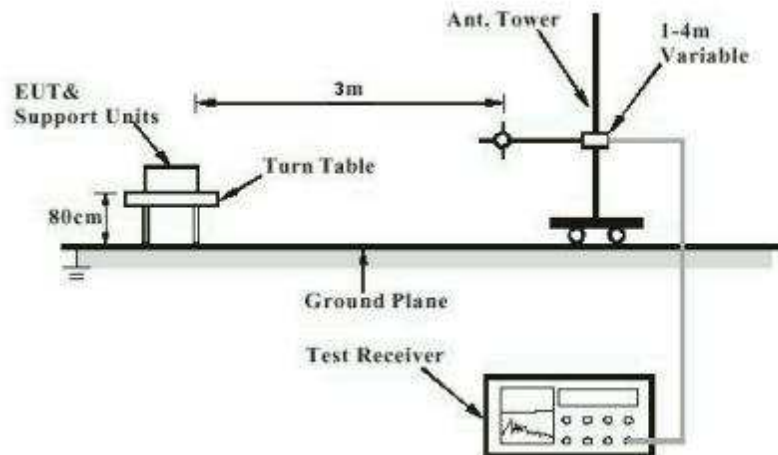


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

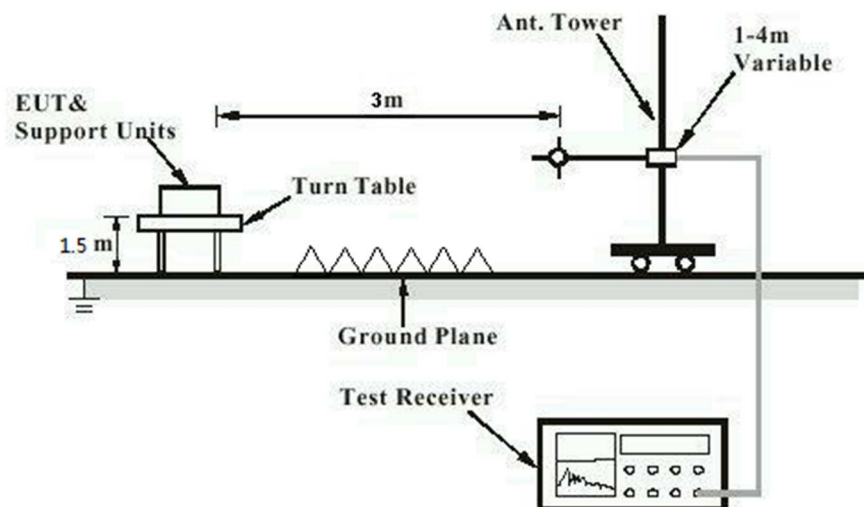


Diagram of Measurement Configuration for Mains Conduction Measurement

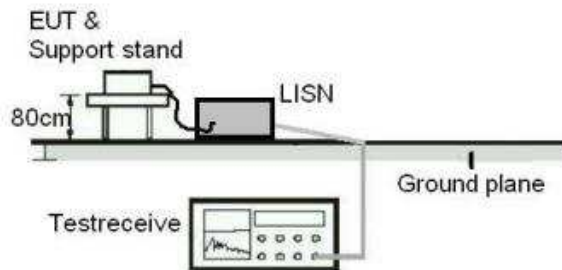
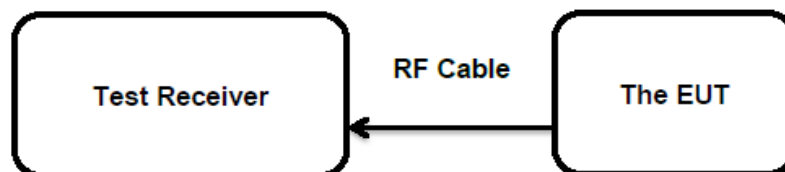


Diagram of Measurement Configuration for Conducted Transmitter Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:

Pass

Test Specification

Test standard : FCC Part 15.247(b)(4) and Part 15.203
RSS-Gen Clause 6.8

According to the manufacturer declared, the EUT has an internal antenna, the directional gain of antenna is 0 dBi, 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.

5.1.2 Maximum Peak Conducted Output Power

RESULT:

Pass

Test Specification

Test standard : FCC Part 15.247(b)(3)
RSS-247 Clause 5.4(d)
Basic standard : ANSI C63.10: 2013
Limits : 1.0 Watts
Kind of test site : Shielded Room

Test Setup

Date of testing : 2021-04-12
Input voltage : Fully charged battery
Operation mode : A
Test channel : Low / Middle / High
Ambient temperature : 24.6 °C
Relative humidity : 48 %
Atmospheric pressure : 101 kPa

Table 5: Test Result of Maximum Peak Conducted Output Power, BLE

Test Mode	Data Rate	Test Channel (MHz)	Measured Peak Power		Limit (W)
			(dBm)	(W)	
GFSK (BLE)	1 Mbps	2402	7.20	0.0052	< 1.0
		2440	7.40	0.0055	
		2480	7.10	0.0051	
	2 Mbps	2402	7.20	0.0052	
		2440	7.40	0.0055	
		2480	7.10	0.0051	
Maximum Measured Value			7.40	0.0055	

Note:

- 1) The cable loss is taken into account in results.
- 2) Antenna gain(G): 0 dBi,
e.i.r.p.=P_(Peak power)+ G, which is far below the 4 W

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5.1.3 Conducted Power Spectral Density

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

Test standard	: FCC Part 15.247(e) RSS-247 Clause 5.2(b)
Basic standard	: ANSI C63.10: 2013
Limits	: < 8 dBm / 3kHz
Kind of test site	: Shielded Room

Test Setup

Date of testing	: Refer to test result
Input voltage	: Fully charged battery
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 24.6 °C
Relative humidity	: 48 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix B.

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5.1.4 6dB Bandwidth

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

Test standard : FCC Part 15.247(a)(2)
RSS-247 Clause 5.2(a)

Basic standard : ANSI C63.10: 2013

Limits : > 500 KHz

Kind of test site : Shielded Room

Test Setup

Date of testing : 2021-04-12

Input voltage : Fully charged battery

Operation mode : A

Test channel : Low / Middle / High

Ambient temperature : 24.6 °C

Relative humidity : 48 %

Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix B.

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5.1.5 99% Bandwidth

RESULT:

Pass

Test Specification

Test standard : RSS-Gen Clause 6.7
Basic standard : ANSI C63.10: 2013
Kind of test site : Shielded Room

Test Setup

Date of testing : 2021-04-12
Input voltage : Fully charged battery
Operation mode : A
Test channel : Low / Middle / High
Ambient temperature : 24.6 °C
Relative humidity : 48 %
Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix B.

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Test Report No.Seite 18 von 21
Page 18 of 21**5.1.6 Conducted Spurious Emissions Measured in 100 kHz Bandwidth****RESULT:****Pass****Test Specification**

Test standard : FCC Part 15.247(d)
RSS-247 Clause 5.5

Basic standard : ANSI C63.10: 2013

Limits : 20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power);
In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a)

Kind of test site : Shielded Room

Test Setup

Date of testing : Refer to test result

Input voltage : Fully charged battery

Operation mode : A

Test channel : Low / Middle / High

Ambient temperature : 24.6 °C

Relative humidity : 48 %

Atmospheric pressure : 101 kPa

Test results of 100kHz Bandwidth of Frequency Band Edge by Conducted method refer to test plots, and compliance is achieved as well.

For the measurement records, refer to the appendix B.

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5.1.7 Radiated Spurious Emission

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

Test standard : FCC Part 15.247(d) & FCC Part 15.205
RSS-247 Clause 3.3

Basic standard : ANSI C63.10: 2013

Limits : Refer to 15.209(a) of FCC part 15.247(d)
RSS-Gen Section 8.9 & 8.10

Kind of test site : 3m Semi-anechoic Chamber

Test Setup

Date of testing : 2021-03-30

Input voltage : Fully charged battery

Operation mode : A

Test channel : Low / Middle / High

Ambient temperature : Refer to test result

Relative humidity : Refer to test result

Atmospheric pressure : 101 kPa

Remark:

Testing 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 B.

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5.1.8 Radiated Emission

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

Test standard	: FCC Part 15.109(a) ICES-003
Basic standard	: ANSI C63.4:2014
Frequency range	: Refer to FCC Part15.33
Classification	: Class B
Limits	: FCC Part 15.109(a) ICES-003 Table 2 & 4
Kind of test site	: 3m Semi-anechoic Chamber

Test Setup

Date of testing	: Refer to test result
Input voltage	: DC 3.0V by battery
Operation mode	: B
Earthing	: Not connected
Ambient temperature	: 23 °C
Relative humidity	: 50 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix C.

6 Photographs of the Test Set-Up

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

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