

Prüfbericht-Nr.: <i>Test Report No.:</i>	50087609 002	Auftrags-Nr.: <i>Order No.:</i>	164093954	Seite 1 von 20 <i>Page 1 of 20</i>	
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	24.05.2017		
Auftraggeber: <i>Client:</i>	Paralenz Group ApS. Refshalevej 163a ST.MF, Copenhagen K, 1432 Denmark				
Prüfgegenstand: <i>Test item:</i>	DIVE CAMERA				
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	PDC-1				
Auftrags-Inhalt: <i>Order content:</i>	Test Report				
Prüfgrundlage: <i>Test specification:</i>	CFR47 FCC Part15: Subpart C Section 15.247 RSS-247 Issue 2 February 2017 CFR47 FCC Part15: Subpart C Section 15.207 RSS-GEN Issue 4 November 2014 CFR47 FCC Part15: Subpart C Section 15.209				
Wareneingangsdatum: <i>Date of receipt:</i>	24.05.2017	Refer to Photo Document			
Prüfmuster-Nr.: <i>Test sample No.:</i>	A000552029-0001 A000552029-0002				
Prüfzeitraum: <i>Testing period:</i>	24.05.2017 - 10.07.2017				
Ort der Prüfung: <i>Place of testing:</i>	EMTEK (Shenzhen) 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:			
11.07.2017 Hardy Suo / Assistant Project Manager		11.07.2017 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: FCC ID: 2AL8V-PDC1A IC: 22808-PDC1A HVIN: PDC-1					
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 ANTENNA REQUIREMENT*RESULT: Pass***5.1.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER***RESULT: Pass***5.1.3 POWER SPECTRAL DENSITY***RESULT: Pass***5.1.4 6dB BANDWIDTH***RESULT: Pass***5.1.5 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 KHZ BANDWIDTH***RESULT: Pass***5.1.6 RADIATED SPURIOUS EMISSION***RESULT: Pass***5.1.7 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 appendixes:
Appendix A: Test data of 2.4GHz band Wi-Fi.

2. Test Sites

2.1 Test Facilities

EMTEK (Shenzhen) Co., Ltd.
 Address: Bldg. 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China.

FCC Registration No.: 406365
 ISED Registration No.: 4480A-2

Note: 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 Radio Test and Measurement Equipment

Radio Spectrum						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Signal Analyzer	Agilent	N9010A	My53470879	May.27, 2017	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	FSV40	132.1-3008K39-100967-AP	May.27, 2017	1 Year
3.	Power Analyzer	Agilent	PS-X10-200	N/A	May.27, 2017	1 Year
4.	Test Accessories	Agilent	PS-X10-100	N/A	May.27, 2017	1 Year
5.	Cable	Agilent	N/A	3#	May.27, 2017	1 Year
6.	Cable	Agilent	N/A	5#	May.27, 2017	1 Year
Spurious Emissions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESCI	101414	May.27, 2017	1 Year
2.	Loop Antenna	Schwarzbeck	FMZB 1519	1519-012	May.27, 2017	1 Year
3.	Pre-Amplifier	LUNAR-EM	LNA30M3G-25	J10100000071	May.27, 2017	1 Year
4.	Bilog Antenna	Schwarzbeck	VULB9163	660	May 28, 2017	1 Year
5.	Cable	H+B	NmSm-05-C15052		May 28, 2017	1 Year
6.	Cable	H+B	NmSm-2-C15201		May 28, 2017	1 Year
7.	Cable	H+B	NmNm-7-C15702		May 28, 2017	1 Year
8.	EMI Test Receiver	Rohde & Schwarz	FSV40	132.1-3008K39-100967-AP	May.27, 2017	1 Year
9.	Pre-Amplifier	Lunar EM	LNA1G18-48	J1011131010001	May.27, 2017	1 Year
10.	Pre-Amplifier	Lunar EM	LNA18G26-40	J1012131010001	May.27, 2017	1 Year
11.	Horn Antenna	Schwarzbeck	BBHA 9120	1178	May 28, 2017	1 Year
12.	Horn Antenna	Schwarzbeck	BBHA 9170	RS1307229170547	May 28, 2017	1 Year
13.	Horn Antenna	AHS/USA	SAS-573	184	May 28, 2017	1 Year
14.	Cable	H+B	SAC-40G-1	414	May 28, 2017	1 Year
15.	Cable	H+B	SUCOFLEX104	MY14871/4	May 28, 2017	1 Year

16.	Cable	H+B	BLU18A-NmSm-6500	D8501	May 28, 2017	1 Year
17.	Cable	A.H	SAC-40G-1	413	May 28, 2017	1 Year
Conducted Emissions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI	26115-010-0027	May 27, 2017	1 Year
2.	L.I.S.N.	Rohde & Schwarz	ENV216	101161	May 27, 2017	1 Year

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 Uncertainty of Measurement

The value of the measurement uncertainty of each parameter is listed as below:

Table 2: Measurement Uncertainty

Test Item	Uncertainty
RF Output Power	±1.5 dB
Power Spectral Density	±3.0 dB
Frequency Error	±3.3%
Occupied Channel Bandwidth	±5%
Conducted Spurious Emissions	±3.0 dB
Radiated Spurious Emissions	±3.7dB (below 30MHz) ±3.78dB (30MHz~1GHz) ±4.46dB (1~6GHz) ±4.96dB (6~18GHz)
Conducted Emissions	±2.9dB
Temperature	±3.2%
Humidity	±2.5%

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A of 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 EMTEK (Shenzhen) Co., Ltd. Test facility located at Bldg. 69, Majialong Industry Zone, 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 DIVE CAMERA which that supports Bluetooth classic, Bluetooth BLE and IEEE 802.11 b/g/n protocols.

Note: This report is for 2.4GHz Band only.

For details refer to user manual and circuit diagram.

3.2 Ratings and System Details

Table 3: Technical Specification

Technical Specification	Value
Product Name	DIVE CAMERA
Model	PDC-1
Frequency Bandwidth	2400-2483.5MHz
Operating Frequency/Channels/Protocol	2412-2462MHz/11CH/802.11b/g/n-HT20 2402-2480MHz
Channel Spacing	1 MHz, 2MHz, 5MHz
Extreme Temperature Range	-20 ~ +55 °C
Modulation	DSSS (DBPSK, DQPSK, CCK) OFDM (BPSK, QPSK, 16QAM, 64QAM) GFSK, pi/4-DQPSK, 8-DPSK
Antenna Number	1
Antenna Type	Integral antenna
Antenna Gain	2.4GHz band: 2.0dBi max
Operation Voltage	Powered by USB Type-C port 5.0Vdc or rechargeable battery (DC 3.8V, 1600mAh)

Table 4: 2.4GHz Band channel and frequency

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

3.3 Independent Operation Modes

The basic operation modes are:

- A. Tx, (2.4GHz Band, 802.11b/g/n)
 - 1. Lowest channel
 - 2. Middle channel
 - 3. Highest channel
- B. Normal operation
- C. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Application Form
- Circuit Diagram
- Instruction Manual
- Photo Documents
- Technical Description
- Bill of Material
- Rating Label

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.

Emissions: 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

Test operation refers to test setup in chapter 5. All testing were performed according to the procedures in ANSI C63.10:2013.

Table 5: 2.4GHz band Test channels

Test channels
CH1-2412MHz
CH6-2437MHz
CH11-2462MHz

Table 6: Worst case test modes

Operating Mode	Worst Test Mode	
	Mode	Duty Cycle
802.11b	1 Mbit/s	>98%
802.11g	6 Mbit/s	>98%
802.11n-HT20	MCS0	>98%

4.3 Special Accessories and Auxiliary Equipment

Table 7: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N
Notebook	LENOVO	WB0205140E	WB06355728
Wireless Access Point	Cisco	AIR-CAP3702E-A-K9	FTX182276QD FCC ID: LDK102087 IC ID: 2461B-102087

4.4 Countermeasures to Achieve ERM 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)

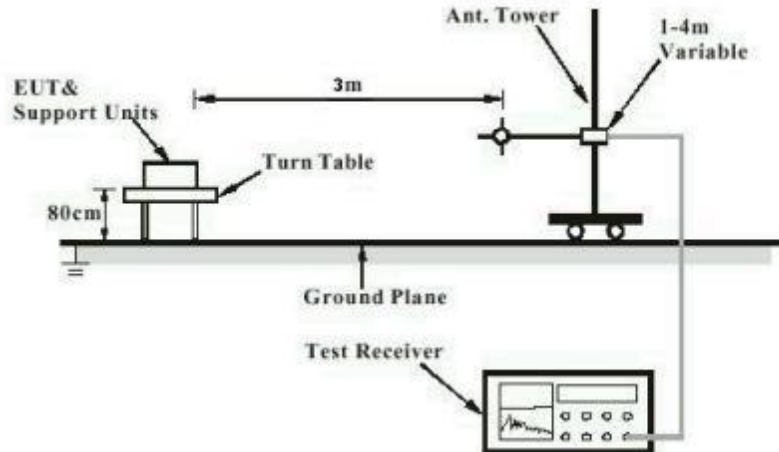


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

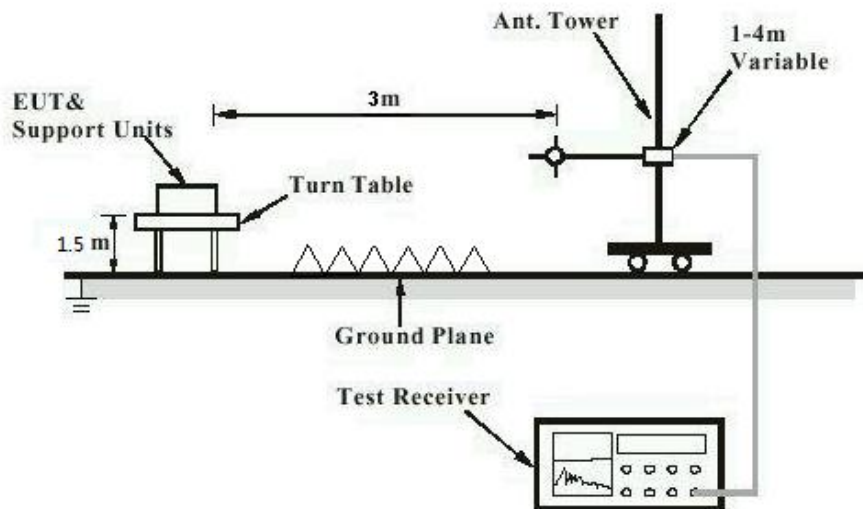


Diagram of Measurement Configuration for Mains Conduction Measurement

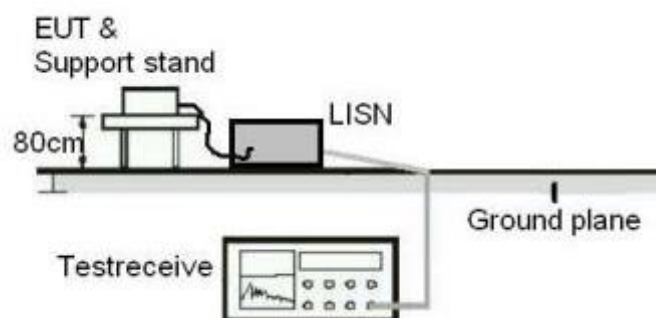
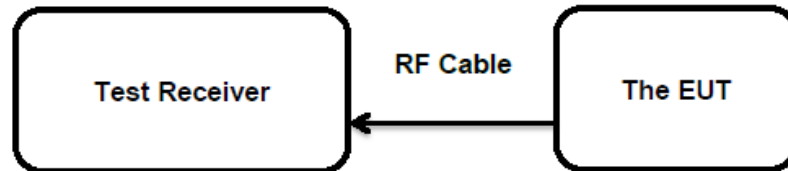


Diagram of Measurement Configuration for Conducted Transmitter Measurement



5. Test Results

5.1 Radio Test Requirement & Test Suites (2.4GHz Band)

5.1.1 Antenna Requirement

RESULT:

Pass

Test Specification

Test standard : FCC Part 15.203
RSS-GEN Clause8.3

The EUT has an integral antenna which in accordance to section 15.203 is considered sufficient to comply with the provisions of this section. a

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 Watt (30dBm) (Maximum peak conducted output power)
	:	* < 4 Watt (36dBm) (e.i.r.p.)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2017-06-14
Input voltage	:	120Vac, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

*Note: The maximum gain of antenna is less than 6dBi.

Refer to attached Appendix A for details of test data.

5.1.3 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	:	< 8dBm/3kHz
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2017-06-17
Input voltage	:	120Vac, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

Refer to attached Appendix A for details of test data.

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	:	> 500KHz
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2017-06-14
Input voltage	:	120Vac, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

Refer to attached Appendix A for details of test data.

5.1.5 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	:	20dBc (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2017-06-17
Input voltage	:	120Vac, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

Refer to attached Appendix A for details of test data.

5.1.6 Radiated Spurious Emission**RESULT:****Pass****Test Specification**

Test standard	:	FCC Part 15.247(d) & FCC Part 15.205 & FCC Part 15.209
	:	RSS-247 clause 3.3
Basic standard	:	ANSI C63.10:2013
Limits	:	FCC Part 15.209
	:	RSS-GEN clause 8.9 and 8.10
Kind of test site	:	3m Semi-Anechoic Chamber (below 1GHz)
	:	3m Anechoic Chamber (above 1GHz)

Test Setup

Date of testing	:	2017-07-06
Input voltage	:	120Vac, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	23 °C
Relative humidity	:	48 %
Atmospheric pressure	:	101 kPa

Refer to attached Appendix A for details of test data.

5.1.7 Conducted Emission on AC Mains**RESULT:****Pass****Test Specification**

Test standard	:	FCC Part 15.207
	:	RSS-GEN clause 8.8
Basic standard	:	ANSI C63.10:2013
Frequency range	:	0.15 - 30MHz
Limits	:	FCC Part 15.207
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2017-06-21
Input voltage	:	120Vac, 60Hz
Operation mode	:	B
Earthing	:	Not connected
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

Refer to attached Appendix A for details of test data.

6. Photographs of the Test Set-Up

Photograph 1: Set-up for Radiated Spurious Emission up to 1GHz

Please refer to the attached setup photos.

Photograph 2: Set-up for Radiated Spurious Emission above 1GHz

Please refer to the attached setup photos.

Photograph 3: Set-up for Conducted Emission on AC Mains

Please refer to the attached setup photos.

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