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6 March 2014

Prüfbericht / *Test Report* Nr. / *No.* 70464-37519-02 (Edition 1)

Auftraggeber *Applicant*	Weatherdock AG Germany
Geräteart *Type of equipment*	AIS Transmitter
Typenbezeichnung *Type designation*	easyONE (AIS-MOB)
Seriennummer / *Serial number*	A109
Auftragsnummer / *Order No.*	1984
Prüfgrundlage *Test standards*	EN 300 440-1 V1.6.1 EN 300 440-2 V1.4.1

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Summary

Prüfergebnisse / *Test Results*	Auftragsnummer / *Order No.* **1984**

Die Prüfungen wurden nach folgenden Vorschriften durchgeführt:
Tests were performed according to:

EN 300 440-1 V1.6.1
EN 300 440-2 V1.4.1

Durchgeführte Prüfung ***Test performed***	**Prüfergebnis** ***Test result***			
	Erfüllt *Passed*	Nicht erfüllt *Not Passed*	Nicht zutreffend *Not applicable*	Nicht durchgeführt *Not performed*
Effektive Isotropische Strahlungsleistung / *Effective isotropically radiated power*	☐	☐	☒	☐
Modulationsbandbreite / *Permitted range of operating frequencies*	☐	☐	☒	☐
Nebenaussendungen / *Unwanted emissions in the spurious domain*	☐	☐	☒	☐
Duty Cycle/ *Duty cycle*	☐	☐	☒	☐
Empfängerempfindlichkeit / Receiver sensitivity	☐	☐	☒	☐
Nachbarkanalselektivität / Adjacent channel selectivity	☐	☐	☒	☐
Blocking / Blocking	☐	☐	☒	☐
Empfänger-Nebenaussendungen / Receiver spurious radiation	☒	☐	☐	☐
Spektrum / *Spectrum Access Techniques*	☐	☐	☒	☐

Bemerkungen / *Remarks:*

Die Prüfergebnisse beziehen sich ausschließlich auf das zur Prüfung vorgestellte Prüfmuster. Ohne schriftliche Genehmigung des Prüflabors darf der Prüfbericht auszugsweise nicht vervielfältigt werden. *The test results relate only to the individual item which has been tested. Without the written approval of the test laboratory this report may not be reproduced in extracts.*

Datum / *Date*	Geprüft von / *Tested by*	Freigabe durch / *Checked by*
2014-03-06	Steindl Martin Martin Steindl Responsible for testing	Roidt Johann Roidt Laboratory manager

Prüfergebnis / *Test Result*

☒ **Erfüllt / *Passed***

☐ **Nicht erfüllt / *Not passed***

Table of Contents

1 Administrative Data

Application details	
Applicant:	Weatherdock AG Germany Sigmundstraße 180 D-90431 Nürnberg
Contact person:	Nr. Norman Jörns
Order number:	1984
Receipt of EUT:	2014-03-03
Return of EUT:	2014-03-03
Date(s) of test:	2014-03-03
Note(s):	Mr. Jörns, representing the applicant attended all tests. The EUT was in care of Mr. Jörns all the time. This test reports covers the radio spectrum matters of the GPS receiver of the EUT, only.
Responsible for testing:	Mr. Martin Steindl
Responsible for test report:	Mr. Martin Steindl
Test report checked by:	Mr. Johann Roidt

Report details	
Report number:	70464-37519-02
Edition:	1
Issue date:	2014-03-06

2 Details about the Test Laboratory

Details about the Test Laboratory	
Company name:	TÜV SÜD Product Service GmbH
Address:	Äußere Frühlingstraße 45 D-94315 Straubing Germany
Laboratory accreditation:	DAkkS Registration No. D-PL-11321-11-01
Contact:	Mr. Johann Roidt Phone: +49 9421 5522-0 Fax: +49 9421 5522-99

3 Description of the Equipment Under Test

Equipment characteristics	
Type designation:	easyONE (AIS-MOB)
Parts of the system:	
Options and accessories:	
Type of equipment:	AIS Transmitter
Serial number:	A109
Manufacturer:	Weatherdock AG
Application:	GPS
Equipment class:	Equipment for portable use
Kind of equipment:	Receiver
Frequency range:	1575.42 MHz
Operating Frequency:	1575.42 MHz
Rated Carrier Power:	N/A
Channel spacing	Wideband
Number of RF-channels:	1
Antenna type:	Integrated
Antenna size:	N/A
Receiver category:	3 (Standard reliable SRD communication media)
Standby mode:	Not Applicable
Temperature Range:	-20 °C to +55 °C
Nominal Temperature:	+20 °C
Power supply:	Battery supply (lithium) Nominal: 6.0 V
Version of EUT:	As received

4 Operation Mode and Configuration of EUT

Operation Mode(s)
GMDSS standby, GPS active

List of ports and cables				
No.	*Description*	*Classification*[1]	*Cable type*	*Cable length*
S1	GMDSS Antenna	signal/control port	Unshielded	33 cm

List of devices connected to EUT				
No.	*Description*	*Type designation*	*Serial no. or ID*	*Manufacturer*

List of support devices				
No.	*Description*	*Type designation*	*Serial no. or ID*	*Manufacturer*
	---			

[1] Ports shall be classified as ac power, dc power or signal/control port.

5 Receiver category

The product family of short range radio devices is divided into three receiver categories, each having a set of relevant receiver requirements and minimum performance criteria. The set of receiver requirements depends on the choice of receiver category by the equipment provider.

Receiver category		
Receiver category	*Relevant receiver clauses in referenced standard*	
1	8.1, 8.2 and 8.3	Highly reliable SRD communication media; e.g. serving human life inherent systems (may result in a physical risk to a person).
2	8.2 and 8.3	Medium reliable SRD communication media e.g. causing Inconvenience to persons, which cannot simply be overcome by other means.
3	8.3	Standard reliable SRD communication media e.g. Inconvenience to persons, which can simply be overcome by other means (e.g. manual).
Selected receiver category:		3 (Standard reliable SRD communication media)
Note:	With reference to the present document manufacturers are recommended to declare category of their devices in accordance with this table, as relevant. In particular where an SRD which may have an inherent safety of human life implication, manufacturers and users should pay particular attention to the potential for interference from other systems operating in the same or adjacent bands.	

The receiver category 1, 2 or 3 shall be stated in the user's manual for the equipment.

5.1 General performance criteria

General performance criteria
☐ A SND/ND ratio of 20 dB, measured at the receiver output through a telephone psophometric weighting network
☐ After demodulation, a data signal with a bit error of 10^{-2}, provided that forward error correction, where provided, is disabled
☐ After demodulation, a message acceptance ratio of 80 %
☐ Applicant declares the performance criteria used to determine the performance of the receiver as described in 5.2.
☒ Not Applicable

5.2 Performance criteria as declared by applicant

Performance criteria		
Criteria during test		
Criteria	*Pass*	*Fail*
A	Operating as inteded No loss of function	Any degradation of performance
B	Loss of function (one or more)	---
Criteria after test		
Criteria	*Pass*	*Fail*
A	Operating as inteded No loss of function No degradation of performance	Any degradation of performance
B	Operating as intended Loss of function(s) self-recoverable No degradation of performance	Anny degradation of performance not self-recoverable

Methods of Observation			
Function	*Observed size*	*Permissible range*	*Observation method*
---			

6 Referenced Regulations

European publication	*International publication*	*Title*
EN 55016-1-1:2007 + A1:2007 + A2:2008	IEC/CISPR 16-1-1:2007 Edition 2.2	Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-1: Radio disturbance and immunity measuring apparatus - Measuring apparatus
EN 55016-1-4:2007 + A1:2008	IEC/CISPR 16-1-4:2008 Edition 2.1	Specification for radio disturbance and immunity measuring apparatus and methods - Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-4: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Radiated disturbances
EN 300 440-1 V1.6.1	---	Electromagnetic compatibility and Radio Spectrum Matters (ERM); Short range devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Part 1: Technical characteristics and test methods
EN 300 440-2 V1.4.1	---	Electromagnetic compatibility and Radio Spectrum Matters (ERM); Short range devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Part 2: Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive

7 Measurement Uncertainty Values

Radio Testing			
Test	k_p	*Expanded Uncertainty*	*Note*
RF-Frequency error	1.96	$\pm 1 \cdot 10^{-7}$	7
RF-Power, conducted carrier	1.96	+0.077 dB / -0.078 dB	7
RF-Power uncertainty for given BER	1.96	+0.94 dB / -1.05	7
RF power, conducted, spurious emissions	1.96	+1.4 dB / -1.6 dB	7
RF power, radiated			
25 MHz – 4 GHz	1.96	+3.6 dB / -5.2 dB	8
1 GHz – 18 GHz	1.96	+3.8 dB / -5.6 dB	8
18 GHz – 26.5 GHz	1.96	+3.5 dB / -4.5 dB	8
26.5 GHz – 66 GHz	1.96	+4.0 dB / -6.5 dB	8
Spectral Power Density, conducted	1.96	+1.4 dB / -1.6 dB	5
Maximum frequency deviation			
300 Hz – 6 kHz	2	±2,89 %	2
6 kHz – 25 kHz	2	±0.2 dB	2
Maximum frequency deviation for FM	2	±2,89 %	2
Adjacent channel power 25 MHz – 1 Ghz	2	±2.31 %	2
Temperature	2	±0.39 K	4
(Relative) Humidity	2	±2.28 %	2
DC- and low frequency AC voltage			
DC voltage	2	±0.01 %	2
AC voltage up to 1 kHz	2	±1.2 %	2
Time	2	±0.6 %	2

Radio Interference Emission Testing			
Test	k_p	*Expanded Uncertainty*	*Note*
Conducted Voltage Emission			
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB	1
100 kHz to 200 MHz (50Ω/5µH AMN)	2	± 3.6 dB	1
Discontinuous Conducted Emission			
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB	1
Conducted Current Emission			
9 kHz to 200 MHz	2	± 3.5 dB	1
Magnetic Fieldstrength			
9 kHz to 30 MHz (with loop antenna)	2	± 3.9 dB	1
9 kHz to 30 MHz (large-loop antenna 2 m)	2	± 3.5 dB	1
Radiated Emission			
Test distance 1 m (ALSE)			
9 kHz to 150 kHz	2	± 4.6 dB	1
150 kHz to 30 MHz	2	± 4.1 dB	1
30 MHz to 200 MHz	2	± 5.2 dB	1
200 MHz to 2 GHz	2	± 4.4 dB	1
2 GHz to 3 GHz	2	± 4.6 dB	1
Test distance 3 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 5.0 dB	1
1 GHz to 6 GHz	2	± 4.6 dB	1
Test distance 10 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 4.9 dB	1

Radio Interference Emission Testing (continued)			
Test	k_p	*Expanded Uncertainty*	*Note*
Radio Interference Power			
30 MHz to 300 MHz	2	± 3.5 dB	1
Harmonic Current Emissions			4
Voltage Changes, Voltage Fluctuations and Flicker			4

Immunity Testing			
Test	k_p	*Expanded Uncertainty*	*Note*
Electrostatic Discharges			4
Radiated RF-Field			
Pre-calibrated field level	2	+32.2 / -24.3 %	5
Dynamic feedback field level	2.05	+21.2 / -17.5 %	3
Electrical Fast Transients (EFT) / Bursts			4
Surges			4
Conducted Disturbances, induced by RF-Fields			
via CDN	2	+15.1 / -13.1 %	6
via EM clamp	2	+42.6 / -29.9 %	6
via current clamp	2	+43.9 / -30.5 %	6
Power Frequency Magnetic Field	2	+20.7 / -17.1 %	2
Pulse Magnetic Field			4
Voltage Dips, Short Interruptions and Voltage Variations			4
Oscillatory Waves			4
Conducted Low Frequency Disturbances			
Voltage setting	2	± 0.9 %	2
Frequency setting	2	± 0.1 %	2
Electrical Transient Transmission in Road Vehicles			4

Note 1:
The expanded uncertainty reported according to CISPR 16-4-2:2003-11 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%

Note 2:
The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%

Note 3:
The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of kp = 2.05, providing a level of confidence of p = 95.45%

Note 4:
It has been demonstrated that the used test equipment meets the specified requirements in the standard with at least a 95%confidence.

Note 5:
The expanded uncertainty reported according to IEC 61000-4-3 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%

Note 6:
The expanded uncertainty reported according to IEC 61000-4-6 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%

Note 7:
The expanded uncertainty reported according ETSI TR 100 028 V1.4.1 (all parts) to is based on a standard uncertainty multiplied by a coverage factor of k_p = 1.96, providing a level of confidence of p = 95.45%

Note 8:
The expanded uncertainty reported according to ETSI TR 102 273 V1.2.1 (all parts) is based on a standard uncertainty multiplied by a coverage factor of kp = 1.96, providing a level of confidence of p = 95.45%

8 Test Results

Transmitter Tests

EN 300 440-1			
Section(s)	*Test performed*	*Page*	*Test Result*
7.1	Effective radiated power	---	Not applicable
7.2	Permitted range of operating frequencies	---	Not applicable
7.3	Unwanted emissions in the spurious domain		
7.3.2	Conduted – Transmitter operating	---	Not applicable
7.3.2	Conduted – Transmitter standby	---	Not applicable
7.3.3 7.3.4	Radiated – Transmitter operating	---	Not applicable
7.3.3 7.3.4	Radiated – Transmitter standby	---	Not applicable
7.4	Duty Cycle	---	Not applicable
7.5	FHHS Modulation	---	Not applicable

Receiver Tests

EN 300 440-1			
Section(s)	*Test performed*	*Page*	*Test Result*
8.1	Adjacent channel selectivity	---	Not applicable
8.2	Blocking	---	Not applicable
8.3	Receiver spurious radiation		
8.3.2	Conducted	---	Not applicable
8.3.3 8.3.4	Radiated	18	Test passed

Spectrum Acces Techniques

EN 300 440-1			
Section(s)	*Test performed*	*Page*	*Test Result*
9.1	Principle for Listen Before Talk (LBT)	---	Not applicable
9.2	Receiver LBT threshold and transmitter max-on-time	---	Not applicable
9.3	Detect And Avoid techniques (DAA)	---	Not applicable
9.4	Adaptive Frequency Agility (AFA)	---	Not applicable

8.1 Receiver spurious radiation

8.1.1 Test Equipment List

	Type		*Designation*	*Inv.-no.*	*Serial No. or ID*	*Manufacturer*
☒	Spectrum analyzer		FSP30	1666	100036	Rohde & Schwarz
☐	EMI test receiver	Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
☐	EMI test receiver		ESU8	2044	100232	Rohde & Schwarz
☐	EMI test receiver		ESMI	1569	839379/013 839587/006	Rohde & Schwarz
☐	Attenuator		4776-10	1638	9412	Narda
☐	Attenuator		4776-20	1639	9503	Narda
☐	DC-block		7006	1636	A2798	Weinschel
☒	Preamplifier	Cabin no. 2	CPA9231A	1651	3393	Schaffner
☒	Preamplifier (1 – 8 GHz)		AFS3-00100800-32-LN	1684	847743	Miteq
☐	Preamplifier (0.5 – 8 GHz)		AMF-4D-005080-25-13P	1685	860149	Miteq
☒	Preamplifier (8 – 18 GHz)		ACO/180-3530	1484	32641	CTT
☒	Trilog antenna	Cabin no. 2	VULB 9163	2058	9163-408	Schwarzbeck
☐	Trilog antenna	Cabin no. 8	VULB 9163	1802	9163-214	Schwarzbeck
☒	Horn antenna		3115	1516	9508-4553	EMCO
☐	Horn antenna		HF907	2073	100154	Rohde & Schwarz
☐	Horn antenna		3160-03	1010	9112-1003	EMCO
☐	Horn antenna		3160-04	1011	9112-1001	EMCO
☐	Horn antenna		3160-05	1012	9112-1001	EMCO
☒	Horn antenna		3160-06	1013	9112-1001	EMCO
☒	Horn antenna		3160-07	1014	9112-1008	EMCO
☒	Horn antenna		3160-08	1015	9112-1002	EMCO
☐	Horn antenna		3160-09	1265	9403-1025	EMCO
☐	Horn antenna		3160-10	1575	399185	EMCO
☐	Horn antenna		24240-20	2086	157845	Flann
☐	Horn antenna		25240-25	2180	205900	Flann
☐	Horn antenna		27240-25	2182	204260	Flann
☐	Harmonic Mixer Accessories		FS-Z30	1577	624413/003	Rohde & Schwarz
☐	External Mixer		WM782A	1576	845881/005	Tektronix
☐	External Mixer		WM782U	2085	B030121	Tektronix
☐	External Mixer		WM782V	2140	B030132	Tektronix
☐	External Mixer		WM782W	2181	B010193	Tektronix
☒	Fully anechoic room		No. 2	1452	---	Albatross
☐	Semi anechoic room		No. 3	1453	---	Siemens
☐	Semi anechoic room		No. 8	2057	---	Albatross

8.1.2 Test Results

Results for receiver spurious emissions in test are documented as listed below.

Radiated

Prüfdatum / *Date of test:*	2014-03-03
Prüfer / *Operator:*	Martin Steindl
Messplatz / *Test site:*	Fully anechoic room, cabin no. 2

Prüfergebnis / *Test Result*

☒ **Erfüllt / *Passed***

☐ **Nicht erfüllt / *Not passed***

Luftdruck / *Barometric pressure:*	955.3 hPa
Relative Luftfeuchtigkeit / *Relative humidity:*	30.1 %
Temperatur / *Ambient temperature:*	23.9 °C

Prüfgrundlage / *Specifications:*	EN 300 440-1 V1.6.1, Sections 8.3.3, 8.3.4
Betriebsart / *Operation mode:*	GPS receiver active
Kommentar / *Comment:*	

Frequency (MHz)	Resolutionbandwidth (kHz)	Spurious emission level (dBm)	Limit (dBm)	Margin (dB)
162.28	100	-71.7	-57.0	14.7
287.86	100	-72.7	-57.0	15.7
1944.13	1000	-62.1	-47.0	15.1
4698.93	1000	-52.4	-47.0	5.4
4728.03	1000	-52.0	-47.0	5.0
4860.60	1000	-51.1	-47.0	4.1

Grenzwert / *Limit*	
Frequencies ≤ 1000 MHz	*Frequencies > 1000 MHz*
2 nW (-57 dBm)	20 nW (-47 dBm)

9 Additional informations

There are no additional informations to this test report

10 Revision History

Revision History			
Edition	*Date*	*Issued by*	*Modifications*
1	2014-03-06	M. Steindl (gz)	First Edition