

RF Exposure and Maximum ERP/EIRP Assessment

For

VEGAPULS
C 11, C 21, C 22, C 23

FCC ID: O6QBRA200
IC: 3892A-BRA200

Assessment Reference: MDE_VEGA_1902_MPE_04

Test Laboratory:
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Note:

The following test results relate only to the devices specified in this document. This report shall not be reproduced in parts without the written approval of the test laboratory.

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0 Summary

0.1 Technical Report Summary

Type of Report

RF Exposure and Maximum ERP/EIRP Assessment for Radar sensors with Radar and Bluetooth Low Energy.

Applicable FCC and ISSED Rules

For RF Exposure:

OET Bulletin 65 Edition 97-01 August 1997

FCC 47 CFR §1.1307

FCC 47 CFR §1.1310

RSS-102 Issue 5 – March 2015

For Maximum ERP/EIRP:

FCC 47 CFR §15.247

FCC 47 CFR §15.256

IC RSS-247, Issue 2

IC RSS-211, Issue 1

Report version control			
Rev Version	Release date	Changes	Version validity
-	02.04.2020	Initial version	Invalid
1	22.04.2020	Deleted Maximum EIRP part	Invalid
2	29.04.2020	Corrected EIRP value for Radar	Invalid
3	06.05.2020	Maximum radiated value for Radar changed	Valid

1 Administrative Data

1.1 Laboratory

Company Name:	7layers GmbH
Address	Borsigstr. 11 40880 Ratingen Germany
FCC accreditation	Designation Number: DE0015 Test Firm Registration #: 929146
Industry Canada Test Site Acceptance	CAB identifier: DE0007 Test Firm Registration #: 3699A
The test facility is also accredited by the following accreditation organisation: Laboratory accreditation no.:	DAkKS D-PL-12140-01-01 DAkKS D-PL-12140-01-02 DAkKS D-PL-12140-01-03
Responsible for Accreditation Scope:	Dipl.-Ing. Bernhard Retka Dipl.-Ing. Robert Machulec Dipl.-Ing. Andreas Petz Dipl.-Ing. Marco Kullik
Report Template Version:	2020-02-19

1.2 Project Data

Responsible for assessment and report:	Mrs. Melanie Anastassiou
Date of Report:	2020-05-06

1.3 Applicant Data

Company Name:	VEGA Grieshaber KG
Address:	Am Hohenstein 113 77761 Schiltach Germany
Contact Person:	Mr. Patrick Friedmann

1.4 Manufacturer Data

Company Name:	please see applicant data
Address:	
Contact Person:	

2 Test object Data

2.1 General EUE Description

Equipment under Evaluation VEGAPULS C 11, C 21, C 22, C 23
 Type Designation: VEGAPULS
 Kind of Device: Radar sensors

General product description:

Radar sensors for continues level measurement of liquids with Bluetooth Low Energy.

2.2 EUT Main components

Type, S/N, Short Descriptions etc. used in this Test Report

Short Description	Equipment under Evaluation	Type Designation	Serial No.	HW Status	SW Status
EUE A (BLE radiated)	VEGAPULS C 21	VEGAPULS	PULS C21 Bluetooth Testmode-rad	1.2.0	1.1.0
EUE B (BLE radiated)	VEGAPULS C 22	VEGAPULS	PULS C22 Bluetooth Testmode-rad	1.2.0	1.1.0
EUE C (BLE radiated)	VEGAPULS C 23	VEGAPULS	PULS C23 Bluetooth Testmode-rad	1.2.0	1.1.0
EUE D (BLE conducted)	VEGAPULS C 23	VEGAPULS	PULS C23 Bluetooth Testmode-cond	1.2.0	1.1.0
EUE E (Radar)	VEGAPULS C 21	VEGAPULS	13202003	1.1.0	1.1.0
EUE F (Radar)	VEGAPULS C 21	VEGAPULS	PULS C21 Radar-Test-Sample	1.1.0	1.1.0
EUE G (Radar)	VEGAPULS C 22	VEGAPULS	13302222	1.1.0	1.1.0
EUE H (Radar)	VEGAPULS C 23	VEGAPULS	132023	1.1.0	1.1.0

NOTE: The short description is used to simplify the identification of the EUE in this test report.

2.3 Ancillary Equipment

For the purposes of this test report, ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Ancillary Equipment can influence the test results.

Short Description	Equipment under Test	Type Designation	HW Status	SW Status	Serial no.	FCC ID
N/A						

2.4 Auxiliary Equipment

For the purposes of this test report, auxiliary equipment is defined as equipment which is used temporarily to enable operational and control features especially used for the tests of the EUT which is not used during normal operation or equipment that is used during the tests in combination with the EUT but is not subject of this test report. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Auxiliary Equipment can influence the test results.

Short Description	Equipment under Test	Type Designation	Serial no.	HW Status	SW Status	FCC ID
N/A						

3 Evaluation Results

3.1 RF Exposure Evaluation

Standards
OET Bulletin 65 Edition 97-01 August 1997
RSS-102 Issue 5 – March 2015

3.1.1 Test limits

As specified in Table 1B of 47 CFR 1.1310 – Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure.

Frequency range (MHz)	Power density (mW/cm ²)
300 – 1,500	f/1500
1,500 – 100,000	1.0

Limits specified per RSS-102, Issue 5.

Frequency range (MHz)	Power density (W/m ²)	Power density (mW/cm ²)
300 – 6000	0.02619 f ^{0.6834}	mW/cm ² = W/m ² * 0.1

Equation OET bulletin 65, page 18, edition 97-01:
$$S = \frac{PG}{4\pi R^2} = \frac{EIRP}{4\pi R^2}$$

Where:

S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the centre of radiation of the antenna

3.1.2 Test Protocol

Comply with MPE limits for FCC

Technology	Duty Cycle (%)	Maximum Conducted / Radiated output power (dBm)	Maximum Conducted / Radiated output power (mW)	antenna gain (dBi)	MPE Limit (mW/cm ²)	Power Density (mW/cm ²)	Separation distance (cm)
BTLE	100	0	1.0000	4,0	1,0000	0.0005	20
Radar	100	34,0	2511.8864	-	1,0000	0.4997	20
Co-Location	100	-	-	-	1,0000	0.5002	20

Comply with MPE limits for Industry Canada

Technology	Duty Cycle (%)	Maximum Conducted / Radiated output power (dBm)	Maximum Conducted / Radiated output power (mW)	antenna gain (dBi)	MPE Limit (mW/cm ²)	Power Density (mW/cm ²)	Separation distance (cm)
BTLE	100	0	1.0000	4,0	0,5351	0.0005	20
Radar	100	34,0	2511.8864	-	1,0000	0.4997	20
Co-Location	100	-	-	-	1,0000	0.5002	20

3.1.3 Conclusion

The product found compliant for FCC and Industry Canada.