

Prüfbericht-Nr.: Test Report No.: 60199	9433-001	Auftrags-Nr.: Order No.:	23870043	Seite 1 von 5 Page 1 of 5
Kunden Referenz-Nr.: Client Reference No.:	330927	Auftragsdatun Order date:	n 2018-05-28	-
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Prüfgegenstand: Test item:	iENBL			
Bezeichnung / Typ-Nr.: Identification / Type No.:	FCC ID: 2AF5R-iENBL111B			
Auftrags-Inhalt: Order content:	RF Exposure Evaluation			
Prüfgrundlage: Test specification:	FCC 47 CFR §2.1091			
Wareneingangsdatum: Date of receipt:	N/A			
Prüfmuster-Nr.: Test sample No.:	N/A			
Prüfzeitraum: Testing period:	N/A			
Ort der Prüfung: Place of testing:	Lund, Sweden			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland Sweden			
Prüfergebnis: Test results:	See detail in report			
Geprüft von Tested by:		<b>Controlliert von</b> Reviewed by:		
	•	Datum Date	•	terschrift gnature

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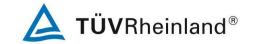
Test Report No.:

Seite 2 von 5 Page 2 of 5

Revisions  Revisions					
RevisionDatumAnmerkungRevisionDateRemark			Verfasser Author		
Draft	2018-11-09	Initial Draft	Niall Forrester		
	2019-10-04	Output powers adjusted			
Note: Latest rev	ision report will repla	ce all previous reports			

# **TABLE OF CONTENTS**

Table	of Contents	2
	oduct Information	
	Equipment under Test (EUT) description	
1.2	Wireless Technologies and Frequency Bands supported by the DUT	3
1.3	Conducted Power and Antenna Gain	3
2 Ev	aluation	4
2.1	Summary	4
	Detailed Calculations	



Test Report No.:

Seite 3 von 5 Page 3 of 5

# PRODUCT INFORMATION

## 1.1 Equipment under Test (EUT) description

Model name:	iENBL
Manufacturer:	Flex
Model number:	iENBL111B
FCC ID:	2AF5R-iENBL111B
Description:	IoT rapid prototyping platform for development within Low Power Wide Area Network Technologies

### 1.2 Wireless Technologies and Frequency Bands supported by the DUT

Technology	Band	Frequency Range (Tx)	Evaluation Performed
LoRa	US Band	902 MHz – 928 MHz	YES
WLAN 802.11 b/g/n	2.4 GHz	2412 MHz – 2472 MHz	YES
Bluetooth Low Energy	2.4 GHz	2400 MHz – 2483.5 MHz	YES

#### 1.3 Conducted Power and Antenna Gain

Technology	Band	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)
LoRa	US Band	17.15	-0.03
WLAN 802.11 b/g/n	2.4 GHz	15.02	2.44
Bluetooth Low Energy	2.4 GHz	5.34	2.44



Test Report No.:

Seite 4 von 5 Page 4 of 5

### **EVALUATION**

### 1.4 Summary

At 20cm, the device is compliant with the "General Population / Uncontrolled" requirements set out in FCC 47 CFR §1.1310 Table 1 (B) for all wireless technologies supported by the device, including supported simultaneous transmission configurations.

#### 1.5 Stand-Alone Calculations

The Power Density at 20cm separation distance has been calculated for each of the transmitter technologies supported by the device according to a re-arrangement of the Friis formula, as below:

$$S = \frac{P * G}{4\pi * r^2}$$

#### Where:

- "S" is power density in mW/cm<sup>2</sup>
- "P" is maximum avg. conducted power (incl. tolerances) in mW according to data from the manufacturer
- "G" is the peak antenna gain (numerical) according to data from the manufacturer
- "r" is the separation distance (20 cm)

Technology	Band	Frequency* (MHz)	Power (dBm)	P (mW)	Gain (dBi)	G (Numerical)	r (cm)	S (mW/cm²)	Limit** (mW/cm²)
LoRa	US Band	902	17.15	51.88	-0.03	0.99	20	0.0103	0.60
WLAN 802.11 b/g/n	2.4 GHz	2412	15.02	31.77	2.44	1.75	20	0.0062	1.00
Bluetooth Low Energy	2.4 GHz	2400	5.34	3.42	2.44	1.75	20	0.0006	1.00

<sup>\*</sup>The lowest frequency in each band has been chosen, to give the most conservative limit

<sup>\*\*</sup>The limits listed are from FCC 47 CFR §1.1310 Table 1 (B): "Limits for General Population/Uncontrolled"

From 30MHz to 1500MHz, the limit is f/1500 mW/cm² where "f" is the frequency in MHz

From 1500MHz to 100000MHz, the limit is 1.0 mW/cm²



Test Report No.:

Seite 5 von 5 Page 5 of 5

#### 1.6 Simultaneous Transmissions Calculations

According to KDB 447498 D01 v06 "General RF Exposure Guidance", clause 7.2:

"Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is  $\leq 1.0$ "

The MPE Ratio is simply the calculated MPE (i.e. "S" above) for a specific transmitter configuration, divided by the MPE limit at the appropriate frequency

Transmitter Combination	MPE 1	Limit 1	MPE 2	Limit 2	Sum of Ratios
WLAN 802.11 b/g/n 2.4GHz + LoRa US band	0.0062	1.00	0.0103	0.60	0,0234
Bluetooth Low Energy 2.4GHz + LoRa US band	0.0006	1.00	0.0103	0.60	0,0178

No other combinations of transmitters are supported by the device

\*\*\*END OF REPORT\*\*\*