

CSA Group Bayern GmbH Ohmstrasse 1-4 · 94342 STRASSKIRCHEN · GERMANY Tel.:+49(0)9424-94810 · Fax:+49(0)9424-9481440 File No. 80125751-06 Rev\_0, page 1 of 39



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## 1 TEST STANDARDS

The tests were performed according to following standards:

#### FCC Rules and Regulations Part 15, Subpart A - General (September 2022)

| Part 15, Subpart A, Section 15.31 | Measurement standards                         |
|-----------------------------------|---|
| Part 15, Subpart A, Section 15.33 | Frequency range of radiated measurements      |
| Part 15, Subpart A, Section 15.35 | Measurement detector functions and bandwidths |

#### FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (September 2022)

| Part 15, Subpart C, Section 15.203               | Antenna requirement   |
|--|---|
| Part 15, Subpart C, Section 15.204 modifications | External radio frequency power amplifiers and antenna                           |
| Part 15, Subpart C, Section 15.205               | Restricted bands of operation   |
| Part 15, Subpart C, Section 15.207               | Conducted limits  |
| Part 15, Subpart C, Section 15.209               | Radiated emission limits, general requirements                                  |
| Part 15, Subpart C, Section 15.247               | Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz |

ANSI C63.10: 2013

KDB 558074 D01 v05r02

**Testing Unlicensed Wireless Devices** 

Guidance for compliance measurements on DTS; FHSS and hybrid system devices operating under Section 15.247 of the FCC rules, April 2, 2019.



# 2 EQUIPMENT UNDER TEST

## 2.1 Information provided by the Client

Please note, we do not take any responsibility for information provided by the client or his representative which may have an influence on the validity of the test results.

## 2.2 Sampling

The customer is responsible for the choice of sample. Sample configuration, start-up and operation is carried out by the customer or according his/her instructions.

## 2.3 General remarks

None

## 2.4 Photo documentation of the EUT – Detailed photos see ATTACHMENT A

## 2.5 Equipment type

**BLE** device

## 2.6 Short description of the equipment under test (EUT)

The EUT is a blood glucose meter equipped with Bluetooth Low Energy. A single PCB antenna is used within the system. The EUT has only one integrated antenna, no temporary connector and no external antenna can be connected. The modulation used by the EUT is GFSK with a data rate of 1 Mbit/s.

| Number of tested samples | : |
|--------------------------|---|
| Serial number            | : |
| Firmware number          | : |
| Туре                     | : |

1 (radiated sample) Z1QGJ07P DTM version 1.0.0 OneTouch Verio Flex 1 (conducted sample) Z1QGJ08F DTM version 1.0.0 OneTouch Verio Flex

1 (normal sample) Z1QGJ073 1.9.2 OneTouch Verio Flex

| Items            | Description                    |
|------------------|--------------------------------|
| BT type          | 5.0 Low Energy                 |
| BT chipset type  | Nordic Semiconductors nRF52805 |
| Modulation       | GFSK                           |
| Frequency range  | 2400 MHz to 2483.5 MHz         |
| Channel numbers  | 40                             |
| Data rate (kbps) | 1000                           |
| Antenna type     | PCB                            |

## 2.7 Variants of the EUT

The Element Verio Platform consists of two devices: OneTouch Verio Flex and OneTouch Ultra Plus Flex. According to the customer the only difference between the two devices is the colour of the housing and the different strip port connectors.



## 2.8 Operation frequency and channel plan

The operating frequency is 2400 MHz to 2483.5 MHz.

Channel plan:

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

Note: the marked frequencies are determined for final testing.

## 2.9 Transmit operating modes

The EUT uses GFSK modulation and may provide following data rates:

- 1000 kbps

(kbps = kilobits per second)

## 2.10 Antenna

A single integrated PCB antenna is used with the EUT, no other antenna can be used with the device.

All measurements were performed radiated, for additional photo documentation of the antenna please refer to Attachment A.

## 2.11 Power supply system utilised

Power supply voltage, V<sub>nom</sub>

: 3 VDC (battery)



### 2.12 Peripheral devices and interface cables

The following peripheral devices and interface cables are connected during the measurements:

| - | Lab notebook 'Mess_Funk 10033' | Model : Lifebook, Fujitsu  |  |
|---|--------------------------------|----------------------------|--|
| - | UART-USB adapter               | Model : TTL-232R-3V3, FTDI |  |
| - | <u>-</u>                       | Model :                    |  |

## 2.13 Determination of worst-case conditions for final measurement

Preliminary tests are performed in all three orthogonal axes of the EUT to locate at which position and at what setting of the EUT produce the maximum of the emissions. For the further measurement the EUT is set in X position.

The tests are carried out in the following frequency band:

#### 2400 MHz – 2483.5 MHz

#### For the final test the following channels and test modes are selected:

| Wireless<br>system | Available<br>channel | Tested channels | Power setting | Modulation | Modulation<br>type | Data rate |
|--------------------|----------------------|-----------------|---------------|------------|--------------------|-----------|
| 802.15.1           | 0 - 39               | 37, 17, 39      | P-4           | DSSS       | GFSK               | 1000 kbps |

#### 2.13.1 Test jig

No test jig is used.

#### 2.13.2 Test software

The EUT has a special firmware that allows enabling the Direct Test Mode.



## 3 TEST RESULT SUMMARY

BLE device using digital modulation and operates in the 2400 MHz – 2483.5 MHz band:

| FCC Rule Part                | RSS Rule Part  | Description   | Result  |
|------------------------------|--|---|---|
| 15.207(a)                    | RSS-Gen, 8.8   | AC power line conducted emissions   | not applicable*   |
| 15.247(a)(2)                 | RSS-247, 5.2(a)  | -6 dB EBW   | passed  |
| 15.247(b)(3)<br>15.247(b)(4) | RSS-247, 5.4(d)  | Maximum peak radiated output power  | passed  |
| 15.247(d)<br>15.209          | RSS-247, 5.5<br>RSS-Gen, 8.9   | Spurious emissions  | passed  |
| 15.247(e)                    | RSS-247, 5.2(b)  | PSD   | passed  |
| 15.35(c)                     | RSS-Gen, 8.2   | Pulsed operation  | passed  |
| 15.203                       |  | Antenna requirement   | passed  |
| -                            | RSS-Gen, 6.7   | 99 % Bandwidth  | passed  |
|                              | FCC Rule Part<br>15.207(a)<br>15.247(a)(2)<br>15.247(b)(3)<br>15.247(b)(4)<br>15.247(d)<br>15.209<br>15.247(e)<br>15.247(e)<br>15.35(c)<br>15.203<br>- | FCC Rule Part         RSS Rule Part           15.207(a)         RSS-Gen, 8.8           15.247(a)(2)         RSS-247, 5.2(a)           15.247(b)(3)         RSS-247, 5.4(d)           15.247(b)(4)         RSS-247, 5.4(d)           15.247(b)         RSS-247, 5.5           15.247(d)         RSS-Gen, 8.9           15.247(e)         RSS-247, 5.2(b)           15.247(e)         RSS-247, 5.2(b)           15.247(e)         RSS-247, 5.2(b)           15.203         -           -         RSS-Gen, 6.7 | FCC Rule PartRSS Rule PartDescription15.207(a)RSS-Gen, 8.8AC power line conducted emissions15.247(a)(2)RSS-247, 5.2(a)-6 dB EBW15.247(b)(3)RSS-247, 5.4(d)Maximum peak radiated output power15.247(b)(4)RSS-247, 5.5Spurious emissions15.247(d)RSS-247, 5.5Spurious emissions15.247(e)RSS-247, 5.2(b)PSD15.247(e)RSS-247, 5.2(b)PSD15.35(c)RSS-Gen, 8.2Pulsed operation15.203Antenna requirement-RSS-Gen, 6.799 % Bandwidth |

\*EUT is battery powered

The mentioned new RSS Rule Parts in the above table are related to: RSS-Gen, Issue 5 + Amendment 1 + Amendment 2, February 2021 RSS-247, Issue 2, February 2017

## 3.1 Revision history of test report

| Test report No | Rev. | Issue Date       | Changes             |
|----------------|------|------------------|---------------------|
| 80125751-06    | 0    | 15 February 2023 | Initial test report |

The test report with the highest revision number replaces the previous test reports.

### 3.2 Final assessment

The equipment under test fulfils the requirements cited in clause 1 test standards.

Date of receipt of test sample

: acc. to storage records

: 14 February 2023

Testing commenced on

: \_27 June 2022

Testing concluded on

\_\_\_\_\_

Checked by:

Tested by:

Klaus Gegenfurtner Teamleader Radio Sabine Kugler Radio Team

Rev. No. 6.5 2021-11-05



## 4 TEST ENVIRONMENT

### 4.1 Address of the test laboratory

CSA Group Bayern GmbH Ohmstrasse 1-4 94342 STRASSKIRCHEN GERMANY

## 4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

| Temperature:          | <u>15 - 35 °C</u> |
|-----------------------|-------------------|
| Humidity:             | 30 - 60 %         |
| Atmospheric pressure: | 86 - 106 kPa      |

## 4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor k = 2. The true value is located in the corresponding interval with a probability of 95 %. The measurement uncertainty was calculated for all measurements listed in this test report on basis of the ETSI Technical Report TR 100 028 Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1 and Part 2. The results are documented in the quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

| Measurement Type                | Range                   | Confidence<br>Level (%) | Calculated<br>Uncertainty |
|---------------------------------|-------------------------|-------------------------|---------------------------|
| AC Conducted Spurious Emissions | 0.15 MHz to 30 MHz      | 95%                     | ± 3.29 dB                 |
| 20 dB Bandwidth                 | Center frequency of EUT | 95%                     | ± 2.5 x 10 <sup>-7</sup>  |
| 99% Occupied Bandwidth          | Center frequency of EUT | 95%                     | ± 2.5 x 10 <sup>-7</sup>  |
| Radiated Spurious Emissions     | 9 kHz to 30 MHz         | 95%                     | ± 3.53 dB                 |
| Radiated Spurious Emissions     | 30 MHz to 1000 MHz      | 95%                     | ± 3.71 dB                 |
| Radiated Spurious Emissions     | 1000 MHz to 10000 MHz   | 95%                     | ± 2.34 dB                 |
| Peak conducted output power     | 902 MHz to 928 MHz      | 95%                     | ± 0.35 dB                 |
| Conducted Spurious Emissions    | 9 kHz to 10000 MHz      | 95%                     | ± 2.15 dB                 |

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## 4.4 Conformity Decision Rule

The applied conformity decision rule is based on ILAC G8:09/2019 clause 4.2.1 Binary Statement for Simple Acceptance Rule (w = 0). Details can be found in the procedure CSA\_B\_V50\_29.

## 4.5 Measurement protocol for FCC and ISED

#### 4.5.1 General information

CSA Group Bayern GmbH is recognized as wireless testing laboratory under the CAB identifier:

#### FCC: DE 0011 ISED: DE0009

#### 4.5.2 General Standard information

The test methods used comply with ANSI C63.10 - "Testing Unlicensed Wireless Devices".

### 4.5.2.1 Justification

The equipment under test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions.

#### 4.5.3 Details of test procedures

4.5.3.1 Conducted emission

Test setup according ANSI C63.10



Non-conducted support

The final level, expressed in  $dB\mu V$ , is arrived at by taking the reading directly from the Spectrum analyser. This level is compared to the limit.

To convert between  $dB\mu V$  and  $\mu V$ , the following conversions apply:

 $dB\mu V = 20(\log \mu V)$  $\mu V = Inverse \log(dB\mu V/20)$ 

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a Line Impedance Stabilization Network (LISN) with 50  $\Omega$  / 50  $\mu$ H (CISPR 16) characteristics. The receiver is protected by means of an impedance matched pulse limiter connected directly to the RF input. Table top equipment is placed on a non-conducting table 80 centimetres above the floor and is positioned 40 centimetres from the vertical ground plane (wall) of the screen room. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emission is re-measured using a tuned receiver with quasipeak and average detection and recorded on the data sheets.

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#### 4.5.3.2 Radiated emission

#### 4.5.3.2.1 OATS1 test site (9 kHz - 30 MHz):

Test setup according ANSI C63.10



Emissions from the EUT are measured in the frequency range of 9 MHz to 30 MHz using a tuned receiver and a calibrated loop antenna. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Cables to simulators/testers (if used in this test) are routed through the centre of the table and to a screened room located outside the test area. The antenna is positioned 3, 10 or 30 metres horizontally from the EUT and is repeated vertically. To locate maximum emissions from the test sample the antenna is varied along the site axis and the EUT is rotated 360 degrees.

#### 4.5.3.2.2 OATS1 test site (30 MHz - 1 GHz):

Test setup according ANSI C63.10.



Spurious emissions from the EUT are measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarised antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Cables to simulators/testers (if used in this test) are routed through the centre of the table and to a screened room located outside the test area. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres and the EUT is rotated 360 degrees. The final level in dB $\mu$ V/m is calculated by taking the reading from the EMI receiver (Level dB $\mu$ V) and adding the correction factors and cable loss factor (dB). The FCC limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

#### The resolution bandwidth setting: 30 MHz – 1000 MHz: RBW: 120 kHz

Example:

| 5.        |        |   |        |     |        |   |          |   |       |
|-----------|--------|---|--------|-----|--------|---|----------|---|-------|
| Frequency | Level  | + | Factor | = L | evel   | - | Limit    | = | Delta |
| (MHz)     | (dBµV) |   | (dB)   | (dE | 3µV/m) |   | (dBµV/m) |   | (dB)  |
| 719.0     | 75.0   | + | 32.6   | = 1 | 07.6   | - | 110.0    | = | -2.4  |
|           |        |   |        |     |        |   |          |   |       |

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Radiated emissions from the EUT are measured in the frequency range 1 GHz up to 18 GHz as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a non-conducting table, 1.5 metre above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12). Any controlling device is positioned such that it does not significantly influence the measurement results. Interconnecting cables that hang closer than 40 cm to the ground plane are folded back and forth in the centre, forming a bundle 30 cm to 40 cm long. Measurements are made in in three orientations of the EUT and the horizontal and vertical polarization planes of measurement antenna in a fully anechoic room. The measurement antenna is adjusted and the EUT orientated to permit the measurement of the maximum emission from the EUT. The conditions determined as worst-case will then be used for the final measurements.

#### 4.5.3.2.4 Anechoic chamber 1 (18 GHz – 40 GHz)



Emissions from the EUT are measured in the frequency range 18 GHz up to 40 GHz as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a non-conducting table, 0.8 metre above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12). Any controlling device is positioned such that it does not significantly influence the measurement results. Interconnecting cables that hang closer than 40 cm to the ground plane are folded back and forth in the centre, forming a bundle 30 cm to 40 cm long. Measurements are made in in three orientations of the EUT and the horizontal and vertical polarization planes of measurement antenna in a fully anechoic room. The measurement antenna is adjusted and the EUT orientated to permit the measurement of the maximum emission from the EUT. The conditions determined as worst-case will then be used for the final measurements. Where appropriate, the test distance may be reduced in order to detect emissions under better uncertainty. The limit is adopted.



## 5 TEST CONDITIONS AND RESULTS

## 5.1 EBW and OBW

For test instruments and accessories used see section 6 Part CPR.

#### 5.1.1 Description of the test location

Test location: Anechoic chamber 1

#### 5.1.2 Photo documentation of the test set-up



### 5.1.3 Applicable standard

According to FCC Part 15, Section 15.247(a)(2): Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 – 2483.5 MHz and 5725 – 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

### 5.1.4 Description of Measurement

The bandwidth was measured at an amplitude level reduced from the reference level of a modulated channel by a ratio of -6 dB. The reference level is the level of the highest signal amplitude observed at the transmitter at either the fundamental frequency or the first order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical. An alternative is to use the bandwidth measurement of the analyser.

Spectrum analyser settings for EBW:RBW: 100 kHz,VBW: 300 kHz,Detector: Max peak,Sweep time: 5 s,Spectrum analyser settings for OBW:RBW: 1-5% OBW, VBW: 3 RBW,Detector: Max peak,Sweep time: 5 s,Span: 2 OBW;



#### 5.1.5 Test result

#### 6dB bandwidth

| Channel | Centre frequency | 6 dB bandwidth | Minimum limit |
|---------|------------------|----------------|---------------|
| Channel | (MHz)            | (kHz)          | (kHz)         |
| 37      | 2402             | 694.340        | 500           |
| 17      | 2440             | 689.430        | 500           |
| 39      | 2480             | 699.450        | 500           |

#### 99% bandwidth

| Channel | Centre frequency | 99 % bandwidth |
|---------|------------------|----------------|
| Channel | (MHz)            | (kHz)          |
| 37      | 2402             | 1047.520       |
| 17      | 2440             | 1047.008       |
| 39      | 2480             | 1050.851       |

#### The requirements are FULFILLED.

#### **Remarks:** For detailed test result please see the following test protocols

#### 5.1.6 Test protocols EBW



Channel 37 (2402 MHz)





Channel 17 (2440 MHz)

#### Channel 39 (2480 MHz)



### 5.1.7 Test protocols OBW



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#### Channel 17 (2440 MHz)

#### Channel 39 (2480 MHz)



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## 5.2 Maximum peak radiated output power

For test instruments and accessories used see section 6 Part CPR 3, CPC.

#### 5.2.1 Description of the test location

Test location: Anechoic chamber 1

#### 5.2.2 Photo documentation of the test set-up



EUT orientation



#### 5.2.3 Applicable standard

According to FCC Part 15, Section 15.247(b)(3): The maximum peak conducted output power of the intentional radiator shall not exceed the following: For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.



#### 5.2.4 Description of Measurement

The maximum peak radiated output power is measured using a spectrum analyser following the procedure set out in ANSI C63.10, item 11.9.2.2. The EUT is set in TX continuous mode while measuring. The radiated measurement was performed in terms of fieldstrength. Therefore, the formula set out in ANSI C63.10, item 9.5 (Equation 22) is changed into the following term:

E = EIRP - (20\*log<sub>10</sub> (3)) + 104.7

#### 5.2.5 Test result

Measured peak EIRP output power:

| Test results radiated   |                  |                 |       |            |        |  |
|-------------------------|------------------|-----------------|-------|------------|--------|--|
|                         |                  | Fieldstrength E | EIRP  | EIRP Limit | Margin |  |
|                         |                  | (dBµV/m)        | (dBm) | (dBm)      | (dB)   |  |
| Lowest frequency        | y: CH37          |                 |       |            |        |  |
| T <sub>nom</sub>        | V <sub>nom</sub> | 93.4            | -1.9  | 36.0       | -37.9  |  |
| Middle frequency: CH17  |                  |                 |       |            |        |  |
| T <sub>nom</sub>        | V <sub>nom</sub> | 93.4            | -1.8  | 36.0       | -37.8  |  |
| Highest frequency: CH39 |                  |                 |       |            |        |  |
| T <sub>nom</sub>        | V <sub>nom</sub> | 92.5            | -2.7  | 36.0       | -38.7  |  |

Measured peak conducted output power:

| Test results conducted |                  |            |                |                |  |  |
|------------------------|------------------|------------|----------------|----------------|--|--|
|                        |                  | A<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |  |  |
| Lowest frequency       | y: CH37          | (dBill)    | (dBill)        | (ub)           |  |  |
| T <sub>nom</sub>       | V <sub>nom</sub> | -4.1       | 30.0           | -34.1          |  |  |
| Middle frequency       | v: CH17          |            |                |                |  |  |
| T <sub>nom</sub>       | V <sub>nom</sub> | -5.1       | 30.0           | -35.1          |  |  |
| Highest frequence      | y: CH39          |            |                |                |  |  |
| T <sub>nom</sub>       | V <sub>nom</sub> | -4.3       | 30.0           | -34.3          |  |  |



Peak Power Limit according to FCC Part 15, Section 15.247(b)(3):

| Frequency   | Peak Power Limit |     |  |  |  |
|-------------|------------------|-----|--|--|--|
| (MHz)       | (dBm)            | (W) |  |  |  |
| 902-928     | 30               | 1.0 |  |  |  |
| 2400-2483.5 | 30               | 1.0 |  |  |  |
| 5725-5850   | 30               | 1.0 |  |  |  |

| Frequency   | EIRP Limit |     |  |  |  |
|-------------|------------|-----|--|--|--|
| (MHz)       | (dBm)      | (W) |  |  |  |
| 902-928     | 36         | 4.0 |  |  |  |
| 2400-2483.5 | 36         | 4.0 |  |  |  |
| 5725-5850   | 36         | 4.0 |  |  |  |

The requirements are **FULFILLED**.

#### **Remarks:** For detailed test result please see the following test protocols



#### 5.2.6 Test protocols

#### Radiated measurements:

#### Channel 37 (2402 MHz)



#### Channel 17 (2440 MHz)

| RefLevel 117.  | 0 dBµV/m | Offset 10 | 0.00 dB =  | RBW 3 MHz | Mode Sween   |    |          |       |               |
|----------------|----------|-----------|------------|-----------|--------------|----|----------|-------|---------------|
| TDF "FS1-18"   | 0.00     | 5401 2    | 011 1110 - | TOTAL     | Mode officep |    |          |       |               |
| 1 Frequency Sw | еер      |           |            |           |              |    |          |       | o 1Pk Max     |
|                |          |           |            |           |              |    |          | M1[1] | 93.44 dBµV/m  |
| 110 dBuV/m     |          |           |            |           |              |    |          | 2.45  | 9992501 GHz   |
|                |          |           |            |           |              |    |          |       |               |
|                |          |           |            |           |              |    |          |       |               |
| 100 dBuV/m-    |          |           |            |           |              |    |          |       |               |
|                |          |           |            |           |              |    |          |       |               |
|                |          |           |            |           |              |    |          |       |               |
| 90 d8uV/m      |          |           |            |           |              |    |          |       |               |
|                |          |           |            |           |              |    |          |       |               |
|                |          |           |            |           |              |    |          |       |               |
| 80 dBuV/m      |          |           |            |           |              |    |          | <br>  |               |
|                |          |           |            |           |              |    |          |       |               |
|                |          |           |            |           |              |    |          |       |               |
| 70 dBuV/m      |          |           |            |           |              |    |          |       |               |
|                |          |           |            |           |              |    |          |       |               |
|                |          |           |            |           |              |    |          |       |               |
| 60 dBuV/m-     |          |           |            |           |              |    |          |       |               |
|                |          |           |            |           |              |    |          |       |               |
|                |          |           |            |           |              |    |          |       |               |
| 50 dBµV/m      |          |           |            |           |              |    |          |       |               |
|                |          |           |            |           |              |    |          |       |               |
|                |          |           |            |           |              |    |          |       |               |
| 40 dBuV/m      |          |           |            |           |              |    |          |       |               |
| 05.0.44.011-   |          |           |            | 10001     |              | 50 |          |       | Cara E O Mila |
| CF 2.44 GHZ    |          |           |            | 10001 p   | 15           | 50 | 0.0 KHZ/ |       | span 5.0 MHz  |

### Channel 39 (2480 MHz)



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#### Conducted measurements:

Channel 37 (2402 MHz)



#### Channel 17 (2440 MHz)

| Ref Level 0.4           | 10 dBm Offset | 0.40 dB 🖷 RBW | 3 MHz      |         |    |           |  |       |                 |
|-------------------------|---------------|---------------|------------|---------|----|-----------|--|-------|-----------------|
| <ul> <li>Att</li> </ul> | 0 dB SWT      | 10.1 ms 🖷 VBW | 10 MHz Mod | e Sweep |    |           |  |       |                 |
| 1 Frequency S           | weep          |               |            |         |    |           |  |       | 01Pk Max        |
|                         |               |               |            |         |    |           |  | M1[1] | -5.06 dBm       |
|                         |               |               |            |         |    |           |  | 2.44  | 0 288 971 GHz   |
|                         |               |               |            |         | M1 |           |  |       |                 |
| -5 dBm-                 |               |               |            |         |    |           |  |       |                 |
|                         |               |               |            |         |    |           |  |       |                 |
|                         |               | -             |            |         |    |           |  |       |                 |
|                         |               |               |            |         |    |           |  |       |                 |
| -10 dBm                 |               |               |            |         |    |           |  |       |                 |
|                         |               |               |            |         |    |           |  |       |                 |
|                         |               |               |            |         |    |           |  |       |                 |
| -15 dBm-                |               |               |            |         |    |           |  |       |                 |
|                         |               |               |            |         |    |           |  |       |                 |
|                         |               |               |            |         |    |           |  |       |                 |
| -00 dbm                 |               |               |            |         |    |           |  |       |                 |
| +20 dbm                 |               |               |            |         |    |           |  |       |                 |
|                         |               |               |            |         |    |           |  |       |                 |
|                         |               |               |            |         |    |           |  |       |                 |
| -25 dBm-                |               |               |            |         |    |           |  |       |                 |
|                         |               |               |            |         |    |           |  |       |                 |
|                         |               |               |            |         |    |           |  |       |                 |
| -20 dBm                 |               |               |            |         |    |           |  |       |                 |
| -30 dbm                 |               |               |            |         |    |           |  |       |                 |
|                         |               |               |            |         |    |           |  |       |                 |
|                         |               |               |            |         |    |           |  |       |                 |
| -35 dBm-                |               |               |            |         |    |           |  |       |                 |
|                         |               |               |            |         |    |           |  |       |                 |
|                         |               |               |            |         |    |           |  |       |                 |
| CE 2 44 CH2             |               |               | 10001 pt   |         | 50 | 0.0.11157 |  |       | Coop E O Milita |
| CF 2.44 GHZ             |               |               | 10001 p    | .5      | 30 | 0.0 KH27  |  |       | span 5.0 Minz   |

#### Channel 39 (2480 MHz)



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## 5.3 Power spectral density

For test instruments and accessories used see section 6 Part CPR.

#### 5.3.1 Description of the test location

Test location: Anechoic chamber 1

#### 5.3.2 Photo documentation of the test set-up



#### 5.3.3 Applicable standard

According to FCC Part 15, Section 15.247(e):

For digitally modulated systems, the power spectral density radiated from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the radiated output power shall be used to determine the power spectral density.

#### 5.3.4 Description of Measurement

The measurement is performed using the procedure set out in 11.10 of ANSI C63.10. The power measurement was done as peak power measurement. Therefore, the PKPSD is measured. The max peak was located and with the spectrum analyser and a marker set to peak.

Spectrum analyser settings: RBW: 3 kHz, VBW: 10 kHz, Detector: Peak, Sweep time: Auto



## 5.3.5 Test result

| Test results radiated       |                  |                      |                   |                     |                |  |
|-----------------------------|------------------|----------------------|-------------------|---------------------|----------------|--|
|                             |                  | PSD<br>(dBµV/m/3kHz) | PSD<br>(dBm/3kHz) | Limit<br>(dBm/3kHz) | Margin<br>(dB) |  |
| Lowest frequency: 2402 MHz  |                  |                      |                   |                     |                |  |
| T <sub>nom</sub>            | V <sub>nom</sub> | 77.8                 | -17.5             | 8.0                 | -25.5          |  |
| Middle frequency: 2440 MHz  |                  |                      |                   |                     |                |  |
| T <sub>nom</sub>            | V <sub>nom</sub> | 78.5                 | -16.8             | 8.0                 | -24.8          |  |
| Highest frequency: 2480 MHz |                  |                      |                   |                     |                |  |
| T <sub>nom</sub>            | V <sub>nom</sub> | 77.0                 | -18.3             | 8.0                 | -26.3          |  |

Power spectral density limit according to FCC Part 15, Section 15.247(e):

| Frequency     | Power spectral density limit |
|---------------|------------------------------|
| (MHz)         | (dBm/3 kHz)                  |
| 2400 - 2483.5 | 8                            |

The requirements are **FULFILLED**.

**Remarks:** For detailed test result please see the following test protocols

#### 5.3.6 Test protocols





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#### Channel 17 (2440 MHz)







## 5.4 Radiated emissions in restricted bands

For test instruments and accessories used see section 6 Part SER1, SER 2, SER 3.

#### 5.4.1 Description of the test location

| Test location: | OATS 1             |
|----------------|--------------------|
| Test location: | Anechoic chamber 1 |

Test distance:

#### 5.4.2 Photo documentation of the test set-up

3 m



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EUT orientation



The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

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#### 5.4.3 Applicable standard

According to FCC Part 15, Section 15.205(a):

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limit specified in Section 15.209(a).

#### 5.4.4 Description of Measurement

The restricted bands are measured radiated. The span of the spectrum analyser is set wide enough to capture the restricted band and measure the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation. The restricted bands are measured falling emissions into it and the nearest restricted band are checked for emissions also the restricted band for the harmonics of the carrier.

Test receiver settings for SER1: RBW: 200 Hz, Detector: Quasi peak, Meas. Time: 1 s, 9 kHz – 150 kHz RBW: 9 kHz, Detector: Quasi peak, Meas. Time: 1 s, 150 kHz – 30 MHz

Test receiver settings for SER2: RBW: 120 MHz, Detector: Quasi peak, Meas. Time: 1 s,

Spectrum analyser settings for SER3: RBW: 1 MHz, VBW: 3 MHz, Detector: Max. peak, Trace: Max. hold, Sweep: Auto



#### 5.4.5 Test result

f < 30 MHz

|                    | FCC Part 15.209 Radiated emission limits; general requirements (< 30 MHz) |                         |                         |                        |                           |                         |                         |                   |                |  |  |
|--------------------|---|-------------------------|-------------------------|------------------------|---------------------------|-------------------------|-------------------------|-------------------|----------------|--|--|
| Frequency<br>(kHz) | PK<br>reading<br>(dBµV)   | QP<br>reading<br>(dBµV) | AV<br>reading<br>(dBµV) | Ant.<br>factor<br>(dB) | Distance<br>corr.<br>(dB) | AV<br>level<br>(dBµV/m) | QP<br>level<br>(dBµV/m) | Limit<br>(dBµV/m) | Dlimit<br>(dB) |  |  |
| 15.0               | 42.1  | 28.3                    | 25.7                    | 20.0                   | -80.0                     | -34.3                   | -31.7                   | 44.1              | -78.4          |  |  |
| 48.0               | 30.7  | 13.9                    | 10.4                    | 20.0                   | -80.0                     | -49.6                   | -46.1                   | 34.0              | -83.6          |  |  |
| 120.0              | 16.4  | 1.3                     | -2.0                    | 20.0                   | -80.0                     | -62.0                   | -58.7                   | 26.0              | -88.0          |  |  |
| 480.0              | 35.9  | 14.5                    | 5.2                     | 20.0                   | -80.0                     | -54.8                   | -45.5                   | 14.0              | -68.8          |  |  |
| 1200.0             | 38.5  | 33.7                    | 29.8                    | 20.0                   | -40.0                     | 9.8                     | 13.7                    | 26.0              | -12.3          |  |  |
| 4800.0             | 26.6  | 16.0                    | 11.7                    | 20.0                   | -40.0                     | 6.6                     | -4.0                    | 29.5              | -33.5          |  |  |
| 25000.0            | 9.7   | 3.2                     | -2.7                    | 20.0                   | -40.0                     | -10.3                   | -16.8                   | 29.5              | -46.3          |  |  |
|                    |   | Nata da                 |                         | والمراجع والمراجع      | ana atana fal             | Linte Al/ ne            |                         |                   |                |  |  |

Note: frequencies in bold characters fall into AV ranges.

| RSS-0              | RSS-Gen 8.9 Radiated emission limits; general requirements (< 30 MHz) |                       |                        |                           |                               |                   |                |  |  |  |  |  |
|--------------------|---|-----------------------|------------------------|---------------------------|-------------------------------|-------------------|----------------|--|--|--|--|--|
| Frequency<br>(kHz) | QP<br>reading<br>(dBµV)   | QP<br>calc.<br>(dBµA) | Ant.<br>factor<br>(dB) | Distance<br>corr.<br>(dB) | Corr. QP<br>level<br>(dBµA/m) | Limit<br>(dBµA/m) | Dlimit<br>(dB) |  |  |  |  |  |
| 15.0               | 28.3  | -23.2                 | 20.0                   | -80.0                     | -83.2                         | 12.6              | -95.8          |  |  |  |  |  |
| 48.0               | 13.9  | -37.6                 | 20.0                   | -80.0                     | -97.6                         | 2.5               | -100.1         |  |  |  |  |  |
| 120.0              | 1.3   | -50.2                 | 20.0                   | -80.0                     | -110.2                        | -5.5              | -104.7         |  |  |  |  |  |
| 480.0              | 14.5  | -37.0                 | 20.0                   | -80.0                     | -97.0                         | -17.5             | -79.5          |  |  |  |  |  |
| 1200.0             | 33.7  | -17.8                 | 20.0                   | -40.0                     | -37.8                         | -25.5             | -12.3          |  |  |  |  |  |
| 4800.0             | 16.0  | -35.5                 | 20.0                   | -40.0                     | -55.5                         | -21.9             | -33.6          |  |  |  |  |  |
| 25000.0            | 3.2   | -48.3                 | 20.0                   | -40.0                     | -68.3                         | -21.9             | -46.4          |  |  |  |  |  |

Note: No emissions detected in the frequency range 9 kHz to 30 MHz. The recorded values are solely noise values of the OATS.



30 MHz < f < 1000 MHz:

| Frequency<br>(MHz) | Reading<br>Vert.<br>(dBµV) | Reading<br>Hor.<br>(dBµV) | Correct.<br>Vert.<br>(dB) | Correct.<br>Hor.<br>(dB) | Level<br>Vert.<br>(dBµV/m) | Level<br>Hor.<br>(dBµV/m) | Limit<br>(dBµV/m) | Dlimit<br>(dB) |
|--------------------|----------------------------|---------------------------|---------------------------|--------------------------|----------------------------|---------------------------|-------------------|----------------|
| 65.00              | -2.2                       | -0.8                      | 16.4                      | 17.3                     | 14.2                       | 16.5                      | 40.0              | -23.5          |
| 144.02             | 2.8                        | 3.9                       | 19.4                      | 18.6                     | 22.2                       | 22.5                      | 43.5              | -21.0          |
| 299.96             | -2.0                       | -0.2                      | 20.2                      | 20.7                     | 18.2                       | 20.5                      | 46.0              | -25.5          |
| 339.21             | -2.1                       | -3.1                      | 21.3                      | 21.8                     | 19.2                       | 18.7                      | 46.0              | -26.8          |
| 369.20             | -1.7                       | -3.8                      | 22.2                      | 22.6                     | 20.5                       | 18.8                      | 46.0              | -25.5          |
| 485.00             | -2.6                       | 2.9                       | 25.3                      | 25.6                     | 22.7                       | 28.5                      | 46.0              | -17.5          |
| 602.40             | -3.2                       | 0.2                       | 28.0                      | 28.4                     | 24.8                       | 28.6                      | 46.0              | -17.4          |



Note: No emissions detected in the frequency range 30 MHz to 1 GHz. The recorded values are solely noise values of the OATS.



#### f > 1000 MHz

#### <u>CH37 – 2402 MHz – P-4:</u>



Correction for pulse operation (see section 5.6):

| Frequency f | Peak     | Pook limit  | Book margin | Correction   | Average  | Average  | Average |
|-------------|----------|-------------|-------------|--------------|----------|----------|---------|
| Fiequency / | emission | reak iiniit | Feak margin | factor $K_E$ | value    | limit    | margin  |
| (MHz)       | (dBµV/m) | (dBµV/m)    | (dB)        | (dB)         | (dBµV/m) | (dBµV/m) | (dB)    |
| 7206.635    | 59.5     | 74.0        | -14.5       | -54.1        | 5.4      | 54.0     | -48.6   |



| Ref Level 95                               | .00 dBµV/m   | • R   | BW 1 MHz                        |   |  |   |  |  |                                  |
|--|--|---|---------------------------------|---|--|---|--|--|----------------------------------|
| <ul> <li>Att<br/>TDF "FS18-40 3</li> </ul> | 0 dB 🖷 S'<br>3''   | WT 100 ms 🖷 V   | BW 3 MHz Mo                     | de Sweep  |  |   |  |  |                                  |
| 1 Frequency S                              | weep   |   |                                 |   |  |   |  | o 1Pk Ma                                   | ax 😑 2Rm Max                     |
|  |  |   |                                 |   |  |   |  | M1[1]                                      | 39.42 dBµV/n                     |
| 90 dBµV/m                                  |  |   |                                 |   |  |   |  | 2  | 5.797 263 GH.                    |
|  |  |   |                                 |   |  |   |  | M2[2]                                      | 31.78 dBµV/m                     |
|  |  |   |                                 |   |  |   |  | 2  | 5.797 263 GH                     |
| 80 dBµV/m                                  |  |   |                                 |   |  |   |  |  |                                  |
|  |  |   |                                 |   |  |   |  |  |                                  |
|  |  | H2 74.000   | ) dBµV/m                        |   |  |   |  |  |                                  |
| 70 dBµV/m                                  |  |   |                                 |   |  |   |  |  |                                  |
|  |  |   |                                 |   |  |   |  |  |                                  |
|  |  |   |                                 |   |  |   |  |  |                                  |
| 60 dBµV/m                                  |  |   |                                 |   |  |   |  |  |                                  |
|  | U1 54 000 db.  | 110-  |                                 |   |  |   |  |  |                                  |
|  | HI 54.000 UBP  | v/m   |                                 |   |  |   |  |  |                                  |
| 50 dBµV/m                                  |  |   |                                 |   |  |   |  |  |                                  |
|  |  |   |                                 |   |  |   |  |  |                                  |
|  |  |   |                                 |   |  |   |  |  | MI                               |
| Hu above the Manuel A                      | مليح أوامر والمحياتهما   |   | المتعادية والمتعادية والمتعادية | ويعدل المروسين المستعقب   | and the station of the state   | والالتقرير ولنقدى وسيلتقهان   | يبري الدريد ويتعار ويقتعنان  | المتطولين ليعرف ريار مطورين أر             | ورر واللمعر المتقافر وسيرقذان    |
| tan distant and the stations               | Children and a state of the sta | selection and a statement of the  | and the second second           | faith distance allot to you know  | The state of the s | and the second secon | and the formation in the second second second  | a an an bability on the produce of the sec | M2 <sup>1</sup>                  |
| وممطلا والعطوان المعظمة                    | يدهمون مل سرو وطباق هو   | ويسببا أساقلهن الترجيب والار  | والمستعدين ورطعته وإماقيها      | والمسيب بالسان بليولنه فسمحه  | Kere   | المحطفان ينقلب واستحصرين  | والمراجعة والمتحدين والمتحد والمتحافظ والمعطور   | ي المالية به هم ، به كانتها الم            | ورواية أويتنافذ والتقاد وحفاتهما |
| and only of the state of the               | A DESCRIPTION OF TAXABLE PARTY.  | and the second se |                                 | And the second se | 1  | outer the second se  | and a second |  |                                  |
| 18.0 GHz                                   |  |   | 16001 pt                        | s   | 80   | 0.0 MHz/  |  |  | 26.0 GHz                         |
| 2 Marker Peak                              | List   |   | 10001                           |   |  | ,   |  |  | 2010 011                         |
| No   | X-Valu   | e   | Y-Va                            | lue   | No   | X-Value   | e  | Y-Va                                       | ue                               |
| 1  | 25.797260  | GHz   | 39.417 d                        | 3µV/m   |  |   |  |  |                                  |
|  |  |   |                                 |   |  |   |  |  |                                  |
|  |  |   |                                 |   |  |   |  |  |                                  |
|  |  |   |                                 |   |  |   |  |  |                                  |

#### <u>CH17 – 2440 MHz – P-4:</u>

| Ref Level 117<br>• Att | .00 dBµV/m<br>10 dB <b>● SWT</b> 100 ms  | RBW 1 MHz     VBW 3 MHz     Mode Sweep   |             |               |                    |
|------------------------|--|--|-------------|---------------|--------------------|
| TDF "FS1-18"           |  | ,  |             |               |                    |
| 1 Frequency Sv         | weep   |  |             |               | o 1Pk Max ⊜2Rm Max |
|                        |  |  |             |               | M1[1] 93.45 dBµV/m |
|                        |  |  |             |               | 2.439 510 GHz      |
| 100 dBµV/m             |  | M1   |             |               | M2[1] 39.36 dBµV/m |
|                        |  |  |             |               | 2,390 000 GHz      |
|                        |  |  |             |               |                    |
| 80 dBµV/m              |  |  |             |               |                    |
|                        | H2 74  | .000 dBµV/m  |             |               |                    |
|                        |  |  |             |               |                    |
| 60. dBuV/m-            |  |  |             |               |                    |
| 00 00p1/m              |  |  |             |               |                    |
|                        |  | 2  | 4           |               |                    |
| 40 40 11/10            |  |  | Lullou      |               |                    |
| AV WWWWWWW             | and the second of the second o |  | a dista     |               |                    |
| N Marson man           | and a second   | and the second s | AND WALLAND |               |                    |
|                        |  | V1 V1  | 4           |               |                    |
| 20 dBµV/m              |  | 6001 ====  |             |               | 4.0.611-           |
| 1.0 GHZ                |  | 6001 pts   |             | 300.0 MHZ7    | 4.0 GHZ            |
| 2 Marker Peak          | List   |  |             |               |                    |
| No                     | X-Value  | V-Value  | No          | X-Value       | Y-Value            |
| 1                      | 1.078240 GHz   | 42.890 dBµV/m  | 3           | 2.439 510 GHZ | 93.455 dBµV/m      |
| 2                      | 2.312030 GH2   | 40.525 UBµV/III  | 4           | 2.307 990 GHz | 43.074 UDµV/III    |
|                        |  |  |             |               |                    |
|                        |  |  |             |               |                    |
| 3 Marker Table         |  |  |             |               |                    |
|                        | Trc X-Value  | V-Value  |             | Euloction     | Function Result    |
| MI                     | 1 2.439 51   | GHz 93.45 dBuV/m   | 1           | rancuon       | Tunction Result    |
| M2                     | 1 2.39   | GHz 39.36 dBuV/n   | ì           |               |                    |
| MB                     | 2 2.39   | GHz 32.27 dBuV/n   | i i         |               |                    |
| M4                     | 1 2.483 5  | GHz 40.14 dBµV/n   | 1           |               |                    |
| M5                     | 2 <b>2.483 5</b>   | GHz 32.18 dBµV/n   | า           |               |                    |

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Correction for pulse operation (see section 5.6):

| Eroquopov f | Peak     | Dook limit  | Dook morgin | Correction   | Average  | Average  | Average |
|-------------|----------|-------------|-------------|--------------|----------|----------|---------|
| Frequency I | emission | Peak IIIIII | Peak margin | factor $K_E$ | value    | limit    | margin  |
| (MHz)       | (dBµV/m) | (dBµV/m)    | (dB)        | (dB)         | (dBµV/m) | (dBµV/m) | (dB)    |
| 7319.131    | 61.6     | 74.0        | -12.4       | -54.1        | 7.5      | 54.0     | -46.5   |

| Ref Level 95                    | .00 dBµV/m                                     | • P                     | BW 1 MHz                      |  |                               |                                 |   |                                 |  |
|---------------------------------|--|-------------------------|-------------------------------|--|-------------------------------|---------------------------------|---|---------------------------------|--|
| <ul> <li>Att</li> </ul>         | 0 dB 🖷 S                                       | WT 100 ms 🖷 V           | BW 3 MHz M                    | ode Sweep                                |                               |                                 |   |                                 |  |
| TDF "FS18-40_                   | 3"<br>Sweep                                    |                         |                               |  |                               |                                 |   | o 1 Dk M                        | lav 🖨 🤉 Dm Mav   |
|                                 | Меср   |                         |                               |  |                               |                                 |   | M1[1]                           | 39.84 dBuV/m   |
| 90 dBµV/m                       |  |                         |                               |  |                               |                                 |   |                                 | 25,781 264 GHz   |
|                                 |  |                         |                               |  |                               |                                 |   | M2[2]                           | 32.09 dBµV/m   |
|                                 |  |                         |                               |  |                               |                                 |   |                                 | 25.781 264 GHz   |
| 80 dBµV/m───                    |  |                         |                               |  |                               |                                 |   |                                 |  |
|                                 |  | H2 74 00                | deuV/m                        |  |                               |                                 |   |                                 |  |
| 70 dBuilden                     |  | 112 14:00               |                               |  |                               |                                 |   |                                 |  |
| 70 UBD 7711                     |  |                         |                               |  |                               |                                 |   |                                 |  |
|                                 |  |                         |                               |  |                               |                                 |   |                                 |  |
| 60 dBµ∨/m                       |  |                         |                               |  |                               |                                 |   |                                 |  |
|                                 |  |                         |                               |  |                               |                                 |   |                                 |  |
|                                 | H1 54.000 dB                                   | /V/m                    |                               |  |                               |                                 |   |                                 |  |
| 50 dBµV/m                       |  |                         |                               |  |                               |                                 |   |                                 |  |
|                                 |  |                         |                               |  |                               |                                 |   |                                 |  |
| 40 dBuV/m                       |  |                         |                               |  |                               |                                 |   |                                 | M1   |
| is a distribution of the states | A surface of the address of the surface of the | المعالم ومالي مادات وما | والاعدار أحروهم وكالمحالي وال | health college direction and             | ومتقرام وتقليا التربيط الأسال | والجروال أخلاف والمتعاد ويرامون | and to out the discourse of   | dianily and a state             | a the standard of the  |
| industria.                      |  | condition of all        |                               | Contract of the second particular second |                               |                                 | and the second se | and the subscript of the second | M2   |
| BU CEPYIN AND                   | والمعادية فيتجمع المغلية في                    |                         |                               | وتوساوي ومعموليه لينزيه فتعافد والغراف   |                               |                                 | in the second   |                                 |  |
| 10.0.011                        |  |                         | 1.0001                        |  |                               |                                 |   |                                 |  |
| 18.0 GHz                        |  |                         | 16001 p                       | ts                                       |                               | 300.0 MHz/                      |   |                                 | 26.0 GHz   |
| 2 Marker Pea                    | K LIST<br>X-Valu                               | e                       | V-Va                          | lue                                      | No                            | X-Valu                          | P   | V-Va                            | lue  |
| 1                               | 25.781 260                                     | GHz                     | 39.840 c                      | BµV/m                                    |                               |                                 | <u> </u>  | 1 40                            | incres in the second se |
| i i                             |  |                         |                               |  |                               |                                 |   |                                 |  |
|                                 |  |                         |                               |  |                               |                                 |   |                                 |  |



#### CH39 - 2480 MHz - P-4:



Correction for pulse operation (see section 5.6):

| Froque | onov f | Peak     | Pook limit  | Book morgin | Correction   | Average  | Average  | Average |
|--------|--------|----------|-------------|-------------|--------------|----------|----------|---------|
| Fieque | ency i | emission | reak iinnit | Feak margin | factor $K_E$ | value    | limit    | margin  |
| (Mł    | Hz)    | (dBµV/m) | (dBµV/m)    | (dB)        | (dB)         | (dBµV/m) | (dBµV/m) | (dB)    |
| 7439   | .127   | 61.8     | 74.0        | -12.2       | -54.1        | 7.7      | 54.0     | -46.3   |

| . Frequency S                        | weep                        | 1                                    |                               | I                           | I                             |                               | I                                 | o 1Pk M                | ax 😑 2Rm Max                            |
|--------------------------------------|-----------------------------|--------------------------------------|-------------------------------|-----------------------------|-------------------------------|-------------------------------|-----------------------------------|------------------------|---|
| 90 dBµV/m                            |                             |                                      |                               |                             |                               |                               |                                   | M1[1]                  | 40.42 dBµV/<br><del>≥5.755 765 Gl</del> |
|                                      |                             |                                      |                               |                             |                               |                               |                                   | M2[2]                  | 31.94 dBµV/                             |
| 0 dBµV/m                             |                             |                                      |                               |                             |                               |                               |                                   | 2                      | 25.755 765 Gł                           |
|                                      |                             | H2 74 000                            | dBuV/m                        |                             |                               |                               |                                   |                        |   |
| 0 dBµV/m−−−−                         |                             |                                      |                               |                             |                               |                               |                                   |                        |   |
| 0 dBµV/m                             |                             |                                      |                               |                             |                               |                               |                                   |                        |   |
|                                      | ——H1 54.000 dB <sub>H</sub> | /V/m                                 |                               |                             |                               |                               |                                   |                        |   |
| 0 dBµV/m−−−−                         |                             |                                      |                               |                             |                               |                               |                                   |                        | 1                                       |
|                                      |                             |                                      |                               |                             |                               |                               |                                   |                        | M1                                      |
| U dBuy/m-<br>Ingiliation and a state | na dana kara dana da        | A putro di A Paldura                 | والمريطين ومعرضا والإمراك     | uluk parlala alari (ara ara | and the second                | ومعاقد وبالأقسين وأخاليه ويرا | and the product of a coloring the | بمقول وبالقروة الظعري  | a kara jilan bahla                      |
| Labban and the                       | is in the second states in  | a land the state of the state of the | e , incetter and incident sys |                             | trade you delik de soude y je |                               |                                   | in the solution of the | M2                                      |
| 18.0 GHz                             |                             |                                      | 16001 p                       | ts                          | 80                            | 0.0 MHz/                      |                                   |                        | 26.0 GH                                 |
| Marker Peak                          | List                        |                                      |                               |                             |                               |                               |                                   |                        |   |
| Marker Peak                          | List<br>X-Valu              |                                      | Y-Va                          | alue                        | No                            | X-Valu                        | e                                 | Y-Va                   | lue                                     |

Radiated limits according to FCC Part 15 Section 15.209(a) for spurious emissions which fall in restricted bands:

| Frequency<br>(MHz) | 15.209 Limits<br>(μV/m) | Measurement distance<br>(m) |
|--------------------|-------------------------|-----------------------------|
| 0.0090.49          | 2400/f(kHz)             | 300                         |
| 0.49 – 1.705       | 24000/f(kHz)            | 30                          |
| 1.705 – 30.0       | 30                      | 30                          |
| 30 - 88            | 100                     | 3                           |
| 88 - 216           | 150                     | 3                           |
| 216 - 960          | 200                     | 3                           |
| Above 960          | 500                     | 3                           |

#### General radiated limit according to RSS-Gen 8.9:

| Frequency<br>(MHz) | RSS-Gen Limits<br>(µA/m) | Measurement distance<br>(m) |
|--------------------|--------------------------|-----------------------------|
| 0.0090.49          | 63.7/f(kHz)              | 300                         |
| 0.49 – 1.705       | 63.7/f(kHz)              | 30                          |
| 1.705 – 30.0       | 0.08                     | 30                          |

| Frequency<br>(MHz) | RSS-Gen Limits<br>(µV/m) | Measurement distance<br>(m) |
|--------------------|--------------------------|-----------------------------|
| 30 - 88            | 100                      | 3                           |
| 88 - 216           | 150                      | 3                           |
| 216 - 960          | 200                      | 3                           |
| Above 960          | 500                      | 3                           |



#### **Restricted bands of operation:**

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209

| MHz                 | MHz                   | MHz             | GHz           |
|---------------------|-----------------------|-----------------|---------------|
| 0.090 - 0.110       | 16.42 – 16.423        | 399.9 – 410     | 4.5 – 5.15    |
| 0.495 - 0.505       | 16.69475 – 16.69525   | 608 - 614       | 5.35 – 5.46   |
| 2.1735 – 2.1905     | 16.80425 – 16.80475   | 960 – 1240      | 7.25 – 7.75   |
| 4.125 – 4.128       | 25.5 – 25.67          | 1300 – 1427     | 8.025 - 8.5   |
| 4.17725 – 4.17775   | 37.5 – 38.25          | 1435 – 1626.5   | 9.0 - 9.2     |
| 4.20725 - 4.20775   | 73 – 74.6             | 1645.5 – 1646.5 | 9.3 – 9.5     |
| 6.215 - 6.218       | 74.8 – 75.2           | 1660 – 1710     | 10.6 – 12.7   |
| 6.26775 - 6.26825   | 108 – 121.94          | 1718.8 – 1722.2 | 13.25 – 13.4  |
| 6.31175 – 6.31225   | 123 – 138             | 2200 – 2300     | 14.47 – 14.5  |
| 8.291 - 8.294       | 149.9 – 150.05        | 2310 – 2390     | 15.35 – 16.2  |
| 8.362 - 8.366       | 156.52475 - 156.52525 | 2483.5 – 2500   | 17.7 – 21.4   |
| 8.37625 - 8.38675   | 156.7 – 156.9         | 2690 – 2900     | 22.01 – 23.12 |
| 8.41425 - 8.41475   | 162.0125 – 167.17     | 3260 - 3267     | 23.6 - 24.0   |
| 12.29 – 12.293      | 167.72 – 173.2        | 3332 – 3339     | 31.2 – 31.8   |
| 12.51975 - 12.52025 | 240 – 285             | 3345.8 – 3358   | 36.43 - 36.5  |
| 12.57675 – 12.57725 | 322 – 335.4           | 3600 – 4400     | Above 38.6    |

#### RSS-Gen, Table 6 - Restricted Frequency Bands

| MHz                 | MHz                   | MHz             | GHz           |
|---------------------|-----------------------|-----------------|---------------|
| 0.090 - 0.110       | 12.57675 - 12.57725   | 399.9 - 410     | 7.250 - 7.750 |
| 0.495 - 0.505       | 13.36 - 13.41         | 608 - 614       | 8.025 - 8.500 |
| 2.1735 - 2.1905     | 16.42 - 16.423        | 960 - 1427      | 9.0 - 9.2     |
| 3.020 - 3.026       | 16.69475 - 16.69525   | 1435 - 1626.5   | 9.3 - 9.5     |
| 4.125 - 4.128       | 16.80425 - 16.80475   | 1645.5 - 1646.5 | 10.6 - 12.7   |
| 4.17725 - 4.17775   | 25.5 - 25.67          | 1660 - 1710     | 13.25 - 13.4  |
| 4.20725 - 4.20775   | 37.5 - 38.25          | 1718.8 - 1722.2 | 14.47 - 14.5  |
| 5.677 - 5.683       | 73 - 74.6             | 2200 - 2300     | 15.35 - 16.2  |
| 6.215 - 6.218       | 74.8 - 75.2           | 2310 - 2390     | 17.7 - 21.4   |
| 6.26775 - 6.26825   | 108 – 138             | 2483.5 - 2500   | 22.01 - 23.12 |
| 6.31175 - 6.31225   | 149.9 - 150.05        | 2655 - 2900     | 23.6 - 24.0   |
| 8.291 - 8.294       | 156.52475 - 156.52525 | 3260 - 3267     | 31.2 - 31.8   |
| 8.362 - 8.366       | 156.7 - 156.9         | 3332 - 3339     | 36.43 - 36.5  |
| 8.37625 - 8.38675   | 162.0125 - 167.17     | 3345.8 - 3358   | Above 38.6    |
| 8.41425 - 8.41475   | 167.72 - 173.2        | 3500 - 4400     |               |
| 12.29 - 12.293      | 240 – 285             | 4500 - 5150     |               |
| 12.51975 - 12.52025 | 322 - 335.4           | 5350 - 5460     |               |

#### The requirements are FULFILLED.

#### **Remarks:**

The measurement was performed up to the 10<sup>th</sup> harmonic. Only the worst-case plots are listed.



## 5.5 Spurious emissions radiated

For test instruments and accessories used see section 6 Part SER1, SER 2, SER 3.

#### 5.5.1 Description of the test location

Test location: NONE

#### 5.5.2 Applicable standard

According to FCC Part 15, Section 15.247(d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

#### 5.5.3 Test result

Limit according to FCC Part 15, Section 15.247(d) for emissions falling not in restricted bands:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. Attenuation below the general limits specified in Section 15.209(a) is not required.

| Frequency  | Spurious emission limit                            |
|------------|--|
| (MHz)      |  |
| Below 1000 | 20 dB below the highest level of the desired power |
| Above 1000 | 20 dB below the highest level of the desired power |

The requirements are **FULFILLED**.

**Remarks:** General limits specified in Section 15.209(a) are fulfilled (see section 5.4), thus additional

measurements not required.

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## 5.6 Correction for pulse operation (duty cycle)

For test instruments and accessories used see section 6 Part DC.

#### 5.6.1 Description of the test location

Test location: Shielded Room S6

#### 5.6.2 Photo documentation of the test set-up

| U |  |
|---|--|
|   |  |
|   |  |

#### 5.6.3 Applicable standard

According to FCC Part 15A, Section 15.35(c):

When the radiated emission limits are expressed in terms of average value and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1s. In cases where the pulse train exceeds 0.1s, the measured field strength shall be determined from the average absolute voltage during a 0.1s interval during which the field strength is at its maximum. The exact method of calculating the average field strength shall be submitted.

### 5.6.4 Description of Measurement

The duty cycle factor (dB) is calculated applying the following formula:

$$K_E = 20 \log (T_{on} / T_{conn})$$

 $K_{E:}$  pulse operation correction factor  $T_{on}$  on air duration

*T<sub>conn</sub>* connection interval duration



#### 5.6.5 Test result

 $K_E = 20 \log ((0.0955 + 0.1009) / 100) = -54.1 \text{ dB}$ 

**Remarks:** Worst case scenario: Download of 500 records from glucose meter to smart phone.

For detailed test results please see the following test protocol.

#### 5.6.6 Test protocol





## 5.7 Antenna application

According to FCC Part 15C, Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit that broken antennas can be replaced by the user, but the use of a standard antenna jack is prohibited.

The EUT has an integrated antenna. No other antenna can be used with the device.

The supplied antenna meets the requirements of part 15.203.

The requirements are FULFILLED.

None

Remarks:



# 6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

| Test ID | Model Type   | Equipment No.   | Next Calib.              | Last Calib.              | Next Verif. | Last Verif. |
|---------|--|---|--------------------------|--------------------------|-------------|-------------|
| CPC     | FSW43<br>minibend KR-16  | 02-02/11-15-001<br>02-02/50-16-018  | 22/04/2023               | 22/04/2022               |             |             |
| CPR 3   | FSW43<br>AMF-6D-01002000-22-10P  | 02-02/11-15-001<br>02-02/17-15-004  | 22/04/2023               | 22/04/2022               |             |             |
|         | 3117<br>BAM 4.5-P<br>NCD<br>KK-SF106-2X11N-6,5M  | 02-02/24-05-009<br>02-02/50-17-024<br>02-02/50-17-025<br>02-02/50-18-016  | 23/06/2023               | 23/06/2022               |             |             |
| DC      | FSW43  | 02-02/11-21-001   | 16/05/2023               | 16/05/2022               |             |             |
| SER 1   | ESR 7<br>HFH 2 - Z 2<br>NW-2000-NB<br>KK-EF393/U-16N-21N20 m<br>KK-SD_7/8-2X21N-33,0M                      | 02-02/03-17-001<br>02-02/24-05-020<br>02-02/50-05-113<br>02-02/50-12-018<br>02-02/50-15-028                                       | 05/08/2023<br>01/06/2025 | 05/08/2022<br>01/06/2022 | 01/06/2023  | 01/06/2022  |
| SER 2   | VULB 9168<br>ESVS 30<br>NW-2000-NB<br>KK-EF393/U-16N-21N20 m<br>KK-SD_7/8-2X21N-33,0M<br>50F-003 N 3 dB    | 01-02/24-14-007<br>02-02/03-05-006<br>02-02/50-05-113<br>02-02/50-12-018<br>02-02/50-15-028<br>02-02/50-21-010                    | 04/04/2023<br>27/07/2023 | 04/04/2022<br>27/07/2022 |             |             |
| SER 3   | FSW43<br>AMF-6D-01002000-22-10P<br>LNA-40-18004000-33-5P   | 02-02/11-15-001<br>02-02/17-15-004<br>02-02/17-20-002   | 22/04/2023               | 22/04/2022               |             |             |
|         | 3117<br>BBHA 9170<br>WHK 3.0/18G-10EF<br>BAM 4.5-P<br>NCD<br>KK-SF106-2X11N-6,5M<br>KMS116-GL140SE-KMS116- | 02-02/24-05-009<br>02-02/24-05-013<br>02-02/50-05-180<br>02-02/50-17-024<br>02-02/50-17-025<br>02-02/50-18-016<br>02-02/50-20-026 | 23/06/2023<br>19/05/2023 | 23/06/2022<br>19/05/2020 | 10/03/2023  | 10/03/2022  |

Notes:

- DC measurements performed on 27/06/2022

- all other measurements performed on 14/02/2023

- End of test report -