

Produkte
Products

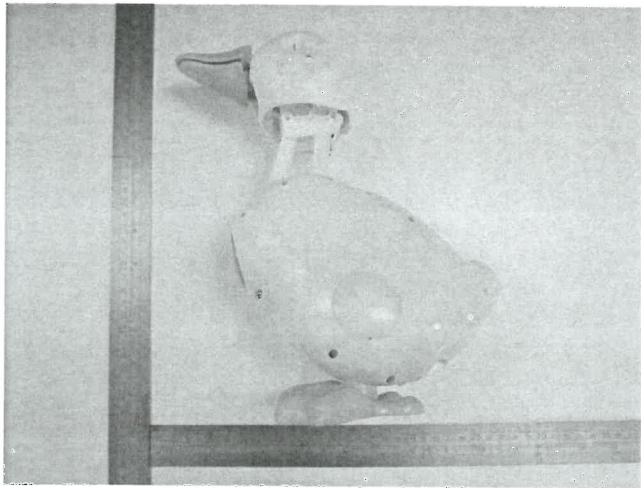

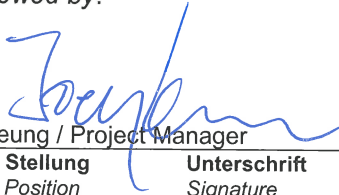
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|---|--|---|-----------------------------|--|
| Prüfbericht-Nr.: <i>Test Report No.:</i> | 50126856 001 | Auftrags-Nr.: <i>Order No.:</i> | 144175652 | Seite 1 von 20 <i>Page 1 of 20</i> |
| Kunden-Referenz-Nr.: <i>Client Reference No.:</i> | N/A | Auftragsdatum: <i>Order date:</i> | 13.02.2018 | |
| Auftraggeber: <i>Client:</i> | Sproutel, Inc. 60 Valley St Ste 29, Providence, RI 02909, USA | | | |
| Prüfgegenstand: <i>Test item:</i> | Short Range Device – Toy duck with Bluetooth connectivity and 13.56MHz RFID reader | | | |
| Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i> | F7E2 | | | |
| Auftrags-Inhalt: <i>Order content:</i> | FCC Certification | | | |
| Prüfgrundlage: <i>Test specification:</i> | FCC Part 15 Subpart C ANSI C63.10-2013 | | | |
| Wareneingangsdatum: <i>Date of receipt:</i> | 27.03.2018 |  | | |
| Prüfmuster-Nr.: <i>Test sample No.:</i> | A000709297-001 | | | |
| Prüfzeitraum: <i>Testing period:</i> | 02.04.2018 - 29.05.2018 | | | |
| Ort der Prüfung: <i>Place of testing:</i> | Hong Kong | | | |
| Prüflaboratorium: <i>Testing laboratory:</i> | TÜV Rheinland Hong Kong Ltd. | | | |
| Prüfergebnis*: <i>Test result*:</i> | Pass | | | |
| geprüft von / tested by: | | kontrolliert von / reviewed by: | | |
|  04.06.2018 David Cheng / Test Engineer | |  04.06.2018 Joey Leung / Project Manager | | |
| Datum <i>Date</i> | Name / Stellung <i>Name / Position</i> | Unterschrift <i>Signature</i> | Datum <i>Date</i> | Name / Stellung <i>Name / Position</i> |
| Sonstiges / Other: FCC ID: 2AN6HF7E2 | | | | |
| Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i> | | Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i> | | |
| * Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested | | | | |
| Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i> | | | | |

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Product information

Manufacturers declarations

| | BLE Transceiver | RFID Transmitter |
|---|----------------------------|------------------|
| Operating frequency range | 2402 - 2480 MHz | 13.56 MHz |
| Type of modulation | GFSK | ASK |
| Number of channels | 40 | 1 |
| Channel separation | 2 MHz | N/A |
| Type of antenna | Integral Antenna | |
| Antenna gain (dBi) | 0 dBi | |
| Power level | fix | |
| Type of equipment | stand alone radio device | |
| Connection to public utility power line | No | |
| Nominal voltage | V _{nom} : 4.5 VDC | |
| Independent Operation Modes | Transmitting | |

Product function and intended use

The equipment under test (EUT) is a toy duck with Bluetooth Low Energy connectivity and RFID reader. It is intended to educate and entertain the children with cancer.

FCC ID: 2AN6HF7E2

| Models | Product description |
|--------|--|
| F7E2 | Short Range Device – Toy duck with Bluetooth connectivity and 13.56MHz RFID reader |

Submitted documents

Circuit Diagram
Block Diagram
Technical Description
User manual
Label

Independent Operation Modes

The basic operation modes are:

- Transmitting mode.

For further information refer to User Manual

Related Submittal(s) Grants

This is a single application for certification of the transmitter.

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Remark

The test results in this test report are only relevant to the tested sample and does not involve any assessment in the production.

Test Set-up and Operation Mode

Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

Test Operation and Test Software

Test operation should refer to test methodology.

- During test, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power was selected according to the instruction given by the manufacturer. The setting of the RF output power expected by the customer shall be fixed on the firmware of the final end product.

Special Accessories and Auxiliary Equipment

- None

Countermeasures to achieve EMC Compliance

- None

Test Methodology

Radiated Emission

The radiated emission measurements of the transmitter part were performed according to the procedures in ANSI C63.10-2013.

For measurement below 1GHz - the equipment under test (EUT) was placed at the middle of the 80 cm height turntable. For measurement above 1GHz - the EUT was placed at the middle of the 1.5 m height turntable and RF absorbing material was placed on ground plane between turntable and measuring antenna. During the testing, the EUT was operated standalone and arranged for maximum emissions. The EUT was tested in three orthogonal planes.

The investigation is performed with the EUT rotated 360°, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

All radiated tests were performed at an antenna to EUT with 3 meters distance, unless stated otherwise in particular parts of this test report.

Field Strength Calculation

The field strength at 3m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

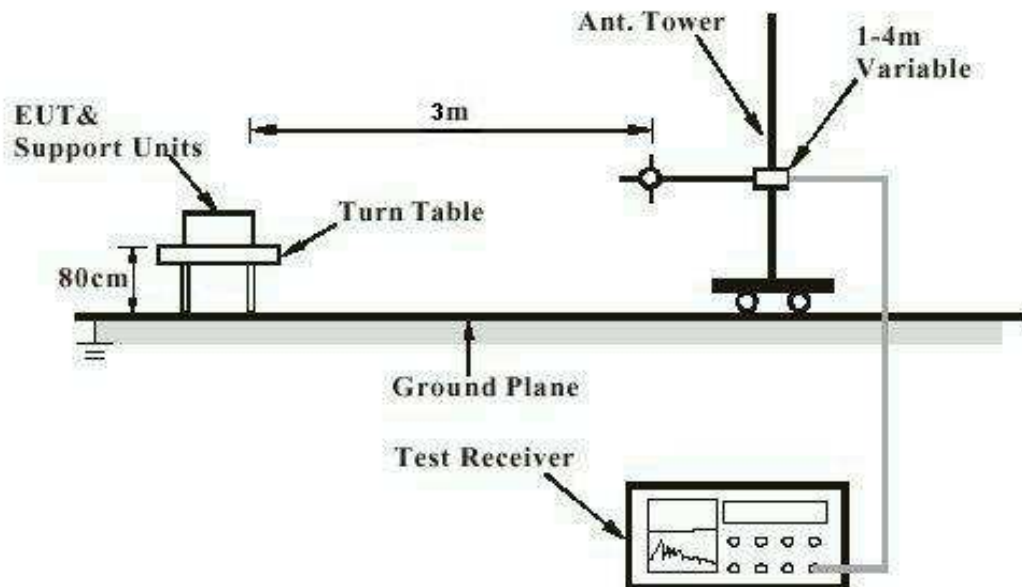
$$FS = R + AF + CF + FA - PA$$

Where FS = Field Strength in dBuV/m at 3 meters.
R = Reading of Spectrum Analyzer in dBuV.
AF = Antenna Factor in dB.
CF = Cable Attenuation Factor in dB.
FA = Filter Attenuation Factor in dB.
PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1 GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)

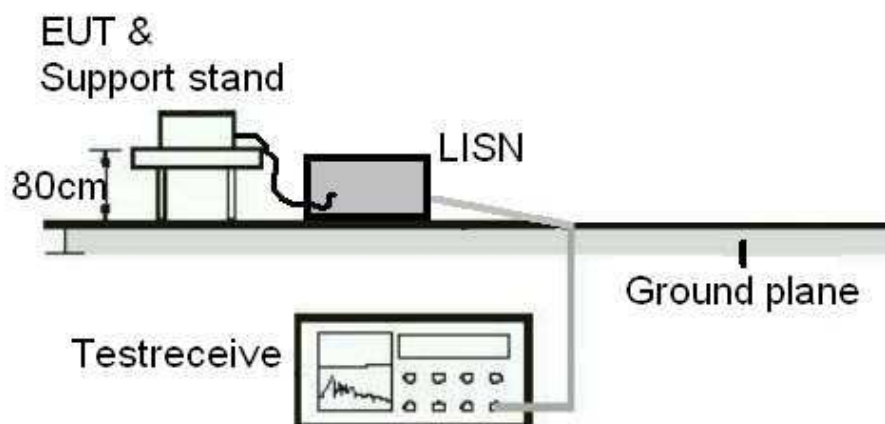
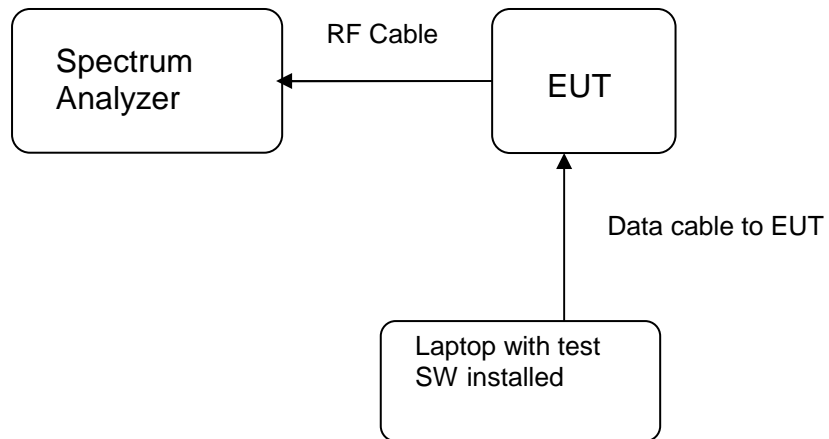


Diagram of Equipment Configuration for Antenna-port Conducted Measurement (if applicable)



Test Facility

Test Laboratory Information

TÜV Rheinland Hong Kong Ltd.

Address: 3-4, 11/F., Fou Wah Industrial Building, 10-16 Pun Shan Street, Tsuen Wan, N.T., Hong Kong

Tel.: +852 2192 1000

Fax: +852 2192 1001

Email service-gc@tuv.com

Web: www.tuv.com

The test facility is recognized or accredited by the following organizations:

| | |
|-------------------------------|-------------------------|
| Type | : Accredited Test Firm |
| Designation Number | : HK0013 |
| Test Firm Registration Number | : 371735 |
| Scope | : Intentional Radiators |

List of Test and Measurement Instruments

TÜV Rheinland Hong Kong Ltd

Radiated Emission

| Equipment | Manufacturer | Type | Cal. Date | Due Date |
|---|--------------------|---------------|-------------|-------------|
| Semi-anechoic Chamber | Frankonia | Nil | 23 Apr 2018 | 23 Apr 2019 |
| Test Receiver | R & S | ESU40 | 07 Sep 2017 | 07 Sep 2018 |
| Active Loop Antenna | EMCO | 6502 | 30 Oct 2017 | 21 Oct 2018 |
| Bi-conical Antenna | R & S | HK116 | 21 Mar 2018 | 21 Mar 2019 |
| Log Periodic Antenna | R & S | HL223 | 22 Mar 2018 | 22 Mar 2020 |
| Horn Antenna | EMCO | 3115 | 28 Mar 2018 | 28 Mar 2020 |
| Double-Ridged Waveguide Horn | EMCO | 3116 | 17 Jun 2016 | 17 Jun 2018 |
| Double-Ridged Waveguide Horn | EMCO | 3117 | 22 Jun 2016 | 22 Jun 2018 |
| Coaxial cable | Harbour | LL335 | 10 Jun 2016 | 10 Jun 2018 |
| High Frequency Cable | Pasternack | PE3VNA4001-3M | 29 Jan 2018 | 29 Jan 2019 |
| Microwave amplifier 0.5-26.5GHz, 25dB gain | HP | 83017A | 18 Jul 2016 | 18 Jul 2018 |
| Preamplifier 18GHz to 40GHz with cable (EMC656) | A.H. Systems, Inc. | PAM-1840VH | 29 Jan 2018 | 29 Jan 2019 |
| High Pass Filter (cutoff freq. =1000MHz) | Trilithic | 23042 | 30 Oct 2017 | 30 Oct 2019 |

Radio Test

| Equipment | Manufacturer | Type | Cal. Date | Due Date |
|---------------------|--------------|--------|-------------|-------------|
| Spectrum Analyzer | R & S | FSP30 | 03 May 2018 | 02 May 2019 |
| Thermometer | Fluke | 50S | 01 Aug 2017 | 31 Jul 2018 |
| Temperature Chamber | Binder | MK 240 | 05 Jul 2017 | 04 Jul 2018 |

Measurement Uncertainty

The estimated combined standard uncertainty for power-line conducted emissions measurements is $\pm 2.42\text{dB}$.

The estimated combined standard uncertainty for radiated emissions measurements is $\pm 4.81\text{dB}$ (9kHz to 30MHz) and $\pm 4.62\text{dB}$ (30MHz to 200MHz) and $\pm 5.67\text{dB}$ (200MHz to 1000MHz) and is $\pm 5.07\text{dB}$ (1GHz to 8.2GHz) and $\pm 4.58\text{dB}$ (8.2GHz to 12.4GHz) and $\pm 4.78\text{dB}$ (12.4GHz to 18GHz)

The estimated combined standard uncertainty for antenna conducted emission is $\pm 2.1\text{dB}$

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of $k=2$, which for the level of confidence is approximately 95%.

Results FCC Part 15 – Subpart C

| | | | | |
|------------------------------------|---|--|---|--|
| FCC 15.203 – Antenna Requirement 1 | | Pass | | |
| FCC Requirement: | No antenna other than that furnished by the responsible party shall be used with the device | | | |
| Results: | a) Antenna type: b) Manufacturer and model no: c) Peak Gain: | BLE portion Integral PCB antenna N/A 0dBi | RFID portion Integral coil antenna N/A N/A | |
| Verdict: | Pass | | | |

| | | | | |
|------------------------------------|--|-----|--|--|
| FCC 15.204 – Antenna Requirement 2 | | N/A | | |
| FCC Requirement: | An intentional radiator may be operated only with the antenna with which it is authorized. If an antenna is marketed with the intentional radiator, it shall be of a type which is authorized with the intentional radiator. | | | |
| Results: | Only one integral antenna can be used. | | | |
| Verdict: | N/A | | | |

| | | | | |
|--|--|-----|--|--|
| FCC 15.207 – Conducted Emission on AC Mains | | N/A | | |
| There is no AC power input or output ports on the EUT. | | | | |

| | | | | |
|---|--|-------------|-------------------|-------------|
| FCC 15.215 (c) – 20 dB Bandwidth | | Pass | | |
| Requirement: | The intentional radiators must be designed to ensure that the 20dB bandwidth of the emission, is contained within the frequency band designated in the rule section under which the equipment is operated. | | | |
| Test Specification : ANSI C63.10-2013 Test date : 03.05.2018 Mode of operation : TX Mode Supply voltage : 4.5VDC Temperature : 23°C Humidity : 50% | | | | |
| Results: | For test protocols refer to Appendix 1. | | | |
| Frequency (MHz) | 20 dB left (MHz) | Limit (MHz) | 20 dB right (MHz) | Limit (MHz) |
| 13.560 | 13.4540 | > 13.110 | 13.6765 | < 14.010 |

| FCC 15.225 (a)(b)(c) – Radiated Emission | | | Pass |
|---|---------------|----------------|--------------------------|
| Test Specification : ANSI C63.10 – 2013 Test date : 25.04.2018 Mode of operation : Tx mode Port of testing : Enclosure Measurement distance : 10 meters Supply voltage : 4.5VDC Temperature : 23°C Humidity : 50% | | | |
| Requirement: (a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters. (b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters. (c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters. | | | |
| Results: For test protocols refer to Appendix 1. | | | |
| Freq. Band (MHz) | Freq. (MHz) | Level (dBuV/m) | Limit/ Detector (dBuV/m) |
| 13.553 – 13.567 | 13.560 | 29.7 | 93.5 / QPK |
| 13.410 – 13.553 | No peak found | --- | 60.0 / QPK |
| 13.567 – 13.710 | No peak found | --- | 60.0 / QPK |
| 13.110 – 13.410 | No peak found | --- | 50.0 / QPK |
| 13.710 – 14.010 | No peak found | --- | 50.0 / QPK |

| FCC 15.225 (d) – Radiated Emissions | | Pass |
|-------------------------------------|---|---------------------------|
| Test Specification | : ANSI C63.10 – 2013 | |
| Test date | : 25.04.2018 | |
| Mode of operation | : TX mode | |
| Port of testing | : Enclosure | |
| Measurement distance | : 10 meters for < 30MHz 3 meters for >= 30MHz | |
| Frequency range | : 9kHz to 1GHz | |
| Supply voltage | : 4.5VDC | |
| Temperature | : 23°C | |
| Humidity | : 50% | |
| Requirement: | The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209. | |
| Results: | Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate. Simultaneous transmission was investigated and no new emissions were found. All three transmit frequency modes comply with the field strength within the restricted bands. There is no spurious found below 30MHz. | |
| Vertical Polarization | | |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m |
| 194.395 | 31.10 | 43.5 / QP |
| 614.020 | 28.50 | 46.0 / QP |
| Horizontal Polarization | | |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m |
| 192.670 | 31.40 | 43.5 / QP |
| 400.001 | 21.20 | 46.0 / QP |

| FCC 15.225 (e) – Frequency Tolerance | | | | | Pass |
|--|-------------------------|--------------------|------------------------|--------------|-----------|
| Test Specification : ANSI C63.10-2013 Test date : 04.05.2018 Mode of operation : Tx mode Port of testing : Antenna port | | | | | |
| Requirement: The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C in 10 degrees C steps at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage or battery end point at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery. | | | | | |
| Results: Pass | | | | | |
| Frequency stability with respect to ambient tempeature | | | | | |
| Temp. (°C) | Supply Voltage (VDC) | Frequency (MHz) | Frequency error (%) | Limit (%) | Verdict |
| 50 | 4.5 | 13.563525 | -0.000700 | +/- 0.01 | Pass |
| 40 | 4.5 | 13.563555 | -0.000479 | +/- 0.01 | Pass |
| 30 | 4.5 | 13.563695 | 0.000553 | +/- 0.01 | Pass |
| 20 | 4.5 | 13.563620 | 0.000000 | +/- 0.01 | Reference |
| 10 | 4.5 | 13.563655 | 0.000258 | +/- 0.01 | Pass |
| 0 | 4.5 | 13.563660 | 0.000295 | +/- 0.01 | Pass |
| -10 | 4.5 | 13.563640 | 0.000147 | +/- 0.01 | Pass |
| -20 | 4.5 | 13.563605 | -0.000111 | +/- 0.01 | Pass |

| FCC 15.247 (a)(2) – 6dB Bandwidth Measurement | | | Pass |
|---|-----------------|------------------|---------------------|
| FCC Requirement: Systems using digital modulation techniques may operate in the 902 – 928 MHz, 2400 – 2483.5 MHz, and 5725 – 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500kHz. | | | |
| Test Specification : ANSI C63.10 – 2013 Test date : 03.05.2018 Mode of operation : Tx mode Port of testing : Temporary antenna port Supply voltage : 4.5VDC Temperature : 23°C Humidity : 50% | | | |
| Results: For test protocols please refer to Appendix 1 | | | |
| Channel frequency (MHz) | 6 dB left (MHz) | 6 dB right (MHz) | 6dB bandwidth (kHz) |
| 2402 | 2401.628 | 2402.336 | 708 |
| 2440 | 2439.640 | 2440.336 | 696 |
| 2480 | 2479.634 | 2480.342 | 708 |

| FCC 15.247(b)(3) – Maximum Peak Conducted Output Power | | | Pass |
|---|-----------------------------|---------------|-------------|
| FCC Requirement: For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850MHz bands: 1 Watt (30dBm) | | | |
| Test Specification : ANSI C63.10 – 2013 Test date : 03.05.2018 Mode of operation : Tx mode Port of testing : Temporary antenna port Supply voltage : 4.5VDC Temperature : 23°C Humidity : 50% | | | |
| Results: For test protocols please refer to Appendix 1 | | | |
| Frequency (MHz) | Measured Output Power (dBm) | Limit (W/dBm) | Verdict |
| 2402 | 2.35 | 1 / 30.0 | Pass |
| 2440 | 1.98 | 1 / 30.0 | Pass |
| 2480 | 1.19 | 1 / 30.0 | Pass |

| FCC 15.247(e) – Power Spectral Density | | | Pass |
|---|---------------------|-------------|-------------|
| FCC Requirement: For digitally modulated systems, the power spectral density conducted 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. | | | |
| Test Specification : ANSI C63.10 – 2013 Test date : 03.05.2018 Mode of operation : Tx mode Port of testing : Temporary antenna port Supply voltage : 4.5VDC Temperature : 23°C Humidity : 50% | | | |
| Results: For test protocols please refer to Appendix 1. | | | |
| Operating frequency (MHz) | Power density (dBm) | Limit (dBm) | Verdict |
| 2402 | 2.21 | 8.0 | Pass |
| 2440 | 1.83 | 8.0 | Pass |
| 2480 | 1.08 | 8.0 | Pass |

| FCC 15.247(d) – Spurious Conducted Emissions | | | | Pass | |
|---|--------------------------|----------------------|-----------------------|------------|---------|
| Test Specification : ANSI C63.10 – 2013 Test date : 04.05.2018 Mode of operation : Tx mode Port of testing : Temporary antenna port Supply voltage : 4.5VDC Temperature : 23°C Humidity : 50% | | | | | |
| FCC Requirement: 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. | | | | | |
| Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate. Only the worst cases is shown below. For test protocols refer to Appendix 1 | | | | | |
| Operating frequency (MHz) | Spurious frequency (MHz) | Spurious Level (dBm) | Reference value (dBm) | Delta (dB) | Verdict |
| 2402 | 2400.0 | -36.72 | 2.21 | 38.72 | Pass |
| 2440 | 2560.0 | -43.52 | 1.83 | 45.35 | Pass |
| 2480 | 2560.0 | -43.28 | 1.08 | 44.36 | Pass |

| FCC 15.205 – Radiated Emissions in Restricted Frequency Bands | | | Pass |
|---|--------------|-------------------------|------|
| Test Specification : ANSI C63.10 – 2013 Test Specification : 25.04.2018 Mode of operation : Tx mode Port of testing : Enclosure Frequency range : 9kHz – 25GHz Supply voltage : 4.5VDC Temperature : 23°C Humidity : 50% | | | |
| FCC Requirement: In any 100kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in section 15.205(a), must also comply with the radiated emission limits specified in section 15.205(c). | | | |
| Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate. Simultaneous transmission was investigated and no new emissions were found. All three transmit frequency modes comply with the field strength within the restricted bands. There is no spurious found below 30MHz. | | | |
| Mode: 2402MHz TX | | Vertical Polarization | |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m | |
| 2389.327 | 50.07 | 74.0 / PK | |
| 2389.327 | 34.19 | 54.0 / AV | |
| No peak found | --- | 74.0 / PK | |
| No peak found | --- | 54.0 / AV | |
| Mode: 2402 MHz TX | | Horizontal Polarization | |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m | |
| 2389.342 | 49.02 | 74.0 / PK | |
| 2389.342 | 34.16 | 54.0 / AV | |
| No peak found | --- | 74.0 / PK | |
| No peak found | --- | 54.0 / AV | |
| Mode: 2440 MHz TX | | Vertical Polarization | |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m | |
| No peak found | --- | 74.0 / PK | |
| No peak found | --- | 54.0 / AV | |
| Mode: 2440 MHz TX | | Horizontal Polarization | |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m | |
| No peak found | --- | 74.0 / PK | |
| No peak found | --- | 54.0 / AV | |
| Mode: 2480MHz TX | | Vertical Polarization | |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m | |
| 2483.500 | 53.67 | 74.0 / PK | |

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| | | |
|---|-------------------------|-----------------------------------|
| 2483.500 | 42.37 | 54.0 / AV |
| No peak found | --- | 74.0 / PK |
| No peak found | --- | 54.0 / AV |
| Mode: 2480 MHz TX Horizontal Polarization | | |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m |
| 2483.500 | 56.11 | 74.0 / PK |
| 2483.500 | 43.87 | 54.0 / AV |
| No peak found | --- | 74.0 / PK |
| No peak found | --- | 54.0 / AV |