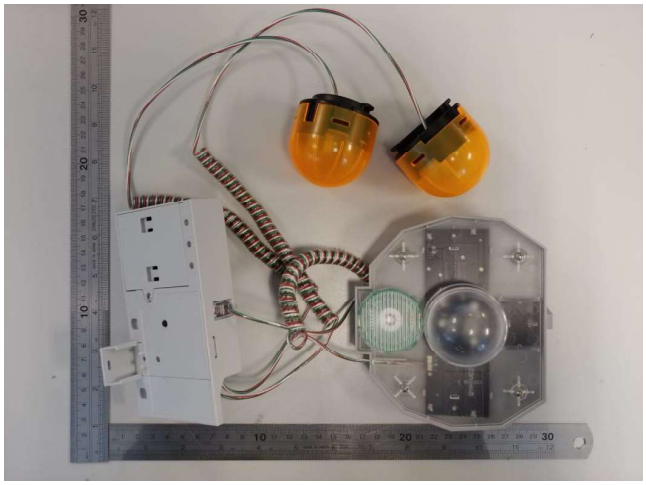
Prüfbericht-Nr.: *Test Report No.:*	**CN21WANV 002**	**Auftrags-Nr.:** *Order No.:*	**158226632**	**Seite 1 von 18** *Page 1 of 18*
Kunden-Referenz-Nr.: *Client Reference No.:*	**N/A**	**Auftragsdatum:** *Order date:*	**21.01.2021**	
Auftraggeber: *Client:*	**geobra Brandstaetter Stiftung & Co.KG Brandstaetterstr. 2-10; 90513 Zirndorf, Germany**			
Prüfgegenstand: *Test item:*	**USSE Enterprise**			
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	**#70548**			
Auftrags-Inhalt: *Order content:*	**US FCC Certification; ISED Canada Certification**			
Prüfgrundlage: *Test specification:*	**FCC Part 15 Subpart C** **RSS-247 Issue 2** **ANSI C63.10-2013**			
Wareneingangsdatum: *Date of receipt:*	**22.01.2021** **25.02.2021**			
Prüfmuster-Nr.: *Test sample No.:*	**A002991780-005** **A003006443-001**			
Prüfzeitraum: *Testing period:*	**22.01.2021 – 16.04.2021**			
Ort der Prüfung: *Place of testing:*	**Hong Kong**			
Prüflaboratorium: *Testing laboratory:*	**TÜV Rheinland Hong Kong Ltd.**			
Prüfergebnis*: *Test result*:*	**Pass**			



geprüft von / *tested by*:			**kontrolliert von** / *reviewed by*:		
16.06.2021	**Felicia Chan / Assistant Engineer**		**16.06.2021**	**Sharon Li / Unit Senior Manager**	
Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

Sonstiges / *Other*: **FCC ID: N2T30659894**
IC ID: 9285A-30659894

This report is prepared for the purpose of IC ID updated and typo mistake regarding the 4.5 VDC test voltage. All the test result were referred from CN21WANV 001 report.

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* 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*

Table of Content

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Product information

Manufacturers declarations

	Transceiver
Operating frequency range	2402 - 2480 MHz
Type of modulation	GFSK
Number of channels	40
Channel separation	2 MHz
Type of antenna	Integral PCB 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	4.5 VDC
Independent Operation Modes	Transmitting

Product function and intended use

The equipment under test (EUT) is a Bluetooth low energy lighting device.

FCC ID: N2T30659894/ IC ID: 9285A-30659894

Models	Product description
#70548	**USSE Enterprise**

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.

Remark

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

This report is prepared for the purpose of IC ID updated and typo mistake regarding the 4.5 VDC test voltage. All the test result were referred from CN21WANV 001 report.

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.

- A test mode sample is provided by the applicant to control the operating channel. The RF output power is fixed in the test mode sample. The setting of the RF output power used in the testing 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 3 m 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:

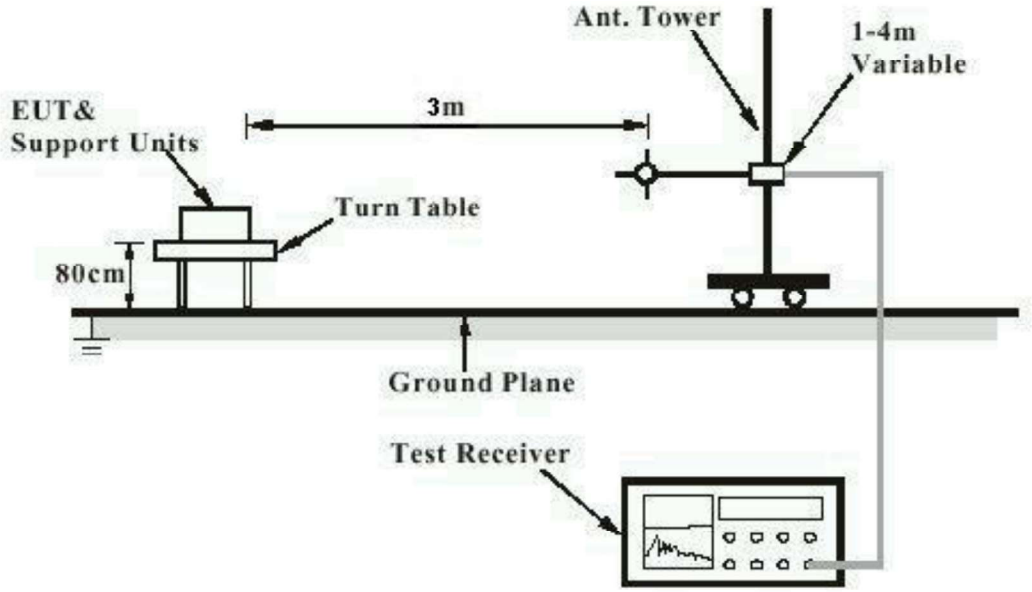
FS = R + AF + CF + FA – PA

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)

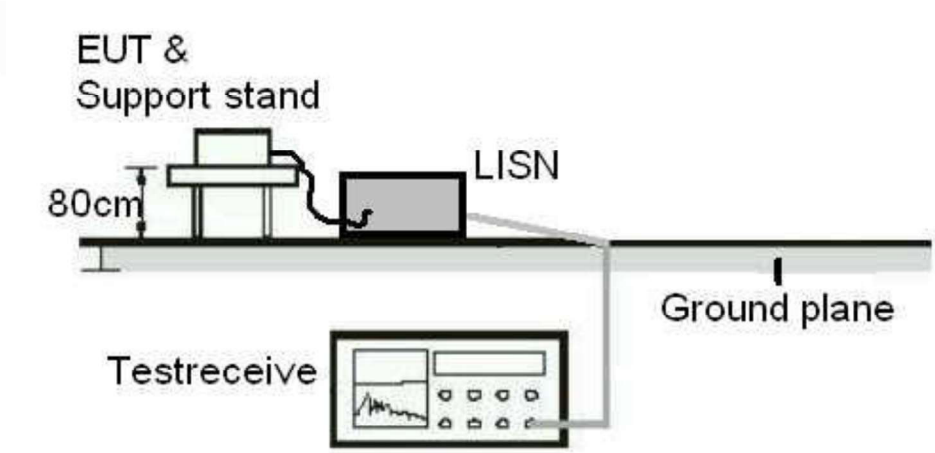
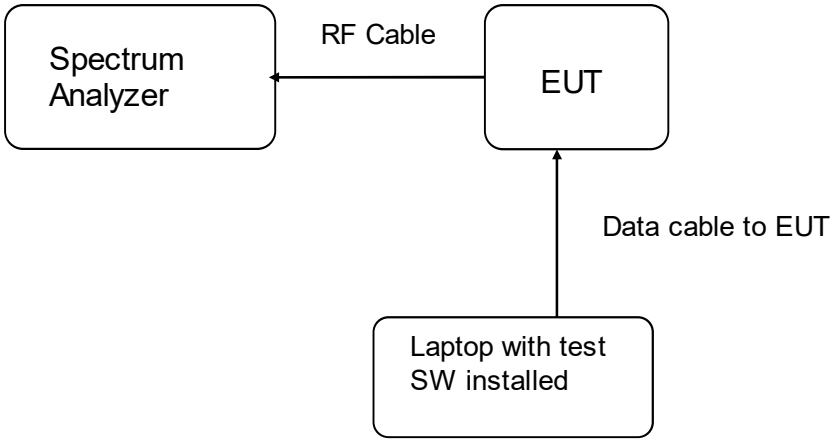


Diagram of Equipment Configuration for Antenna-port Conducted Measurement (if applicable)



Test Facility

Test Laboratory Information

TÜV Rheinland Hong Kong Ltd.
Address: 3-4/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

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

FCC
Test Firm Registration Number : 371735

ISED/IC

Test Site Registration Number : 26152

List of Test and Measurement Instruments

Radiated Emission

Equipment	Manufacturer	Type	Cal. Date	Due Date
Semi-anechoic Chamber	Frankonia	Nil	5-Mar-21	5-Mar-22
Multi-functional Anechoic Chamber	Albatross	Nil	4-Jan-21	4-Jan-22
Test Receiver	R & S	ESU40	7-Oct-20	7-Oct-21
Active Loop Antenna	EMCO	6502	3-Nov-20	3-Nov-22
Bi-conical Antenna	R & S	HK116	15-Sep-20	15-Sep-22
Log Periodic Antenna	R & S	HL223	15-Sep-20	15-Sep-22
Standard Gain Horn	ETS-Lindgren	3160-07	24-Nov-20	24-Nov-22
Standard Gain Horn	ETS-Lindgren	3160-08	24-Nov-20	24-Nov-22
Standard Gain Horn	ETS-Lindgren	3160-10	30-Oct-20	30-Oct-22
Double-Ridged Waveguide Horn	EMCO	3116	30-Oct-20	30-Oct-22
Double-Ridged Waveguide Horn	EMCO	3117	11-Nov-20	11-Nov-22
Coaxial cable	Harbour	SF118/11n/11n/12000.0	3-Aug-20	3-Aug-22
High Frequency Cable	Pasternack	PE3VNA4001-3M	29-Jan-21	29-Jan-23
Microwave amplifer 0.5-26.5GHz, 25dB gain	COM-POWER Corporation	PAM-118A	5-Mar-21	5-Mar-22
Preamplifier 18GHz to 40GHz with cable (EMC656)	A.H. Systems, Inc.	PAM-1840VH	29-Jan-21	29-Jan-22
High Pass Filter (cutoff freq. =1000MHz)	Trilithic	23042	30-Oct-19	30-Oct-21
Bore-Sight Antenna Mast	Maturo	BAM 4.0-P-10kg	N.A.	N.A.

Radio Test

Equipment	**Manufacturer**	**Type**	**Cal. Date**	**Due Date**
Spectrum Analyzer	R & S	FSV40	3-Nov-20	3-Nov-21

Measurement Uncertainty

The estimated combined standard uncertainty for power-line conducted emissions measurements is 2.28dB.

The estimated combined standard uncertainty for radiated emissions measurements is 3.23dB (9kHz to 30MHz) and 5.18dB (30MHz to 200MHz) and 6.09dB (200MHz to 1000MHz) and is 4.91dB (1GHz to 8.2GHz) and 4.78dB (8.2GHz to 12.4GHz) and 4.91dB (12.4GHz to 18GHz)

The estimated combined standard uncertainty for antenna conducted emission is 2.68dB

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 / RSS-247 Issue 2

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:	Integral PCB antenna N/A 0 dBi
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

RSS-Gen 6.3 – External Control	**Pass**
IC Requirement:	The device shall not have any external controls accessible to the user that enable it to be adjusted, selected or programmed to operate in violation of the limits prescribed in the applicable RSS.
Results:	The device does not have any transmitter external controls accessible to the user that can be adjusted and operated in violation of the limits of this standard.
Verdict:	Pass

RSS-Gen 8.3 – Antenna Requirement		**Pass**
IC Requirement:	When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer.	
Results:	a) Antenna type: b) Manufacturer c) model no d) Gain with reference to an isotropic radiator:	Integral PCB antenna N/A N/A 0 dBi
Verdict:	Pass	

FCC 15.207/ RSS-Gen 8.8 – Conducted Emission on AC Mains	N/A
There is no AC power input or output ports on the EUT.	

FCC 15.247 (a)(2) / RSS-247 5.2 – 6dB Bandwidth Measurement	Pass
FCC/ IC 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 : 18.03.2021 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	2401.663	2402.198	534
2440	2439.643	2440.198	554
2480	2479.663	2480.198	534

RSS-Gen 6.6 – Occupied Bandwidth	Pass
FCC/ IC Requirement: N/A	
Test Specification : RSS-Gen Test date : 18.03.2021 Mode of operation : Tx mode Port of testing : Temporary antenna port Supply voltage : 4.5VDC Temperature : 23°C Humidity : 50%	
Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types. For test protocols refer to Appendix 1.	

Frequency (MHz)	Left (MHz)	Right (MHz)	99% bandwidth (MHz)
2402	2401.471	2402.578	1.107
2440	2439.460	2440.593	1.129
2480	2479.406	2480.542	1.129

FCC 15.247(b)(3) / RSS-247 5.4 – Maximum Peak Conducted Output Power	Pass

FCC/ IC 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 : 18.03.2021
Mode of operation : Tx mode
Port of testing : Temporary antenna port
Supply voltage : 4.5VDC
Temperature : 23ºC
Humidity : 50%

Results: For test protocols please refer to Appendix 1

Frequency (MHz)	Measured Output Power (dBm)	Limit (dBm)	Verdict
2402	-5.8	30.0	Pass
2440	-5.6	30.0	Pass
2480	-6.0	30.0	Pass

FCC 15.247(e) / RSS-247 5.2 – Power Spectral Density	Pass

FCC/ IC 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 : 18.03.2021
Mode of operation : Tx mode
Port of testing : Temporary antenna port
Supply voltage : 4.5VDC
Temperature : 23ºC
Humidity : 50%

Results: For test protocols please refer to Appendix 1.

Operating frequency (MHz)	Power density (dBm)	Limit (dBm)	Verdict
2402	-5.37	8.0	Pass
2440	-5.49	8.0	Pass
2480	-5.36	8.0	Pass

FCC 15.247(d) / RSS-247 5.5 – Spurious Conducted Emissions **Pass**

Test Specification : ANSI C63.10 – 2013
Test date : 21.03.2021
Mode of operation : Tx mode
Port of testing : Temporary antenna port
Supply voltage : 4.5VDC
Temperature : 23ºC
Humidity : 50%

FCC/ IC 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	2396.775	-45.30	-5.37	39.93	Pass
2440	4879.525	-52.60	-5.49	47.11	Pass
2480	2485.025	-47.70	-5.36	42.34	Pass

FCC 15.205/ RSS-Gen 8.9 – Radiated Emissions in Restricted Frequency Bands Pass

Test Specification : ANSI C63.10 – 2013
Test Date : 21.03.2021
Mode of operation : Tx mode
Port of testing : Enclosure
Frequency range : 9kHz – 25GHz
Supply voltage : 4.5VDC
Temperature : 23ºC
Humidity : 50%

FCC/ IC 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 must also comply with the radiated emission general limits.

Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate.

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
2390.000	44.1	74.0 / PK
2390.000	26.0	54.0 / AV
4803.967	51.8	74.0 / PK
4803.967	35.6	54.0 / AV
5760.000	51.0	74.0 / PK
5760.000	47.9	54.0 / AV
7205.951	44.3	74.0 / PK
7205.951	29.9	54.0 / AV

Mode: 2402 MHz TX Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
408.004	35.3	46.0 / QP
672.001	37.3	46.0 / QP
936.001	36.6	46.0 / QP
2390.000	39.6	74.0 / PK
2390.000	28.9	54.0 / AV
4803.487	57.2	74.0 / PK
4803.487	38.7	54.0 / AV
7205.471	44.0	74.0 / PK
7205.471	29.9	54.0 / AV

Mode: 2440 MHz TX	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4879.490	51.1	74.0 / PK
4879.490	37.4	54.0 / AV
5760.064	43.2	74.0 / PK
5760.064	29.6	54.0 / AV
7319.483	43.2	74.0 / PK
7319.483	29.6	54.0 / AV
Mode: 2440 MHz TX	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4879.490	53.8	74.0 / PK
4879.490	40.1	54.0 / AV
7319.740	43.7	74.0 / PK
7319.740	29.7	54.0 / AV
Mode: 2480MHz TX	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2483.500	45.9	74.0 / PK
2483.500	30.3	54.0 / AV
4959.483	53.7	74.0 / PK
4959.483	39.9	54.0 / AV
7439.474	43.4	74.0 / PK
7439.474	29.8	54.0 / AV
Mode: 2480 MHz TX	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2483.500	45.5	74.0 / PK
2483.500	30.8	54.0 / AV
4959.483	53.7	74.0 / PK
4959.483	39.7	54.0 / AV
7439.467	43.3	74.0 / PK
7439.467	29.8	54.0 / AV