Credence ID LLC

TEST REPORT

SCOPE OF WORK
FCC Testing–CE1-CID-16-4G-011

REPORT NUMBER
210916025SZN-003

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25 March 2022 [----------]

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TEST REPORT

Intertek Report No.: 210916025SZN-003

Credence ID LLC

Application
For
Certification

FCC ID: 2AMBZ-CE1-16-4G-11

Rugged Handheld Device

Model: CE1-CID-16-4G-011

Brand Name: Credence ID

2.4GHz Wi-Fi Transceiver

Report No.: 210916025SZN-003

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [10-1-20]

Prepared and Checked by:

Jeff Liang
Project Engineer

Approved by:

Peter Kang
Senior Technical Supervisor
Date: 25 March 2022

MEASUREMENT/TECHNICAL REPORT

This report concerns (check one) Original Grant X Class II Change _____

Equipment Type: DTS - Part 15 Digital Transmission Systems (Wi-Fi transmitter portion)

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes _____ No X

If yes, defer until: _____
date

Company Name agrees to notify the Commission by: _____
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes _____ No X

If no, assumed Part 15, Subpart C for intentional radiator - the new 47 CFR [10-01-20] Edition] provision.

Report prepared by:

Jeff Liang
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Table of Contents

1.0 Summary of Test results

Applicant: Credence ID LLC
Applicant Address: 2335 Broadway Suite 100 Oakland California United States
Manufacturer: Credence ID LLC
Manufacturer Address: 2335 Broadway Suite 100 Oakland California United States

Model: CE1-CID-16-4G-011

FCC ID: 2AMBZ-CE1-16-4G-11

TEST ITEM	REFERENCE	RESULTS
Max. Output power	15.247(b)(3)	Pass
6 dB Bandwidth	15.247(a)(2)	Pass
Max. Power Density	15.247(e)	Pass
Out of Band Antenna Conducted Emission	15.247(d)	Pass
Radiated Emission in Restricted Bands	15.247(d), 15.209, FCC 15.205	Pass
AC Conducted Emission	15.207	Pass
Antenna Requirement	15.203	Pass (See Notes)

Notes: The EUT uses an Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.

2.0 General Description

2.1 Product Description

The Equipment Under Test (EUT) is a Rugged Handheld Device with 2.4G Wi-Fi function operating at 2412-2462MHz. The EUT is powered by DC 5V/2.5A or DC 9V/1.5A by adapter. For more detailed features description, please refer to the user's manual.

Type of Modulation: BPSK, QPSK, 16QAM, 64QAM for OFDM; CCK, DQPSK, DBPSK for DSSS.
Antenna Type: Integral Antenna
Antenna Gain: 0.4dBi

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

2.2 Related Submittal(s) Grants

This is an application for certification of:
This is an application for certification of a transceiver for the Rugged Handheld Device which has 2.4GHz WIFI function.
For the Bluetooth (EDR) function was tested and demonstrated in report 210916025SZN-001.
For the Bluetooth (BLE) function was tested and demonstrated in report 210916025SZN-002.
For the 5G WIFI function was tested and demonstrated in report 210916025SZN-004.
For the WCDMA/LTE function was tested and demonstrated in report 210916025SZN-005.
For the NFC function was tested and demonstrated in report 210916025SZN-006.
For the other function was tested and demonstrated in FCC SDoC report 210916025SZN-008.

2.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013) and KDB 558074 D01 v05r02. Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

2.4 Test Facility

The Semi-anechoic chamber and shielded room used to collect the radiated data and conducted data are **Intertek Testing Services Shenzhen Ltd. Longhua Branch** and located at 101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, Shenzhen, P.R. China. This test facility and site measurement data have been fully placed on file with File Number: CN1188.

3.0 System Test Configuration

3.1 Justification

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables were manipulated to produce worst case emissions. The EUT was powered by a fully DC 3.8V rechargeable Li-ion battery and charged by DC 5V/2.5A or DC 9V/1.5A through adapter during the test.

On 802.11b/g/n-HT20/n-HT40 mode, one antenna are used, and all data rate were tested and only the worst case data is shown in the report.

For maximizing emissions, the EUT was rotated through 360°, the EUT was placed on the styrene turntable with 0.1m. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

The EUT and transmitting antenna was centered on the turntable.

Radiated emission measurement were performed the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

3.2 EUT Exercising Software

The EUT exercise program (provided by client) used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The worst case configuration is used in all specified testing.

The parameters of test software setting:
During the test, Channel and power controlling software provided by the applicant was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the application and is going to be fixed on the firmware of the end product.

Testing Software: Nonsignaling operation platform

3.3 Special Accessories

USB cable (Shielded, Length 100cm)

3.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

3.5 Equipment Modification

Any modifications installed previous to testing by Credence ID LLC will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Longhua Branch.

3.6 Support Equipment List and Description

Description	Manufacturer	Model No.
Power Adapter	(Provided by Applicant)	MODEL: HJ-FC001K7-UK INPUT: 100-240V~50/60Hz 0.6A OUTPUT: 5.0V⎓3.0A OR 9.0V⎓2.0A OR 12.0V⎓1.5A 18W
USB Cable	(Provided by Applicant)	shielded, 100cm

4.0 Measurement Results

4.1 Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(3):

The antenna power of the EUT was connected to the input of a broadband peak RF power meter. The power meter has a video bandwidth that is greater than DTS bandwidth and utilize a fast-responding diode detector. Power was read directly at the EUT antenna terminals with cable loss added.

For antennas with gains of 6 dBi or less, maximum allowed Transmitter output is 1 watt (+30 dBm).

IEEE 802.11b (CCK, 1Mbps)		
Frequency (MHz)	Output in dBm (Peak Reading)	Output (mWatt)
Low Channel: 2412	17.00	50.12
Middle Channel: 2437	17.68	58.61
High Channel: 2462	17.31	53.83

IEEE 802.11g (16QAM, 6Mbps)		
Frequency (MHz)	Output in dBm (Peak Reading)	Output (mWatt)
Low Channel: 2412	20.50	112.20
Middle Channel: 2437	21.93	155.96
High Channel: 2462	20.50	112.20

IEEE 802.11n-HT20 (64QAM, 6.5Mbps)		
Frequency (MHz)	Output in dBm (Peak Reading)	Output (mWatt)
Low Channel: 2412	20.96	124.74
Middle Channel: 2437	22.14	163.68
High Channel: 2462	20.91	123.31

IEEE 802.11n-HT40 (64QAM, 13.5Mbps)		
Frequency (MHz)	Output in dBm (Peak Reading)	Output (mWatt)
Low Channel: 2422	21.60	144.54
Middle Channel: 2437	21.43	139.00
High Channel: 2452	21.42	138.68

Cable loss: 1.0 dB External Attenuation: 0 dB

Cable loss, external attenuation has been included in OFFSET function

EUT max. output level = 22.14dBm
EUT max. E.I.R.P = 22.14dBm + 0.4dBi = 22.54dBm = 179.47mW

For RF Exposure, the information is saved with filename: RF exposure.pdf.

4.2 Minimum 6 dB RF Bandwidth, FCC Rule 15.247(a) (2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was set to 100 KHz according to FCC KDB 558074 D01 v05r02. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

Limit: The 6 dB Bandwidth is at least 500 kHz.

Test Result: Please refer to Appendix A of "210916025SZN-003_ Appendix"

4.3 Maximum Power Density Reading, FCC Rule 15.247(e):

The Measurement Procedure PKPSD was set according to the FCC KDB 558074 D01 v05r02.

Antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.

Limit: The Power Density does not exceed 8dBm/3 kHz.

Test Result: Please refer to Appendix B of "210916025SZN-003_ Appendix"

4.4 Out of Band Conducted Emissions, FCC Rule 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. The Measurement Procedure was set according to the FCC KDB 558074 D01 v05r02.

All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the passband.

Refer to the attached test plots for out of band conducted emissions data with rate of 1Mbps for 802.11b and 6Mbps for 802.11g and 6.5Mbps for 802.11n-HT20 and 13.5Mbps for 802.11n-HT40.

The test plots showed all spurious emission up to the tenth harmonic were measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

Test Result: Please refer to Appendix C of "210916025SZN-003_ Appendix"

4.5 Out of Band Radiated Emissions (for emissions in 4.4 above that are less than 20dB below carrier), FCC Rule 15.247(d):

For out of band emissions that are close to or that exceed the 20dB attenuation requirement described in the specification, radiated measurements were performed at a 3m separation distance to determine whether these emissions complied with the general radiated emission requirement.

[×] Not required, since all emissions are more than 20dB below fundamental
[ ] See attached data sheet

4.6 Transmitter Radiated Emissions in Restricted Bands, FCC Rule 15.35(b) (c):

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included. All measurements were performed with peak detection unless otherwise specified.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Test Result: Please refer to Appendix D of “210916025SZN-003_ Appendix”

4.7 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD

Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD

Example
Assume a receiver reading of 62.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB. The net field strength for comparison to the appropriate emission limit is 42 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 62.0 dBμV
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB
FS = 62 + 7.4 + 1.6 - 29 + 0 = 42 dBμV/m

Level in mV/m = Common Antilogarithm [(42 dBμV/m)/20] = 125.9 μV/m

4.8 Radiated Spurious Emission

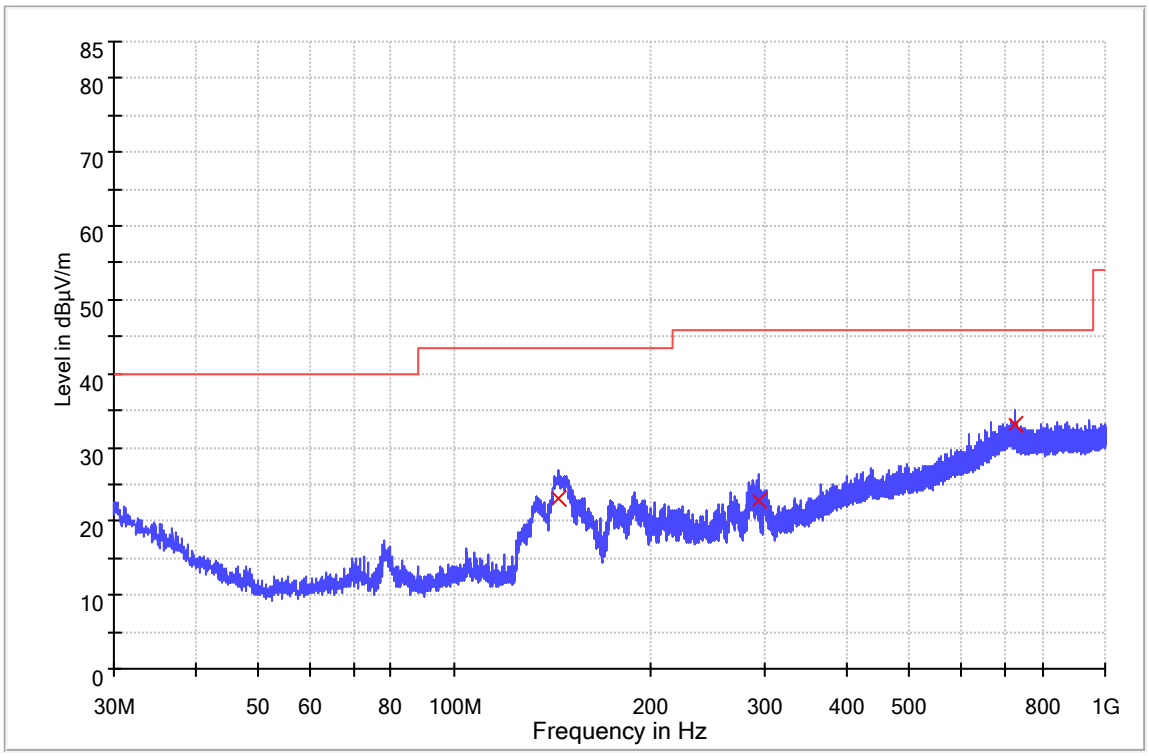
Worst Case Radiated Spurious Emission
at 2483.500MHz
is passed by 1.0dB margin.

For the electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf.

Applicant: Credence ID LLC
Date of Test: 16 November 2021 Model: CE1-CID-16-4G-011
Worst Case Operating Mode: WIFI Link

ANT Polarity: Horizontal

FCC Part 15

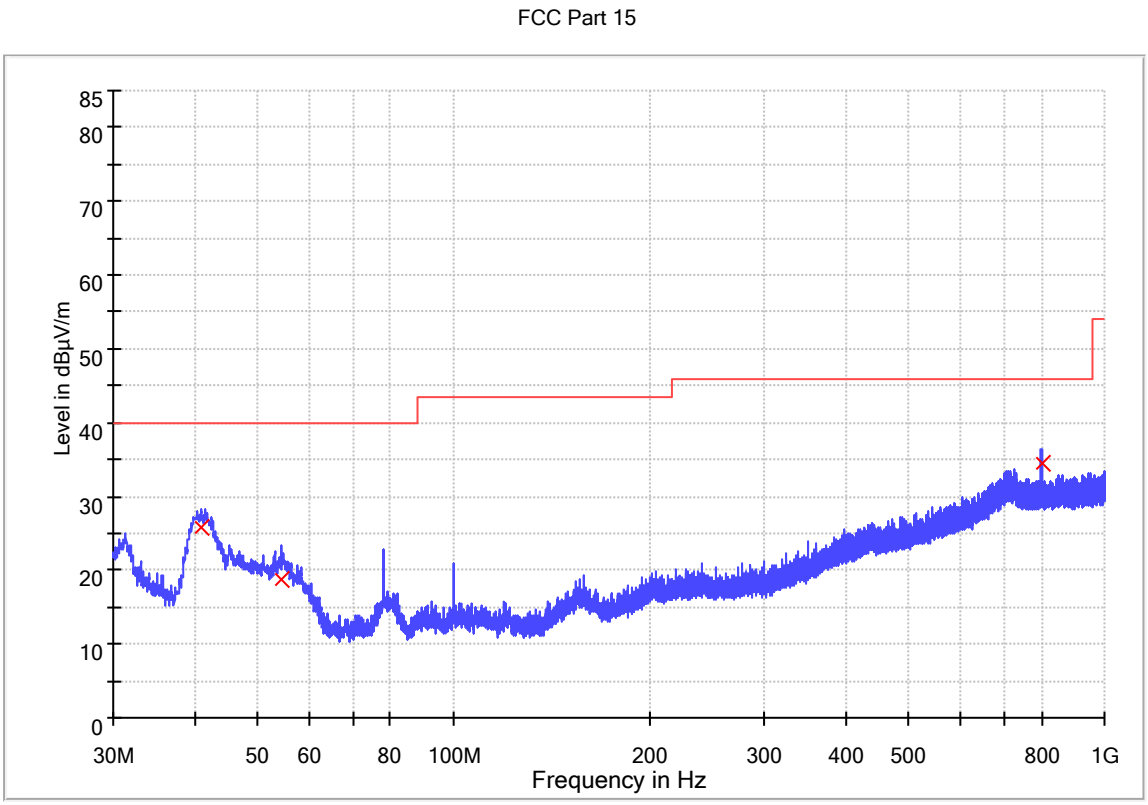


Frequency (MHz)	Quasi Peak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB/m)	Margin - QPK (dB)	Limit – QPK (dBµV/m)
144.363000	23.0	1000.0	120.000	H	15.7	20.5	43.5
292.967000	22.8	1000.0	120.000	H	20.3	23.2	46.0
728.949667	33.2	1000.0	120.000	H	32.0	12.8	46.0

Remark:
1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. Quasi Peak (dBµV/m) = Corr. (dB/m) + Read Level (dBµV)
3. Margin (dB) = Limit Line (dBµV/m) – Level (dBµV/m)

Applicant: Credence ID LLC
Date of Test: 16 November 2021 Model: CE1-CID-16-4G-011
Worst Case Operating Mode: WIFI Link

ANT Polarity: Vertical



Frequency (MHz)	Quasi Peak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB/m)	Margin - QPK (dB)	Limit – QPK (dBµV/m)
40.993333	25.9	1000.0	120.000	V	16.7	14.1	40.0
54.347000	18.9	1000.0	120.000	V	13.2	21.1	40.0
800.018333	34.5	1000.0	120.000	V	32.0	11.5	46.0

Remark:
1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. Quasi Peak (dBµV/m) = Corr. (dB/m) + Read Level (dBµV)
3. Margin (dB) = Limit Line (dBµV/m) – Level (dBµV/m)

Applicant: Credence ID LLC
Date of Test: 16 November 2021 Model: CE1-CID-16-4G-011

Radiated Emissions (above 1GHz)

Worst Case Operating Mode: Transmitting (802.11b-Channel 01)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	55.2	36.8	33.5	51.9	74.0	-22.1
Horizontal	*2390.000	67.3	36.4	29.1	60.0	74.0	-14.0

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	45.6	36.8	33.5	42.3	54.0	-11.7
Horizontal	*2390.000	55.8	36.4	29.1	48.5	54.0	-5.5

Worst Case Operating Mode: Transmitting (802.11b-Channel 06)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	54.9	36.7	33.4	51.6	74.0	-22.4
Horizontal	*7311.000	50.8	36.6	35.8	50.0	74.0	-24.0

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	45.6	36.7	33.4	42.3	54.0	-11.7
Horizontal	*7311.000	43.0	36.6	35.8	42.2	54.0	-11.8

Worst Case Operating Mode: Transmitting (802.11b-Channel 11)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	57.3	36.5	33.3	54.1	74.0	-19.9
Horizontal	*2483.500	67.9	36.8	29.3	60.4	74.0	-13.6

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	50.5	36.8	33.3	47.0	54.0	-7.0
Horizontal	*2483.500	56.2	36.5	29.3	49.0	54.0	-5.0

Worst Case Operating Mode: Transmitting (802.11g-Channel 01)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	57.1	36.8	33.5	53.8	74.0	-20.2
Horizontal	*2390.000	76.7	36.4	29.1	69.4	74.0	-4.6

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	50.0	36.8	33.5	46.7	54.0	-7.3
Horizontal	*2390.000	56.5	36.4	29.1	49.2	54.0	-4.8

Worst Case Operating Mode: Transmitting (802.11g-Channel 06)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	57.3	36.7	33.4	54.0	74.0	-20.0
Horizontal	*7311.000	51.7	36.6	35.8	50.9	74.0	-23.1

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	50.2	36.7	33.4	46.9	54.0	-7.1
Horizontal	*7311.000	43.6	36.6	35.8	42.8	54.0	-11.2

Worst Case Operating Mode: Transmitting (802.11g-Channel 11)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	57.3	36.5	33.3	54.1	74.0	-19.9
Horizontal	*2483.500	71.4	36.8	29.3	63.9	74.0	-10.1

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	50.5	36.8	33.3	47.0	54.0	-7.0
Horizontal	*2483.500	56.9	36.5	29.3	49.7	54.0	-4.3

Worst Case Operating Mode: Transmitting (802.11n20-Channel 01)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	56.7	36.8	33.5	53.4	74.0	-20.6
Horizontal	*2390.000	76.1	36.4	29.1	68.8	74.0	-5.2

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	49.8	36.8	33.5	46.5	54.0	-7.5
Horizontal	*2390.000	56.6	36.4	29.1	49.3	54.0	-4.7

Worst Case Operating Mode: Transmitting (802.11n20-Channel 06)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	57.1	36.7	33.4	53.8	74.0	-20.2
Horizontal	*7311.000	51.4	36.6	35.8	50.6	74.0	-23.4

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	50.0	36.7	33.4	46.7	54.0	-7.3
Horizontal	*7311.000	43.4	36.6	35.8	42.6	54.0	-11.4

Worst Case Operating Mode: Transmitting (802.11n20-Channel 11)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	57.0	36.5	33.3	53.8	74.0	-20.2
Horizontal	*2483.500	72.6	36.8	29.3	65.1	74.0	-8.9

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	50.4	36.8	33.3	46.9	54.0	-7.1
Horizontal	*2483.500	57.1	36.5	29.3	49.9	54.0	-4.1

Worst Case Operating Mode: Transmitting (802.11n40-Channel 03)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4844.000	56.6	36.8	33.5	53.3	74.0	-20.7
Horizontal	*2390.000	77.9	36.4	29.1	70.6	74.0	-3.4

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4844.000	49.5	36.8	33.5	46.2	54.0	-7.8
Horizontal	*2390.000	58.0	36.4	29.1	50.7	54.0	-3.3

Worst Case Operating Mode: Transmitting (802.11n40-Channel 06)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	56.9	36.7	33.4	53.6	74.0	-20.4
Horizontal	*7311.000	51.3	36.6	35.8	50.5	74.0	-23.5

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	49.8	36.7	33.4	46.5	54.0	-7.5
Horizontal	*7311.000	43.1	36.6	35.8	42.3	54.0	-11.7

Worst Case Operating Mode: Transmitting (802.11n40-Channel 09)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4904.000	57.0	36.8	33.3	53.5	74.0	-20.5
Horizontal	*2483.500	80.2	36.5	29.3	73.0	74.0	-1.0

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4904.000	50.3	36.8	33.3	46.8	54.0	-7.2
Horizontal	*2483.500	58.8	36.5	29.3	51.6	54.0	-2.4

NOTES:

1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

4.9 Conducted Emission

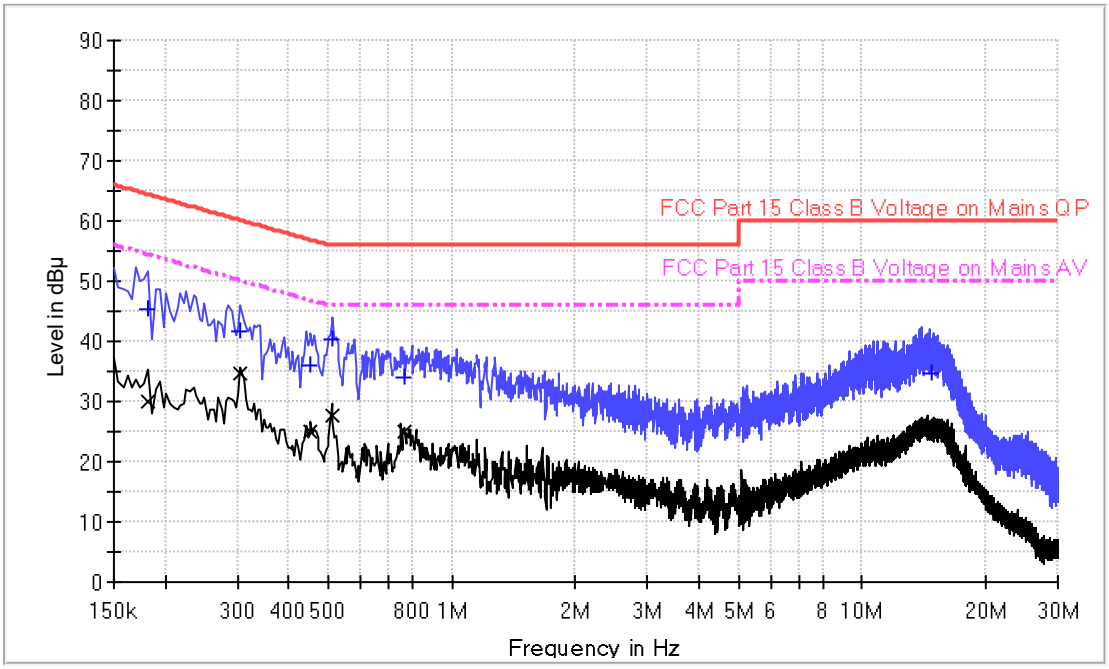
Worst Case Conducted Emission
at 0.306000MHz
is passed by 14.8dB margin.

For the electronic filing, the worst case radiated emission configuration photographs are saved with filename: conducted photos.pdf.

Applicant: Credence ID LLC
Date of Test: November 19, 2021
Model: CE1-CID-16-4G-011
Worst Case Operating Mode: WIFI Link
Phase: Live

Graphic / Data Table

Conducted Emissions
Pursuant to FCC 15.207: Emissions Requirement



Limit and Margin QP

Frequency (MHz)	Quasi Peak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.182000	45.4	9.000	L1	9.6	19.0	64.4
0.306000	41.8	9.000	L1	9.6	18.3	60.1
0.454000	35.9	9.000	L1	9.6	20.9	56.8
0.510000	40.5	9.000	L1	9.6	15.5	56.0
0.766000	34.0	9.000	L1	9.6	22.0	56.0
14.818000	34.7	9.000	L1	10.0	25.3	60.0

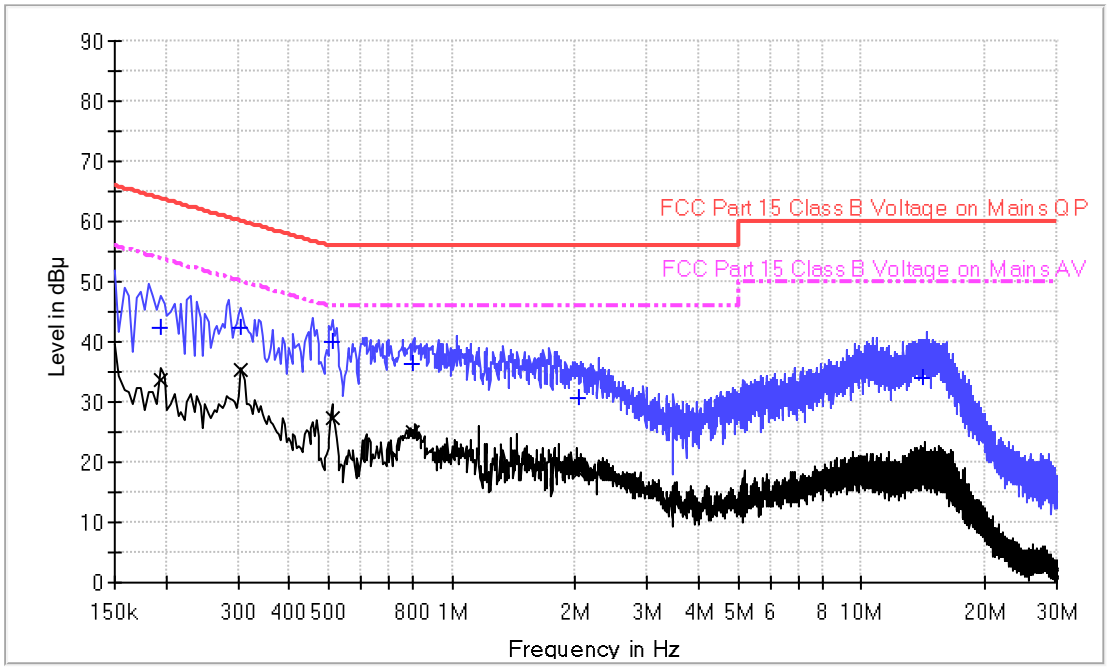
Limit and Margin AV

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.182000	30.2	9.000	L1	9.6	24.2	54.4
0.306000	34.8	9.000	L1	9.6	15.3	50.1
0.454000	24.9	9.000	L1	9.6	21.9	46.8
0.510000	27.7	9.000	L1	9.6	18.3	46.0
0.766000	24.9	9.000	L1	9.6	21.1	46.0
14.818000	25.9	9.000	L1	10.0	24.1	50.0

Applicant: Credence ID LLC
Date of Test: November 19, 2021
Model: CE1-CID-16-4G-011
Worst Case Operating Mode: WIFI Link
Phase: Neutral

Graphic / Data Table

Conducted Emissions
Pursuant to FCC 15.207: Emissions Requirement



Limit and Margin QP

Frequency (MHz)	Quasi Peak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.194000	42.5	9.000	N	9.5	21.4	63.9
0.306000	42.3	9.000	N	9.5	17.8	60.1
0.510000	40.1	9.000	N	9.5	15.9	56.0
0.798000	36.2	9.000	N	9.5	19.8	56.0
2.034000	30.6	9.000	N	9.5	25.4	56.0
14.178000	33.9	9.000	N	10.0	26.1	60.0

Limit and Margin AV

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.194000	33.7	9.000	N	9.5	20.2	53.9
0.306000	35.3	9.000	N	9.5	14.8	50.1
0.510000	27.3	9.000	N	9.5	18.7	46.0
0.798000	25.2	9.000	N	9.5	20.8	46.0
2.034000	18.5	9.000	N	9.5	27.5	46.0
14.178000	18.6	9.000	N	10.0	31.4	50.0

4.10 Radiated Emissions from Digital Section of Transceiver, FCC Ref: 15.109

[ ] Not required - No digital part

[ ] Test results are attached

[x] Included in the separated report.

4.11 Transmitter Duty Cycle Calculation and Measurements, FCC Rule 15.35(b), (c)

The EUT antenna output port was connected to the input of the spectrum analyzer. The analyzer center frequency was set to EUT RF channel carrier. The SWEP function on the analyzer was set to ZERO SPAN. The Transmitter ON time was determined from the resultant time-amplitude display:

	See attached spectrum analyzer chart (s) for Transmitter timing
	See Transmitter timing diagram provided by manufacturer
x	Not applicable, duty cycle was not used.

5.0 Equipment Photographs

For electronic filing, the photographs are saved with filename: external photos.pdf & internal photos.pdf.

6.0 Product Labeling

For electronic filing, the FCC ID label artwork and location is saved with filename: label.pdf.

7.0 Technical Specifications

For electronic filing, the block diagram and circuit diagram are saved with filename: block.pdf and circuit.pdf respectively.

8.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.

9.0 Confidentiality Request

For electronic filing, the confidentiality request of the tested EUT is saved with filename: request.pdf.

10.0 Discussion of Pulse Desensitization

The determination of pulse desensitivity was made in accordance with Hewlett Packard Application Note 150-2, *Spectrum Analysis ... Pulsed RF.*

Pulse desensitivity is not applicable for this device since the transmitter transmits the RF signal continuously.

11.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ182-02	RF Power Meter	Anritsu	ML2496A	1302005	2021-05-10	2022-05-10
SZ182-02-01	Power Sensor	Anritsu	MA2411B	1207429	2021-05-10	2022-05-10
SZ056-06	Signal Analyzer	R&S	FSV 40	101101	2020-12-22	2021-12-22
SZ062-10	RF Cable	Bedea	RG 58	--	2021-06-01	2021-12-01
SZ056-08	Signal Analyzer	R&S	FSV 40	101430	2020-12-22	2021-12-22
SZ185-03	EMI Receiver	R&S	ESR7	101975	2020-12-22	2021-12-22
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	2021-05-18	2023-05-18
SZ061-12	BiConiLog Antenna	ETS	3142E	00166158	2021-08-04	2024-08-04
SZ061-09	Double-Ridged Waveguide Horn Antenna	ETS	3115	00092347	2020-10-17	2022-10-17
SZ061-15	Double-Ridged Waveguide Horn Antenna	ETS	3116C-PA	00224718	2021-07-06	2024-07-06
SZ181-08	Microwave System Amplifier	Agilent	83017A	MY57280108	2021-08-04	2022-08-04
SZ188-05	Anechoic Chamber	ETS	FACT 3-2.0	CT001880-Q1391	2021-05-25	2024-05-25
SZ062-23	RF Cable	RADIALL	SF104PE	MY4262/4PE	2021-09-26	2022-09-26
SZ062-35	RF Cable	Rebes	A50-3.5M3.5M-8M	19100879	2021-09-26	2022-09-26
SZ067-04	Notch Filter	Micro-Tronics	BRM50702-02	015	2021-05-11	2022-05-11
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	2021-07-12	2022-07-12
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	2021-11-02	2022-11-02
SZ187-02	Two-Line V-Network	R&S	ENV216	100072	2021-05-12	2022-05-12
SZ188-03	Shielding Room	ETS	RFD-100	4100	2020-01-07	2023-01-07

********** End of Report**********