Photogram Ltd

TEST REPORT

SCOPE OF WORK
FCC TESTING–Camera

REPORT NUMBER
240322036SZN-001

ISSUE DATE **[REVISED DATE]**
05 August 2024 [----------]

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101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community,
GuanHu Subdistrict, LongHua District, Shenzhen, P.R. China.

Tel: (86 755) 8601 6288
Fax: (86 755) 8601 6751
www.intertek.com

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TEST REPORT

Intertek Report No.: 240322036SZN-001

Photogram Ltd

Application
For
Certification

FCC ID: 2BGK8AC1

Digital Camera

Model: Camera

2.4GHz Wi-Fi Transceiver

Report No.: 240322036SZN-001

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 [10-1-23]

Prepared and Checked by:

Draven

Draven Li
Project Engineer

Approved by:

Peter Kang

Peter Kang
Sr. Technical Supervisor
Date: 05 August 2024

MEASUREMENT/TECHNICAL REPORT

This report concerns (check one) Original Grant ___ Class II Change _X_

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 [10-01-23] Edition] provision.

Report prepared by:

Draven Li
Intertek Testing Services Shenzhen Ltd. Longhua Branch
101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, Shenzhen, P.R. China.
Tel: (86 755) 8614 0743 Fax: (86 755) 8601 6661

Table of Contents

1.0 Summary of Test results

Applicant: Photogram Ltd
Applicant Address: 71 - 75 Shelton Street, London, WC2H 9JQ, UK
Manufacturer: Photogram Ltd
Manufacturer Address: 71 - 75 Shelton Street, London, WC2H 9JQ, UK

Model: Camera

FCC ID: 2BGK8AC1

TEST ITEM	REFERENCE	RESULTS
Radiated Emission in Restricted Bands	15.247(d), 15.209, FCC 15.205	Pass

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 Digital Camera with 2.4G WIFI function operating in 2412-2462MHz and 5G WIFI function operating in 5150MHz~5250 MHz, 5250MHz~5350MHz, 5470MHz-5725MHZ, 5725MHz~5850MHz. The EUT is powered by DC 3.7V rechargeable battery. For more detail information pls. refer to the user manual.

2.4G WIFI:
Type of Modulation: BPSK, QPSK, 16QAM, 64QAM for OFDM; CCK, DQPSK, DBPSK for DSSS.
Antenna Type: PIFA Antenna
Antenna Gain: 2.0dBi

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

This report is based on the previous report with report number RSZ200929002-00C Dated 06 February 2021. The changes are modifying the antenna trace layout and antenna type. Considering antenna gain and RF module have not changed, RF specifications are the same. Spurious emissions have been re-performed.

2.2 Related Submittal(s) Grants

This is an application for certification of a transceiver for the Digital Camera which has 2.4GHz WIFI function.
For the 5GHz WIFI function was tested and demonstrated in report 240322036SZN-002.

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 Full charged DC 3.7V rechargeable battery during the test.

The product may be equipped with different adapter, HDMI Cable and Micro USB Cable which mentioned in section 2.1. All the accessories have been tested, but only the worst data was reported in this report.

The EUT supports 802.11b/g/n-HT20/n-HT40 mode, there are two antennas are used, MIMO is supported by 802.11n-HT20/n-HT40, 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 0.8m up to 1GHz and 1.5 m above 1GHz. 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.

Test software: QRCT

3.3 Special Accessories

N/A

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 Photogram Ltd 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	Remark
PC (Provided by Intertek)	Dell	Latitude 3410
Type-C Cable (Provided by Intertek)	N/A	unshielded, 15cm

Applicant: Photogram Ltd
Date of Test: 25 July 2024 Model: Camera

4.0 Measurement Results

4.1 Radiated Spurious Emission

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit. Simultaneous transmission was considered during the test, only the worst case data is recorded in this report.

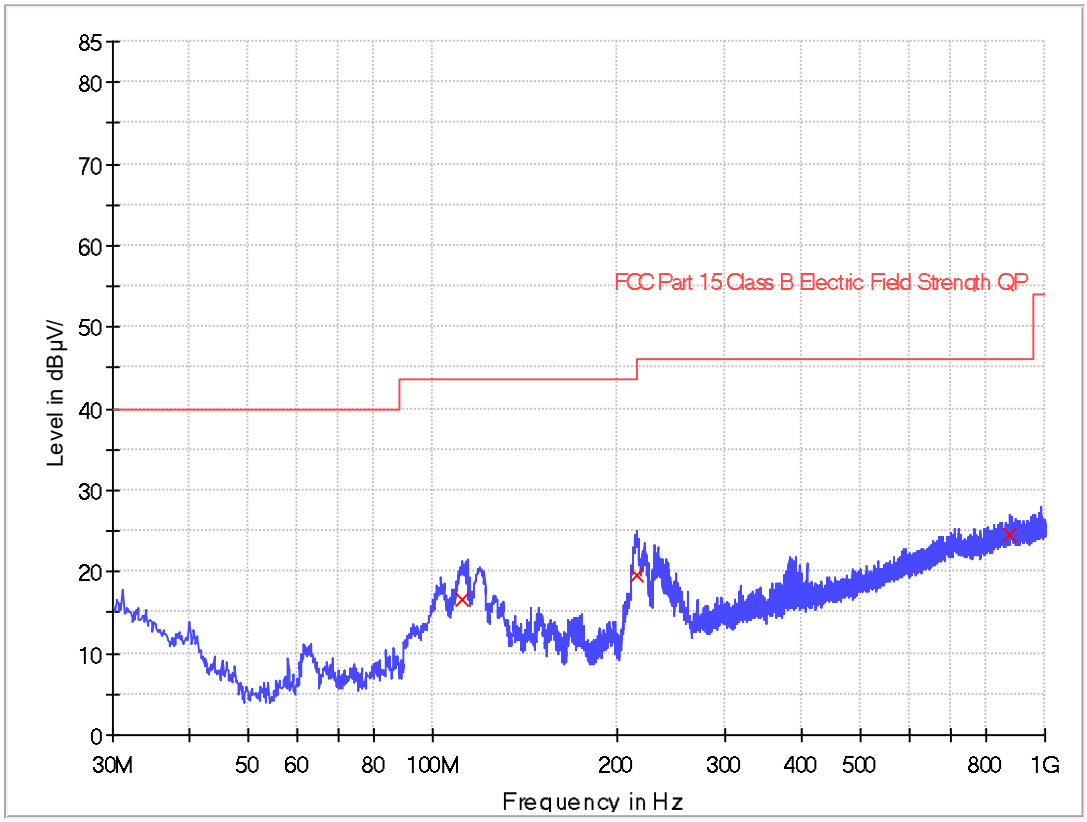
Worst Case Radiated Spurious Emission
at 2390.000MHz
is passed by 7.3dB margin.

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

Applicant: Photogram Ltd
Date of Test: 25 July 2024
Model: Camera
Worst Case Operating Mode: Simultaneous transmission

ANT Polarity: Horizontal

FCC Part 15

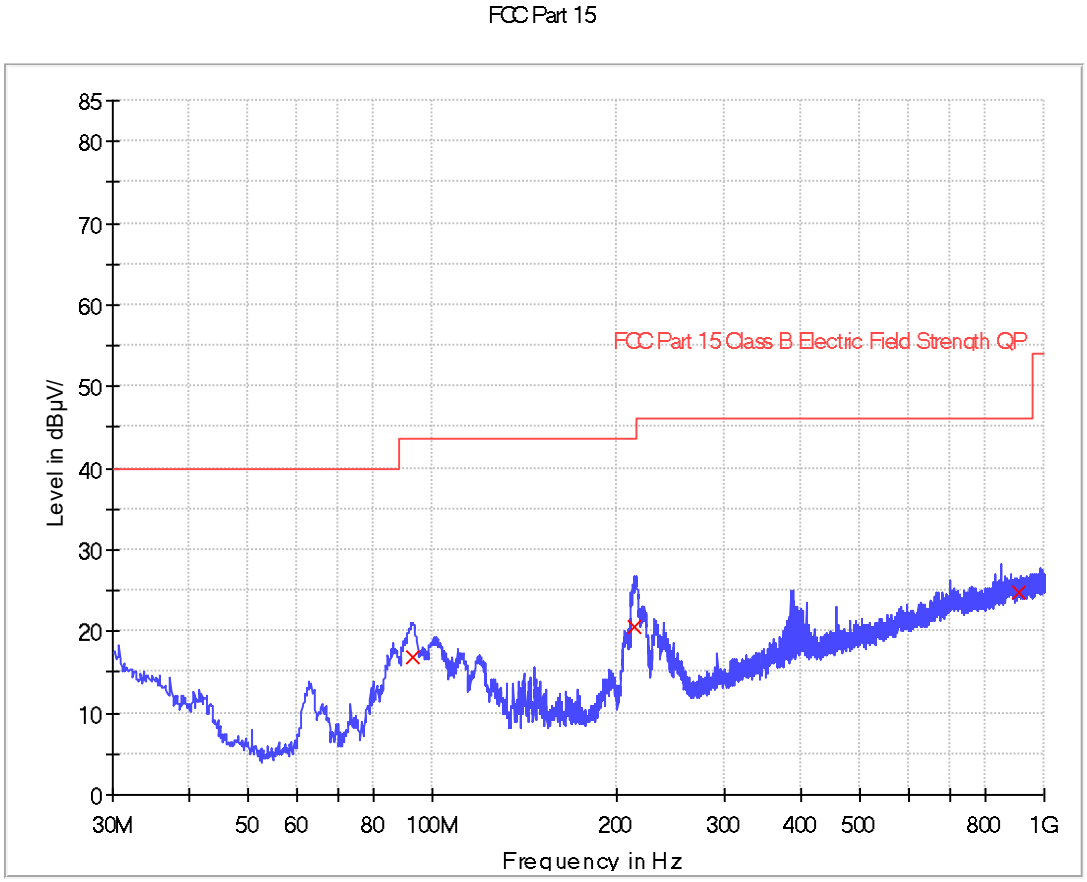


Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
111.480000	16.5	1000.0	120.000	H	8.3	27.0	43.5
215.391250	19.6	1000.0	120.000	H	12.0	23.9	43.5
875.597500	24.5	1000.0	120.000	H	25.2	21.5	46.0

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

Applicant: Photogram Ltd
Date of Test: 25 July 2024 Model: Camera
Worst Case Operating Mode: Simultaneous transmission

ANT Polarity: Vertical



Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
92.686250	16.8	1000.0	120.000	V	8.9	26.7	43.5
213.572500	20.5	1000.0	120.000	V	11.9	23.0	43.5
905.425000	24.7	1000.0	120.000	V	25.5	21.3	46.0

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

Applicant: Photogram Ltd
Date of Test: 25 July 2024 Model: Camera

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)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	45.1	36.8	33.5	41.8	74.0	-32.2
Horizontal	*2390.000	67.5	36.4	29.1	60.2	74.0	-13.8

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	37.5	36.8	33.5	34.2	54.0	-19.8
Horizontal	*2390.000	53.8	36.4	29.1	46.5	54.0	-7.5

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

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	44.5	36.7	33.4	41.2	74.0	-32.8
Horizontal	*7311.000	56.3	36.6	35.8	55.5	74.0	-18.5

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	36.4	36.7	33.4	33.1	54.0	-20.9
Horizontal	*7311.000	44.3	36.6	35.8	43.5	54.0	-10.5

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

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	43.7	36.8	33.3	40.2	74.0	-33.8
Horizontal	*2483.500	66.5	36.5	29.3	59.3	74.0	-14.7

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	39.9	36.8	33.3	36.4	54.0	-17.6
Horizontal	*2483.500	53.3	36.5	29.3	46.1	54.0	-7.9

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

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	49.6	36.8	33.5	46.3	74.0	-27.7
Horizontal	*2390.000	67.4	36.4	29.1	60.1	74.0	-13.9

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	44.8	36.8	33.5	41.5	54.0	-12.5
Horizontal	*2390.000	54.0	36.4	29.1	46.7	54.0	-7.3

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

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	46.6	36.7	33.4	43.3	74.0	-30.7
Horizontal	*7311.000	48.4	36.6	35.8	47.6	74.0	-26.4

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	40.7	36.7	33.4	37.4	54.0	-16.6
Horizontal	*7311.000	42.9	36.6	35.8	42.1	54.0	-11.9

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

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	48.0	36.8	33.3	44.5	74.0	-29.5
Horizontal	*2483.500	65.3	36.5	29.3	58.1	74.0	-15.9

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	44.0	36.8	33.3	40.5	54.0	-13.5
Horizontal	*2483.500	52.8	36.5	29.3	45.6	54.0	-8.4

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

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	47.5	36.8	33.5	44.2	74.0	-29.8
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)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	39.4	36.8	33.5	36.1	54.0	-17.9
Horizontal	*2388.000	53.3	36.4	29.1	46.0	54.0	-8.0

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

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	46.8	36.7	33.4	43.5	74.0	-30.5
Horizontal	*7311.000	50.5	36.6	35.8	49.7	74.0	-24.3

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	41.4	36.7	33.4	38.1	54.0	-15.9
Horizontal	*7311.000	43.0	36.6	35.8	42.2	54.0	-11.8

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

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	48.0	36.8	33.3	44.5	74.0	-29.5
Horizontal	*2483.500	66.1	36.5	29.3	58.9	74.0	-15.1

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	38.8	36.8	33.3	35.3	54.0	-18.7
Horizontal	*2483.500	53.7	36.5	29.3	46.5	54.0	-7.5

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

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4844.000	48.5	36.8	33.5	45.2	74.0	-28.8
Horizontal	*2390.000	67.0	36.4	29.1	59.7	74.0	-14.3

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4844.000	40.4	36.8	33.5	37.1	54.0	-16.9
Horizontal	*2390.000	52.4	36.4	29.1	45.1	54.0	-8.9

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

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	46.4	36.7	33.4	43.1	74.0	-30.9
Horizontal	*7311.000	51.1	36.6	35.8	50.3	74.0	-23.7

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	40.9	36.7	33.4	37.6	54.0	-16.4
Horizontal	*7311.000	45.0	36.6	35.8	44.2	54.0	-9.8

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

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4904.000	48.1	36.8	33.3	44.6	74.0	-29.4
Horizontal	*2483.500	66.4	36.5	29.3	59.2	74.0	-14.8

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4904.000	40.2	36.8	33.3	36.7	54.0	-17.3
Horizontal	*2483.500	52.5	36.5	29.3	45.3	54.0	-8.7

NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value. Average detector is used, 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.

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
SZ061-13	BiConiLog Antenna	ETS	3142E	00217919	2021-09-05	2024-09-05
SZ185-03	EMI Receiver	R&S	ESCI	101975	2024-04-23	2025-04-23
SZ061-08	Horn Antenna	ETS	3115	00092346	2021-09-05	2024-09-05
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	2021-05-18 2024-05-05	2024-05-18 2027-05-05
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	2023-04-27 2024-04-22	2024-04-27 2025-04-22
SZ056-08	Signal Analyzer	R&S	FSV 40	101430	2023-12-13	2024-12-13
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	2023-04-27 2024-04-22	2024-04-27 2025-04-22
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	2021-12-12	2024-12-12
SZ062-24	RF Cable	RADIALL	RG 213U	--	2023-09-26	2024-09-26
SZ062-25	RF Cable	RADIALL	0.04-26.5GHz	--	2023-09-26	2024-09-26
SZ062-38	RF Cable	RADIALL	0.04-26.5GHz	--	2023-11-14	2024-11-14
SZ067-04	Notch Filter	Micro-Tronics	BRM50702-02	--	2023-04-27 2024-04-23	2024-04-27 2025-04-23

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