

RF EXPOSURE EVALUATION REPORT

Product Name: 3D Excavator Guidance System
Trade Mark: FJDynamics
Model No.: G31 Pro
Report Number: 24102114225RFC-3
Test Standards: FCC 47 CFR Part 1 Subpart I
FCC ID: 2A2LL-G31PRO
Test Result: PASS
Date of Issue: February 8, 2025

Prepared for:

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UTTR-RF-FCCPART1-V1.1

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	FJ Dynamics Co., Ltd.
Address of Applicant:	21F, Das Tower, No. 28, 1st South Keji Road, Nanshan District, Shenzhen, China
Manufacturer:	FJ Dynamics Co., Ltd.
Address of Manufacturer:	21F, Das Tower, No. 28, 1st South Keji Road, Nanshan District, Shenzhen, China

1.2 EUT INFORMATION

Product Name:	3D Excavator Guidance System		
Model No.:	G31 Pro		
Trade Mark:	FJDynamics		
DUT Stage:	Identical Prototype		
EUT Supports Function: (Provided by the customer)	2.4 GHz ISM Band:	IEEE 802.11b/g/n	
		Bluetooth 5.0	
	Radio Rx Band:	902-928MHz	
	RNSS Rx Bands:	1164-1300 MHz	GPS/ Galileo
		1559-1610 MHz	GPS/ Galileo/ GLONASS/ BDS/ SBAS
Sample Received Date:	October 21, 2024		
Remark: The above EUT's information was provided by customer. Please refer to the specifications or user's manual for more detailed description.			

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

For 2.4 GHz ISM Band of Wi-Fi	
Frequency Band:	2400 MHz to 2483.5 MHz
Frequency Range:	2412 MHz to 2472 MHz
Support Standards:	IEEE 802.11b, IEEE 802.11g, IEEE 802.11n-HT20, IEEE 802.11n-HT40
Type of Modulation:	IEEE 802.11b: DSSS(CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM(64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n-HT20: OFDM(64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n-HT40: OFDM(64-QAM, 16-QAM, QPSK, BPSK)
Data Rate:	IEEE 802.11b: Up to 11 Mbps IEEE 802.11g: Up to 54 Mbps IEEE 802.11n-HT20: Up to MCS7 IEEE 802.11n-HT40: Up to MCS7
Number of Channels:	IEEE 802.11b: 13 IEEE 802.11g: 13 IEEE 802.11n-HT20: 13 IEEE 802.11n-HT40: 9
Channel Separation:	5 MHz
Antenna Type: (Provided by the customer)	External Antenna
Antenna Gain: (Provided by the customer)	2.86 dBi
Maximum Peak Power:	IEEE 802.11b: 19.84 dBm IEEE 802.11g: 22.92 dBm IEEE 802.11n-HT20: 22.64 dBm IEEE 802.11n-HT40: 21.78 dBm

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For Bluetooth	
Frequency Band:	2400 MHz to 2483.5 MHz
Frequency Range:	2402 MHz to 2480 MHz
Bluetooth Version:	Bluetooth LE
Type of Modulation:	GFSK
Number of Channels:	40
Channel Separation:	2 MHz
Antenna Type: (Provided by the customer)	External Antenna
Antenna Gain: (Provided by the customer)	2.86 dBi
Maximum Peak Power:	2.21 dBm

1.4 OTHER INFORMATION

None.

1.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product, according to the specifications of the manufacturers. It must comply with the requirements of the following standards:

FCC 47 CFR Part 1 Subpart I

All test items have been performed and recorded as per the above standards

1.6 DEVIATION FROM STANDARDS

None.

1.7 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.8 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

2. EQUIPMENT LIST

Please refer to the RF test report.

3. MPE EVALUATION

3.1 REFERENCE DOCUMENTS FOR EVALUATION

No.	Identity	Document Title
1	FCC 47 CFR Part 1 Subpart I	PROCEDURES IMPLEMENTING THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969
2	KDB 447498 D01 General RF Exposure Guidance v06	RF EXPOSURE PROCEDURES AND EQUIPMENT AUTHORIZATION POLICIES FOR MOBILE AND PORTABLE DEVICES

3.2 MPE COMPLIANCE REQUIREMENT

3.2.1 Limits

3.2.1.1 FCC 47 CFR Part 1 Subpart I

According to §1.1307(b)(1), system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

Limits for Occupational / Controlled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	F/300	6
1500-100000	/	/	5	6

Limits for General Population / Uncontrolled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-100000	/	/	1	30

Note: f = frequency in MHz: * = Plane-wave equivalents power density.

3.2.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

3.3 MPE CALCULATION METHOD

FCC 47 CFR Part 1 Subpart I

$$S = PG/4\pi R^2 = EIRP/4\pi R^2$$

S = power density (in appropriate units, e.g., mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor is normally numeric gain.

R = 20cm distance to the center of radiation of the antenna (in appropriate units, e.g., cm)

3.4 MPE CALCULATION RESULTS

Note: For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

3.4.1 For WLAN & Bluetooth

For Wi-Fi function, operating at 2412MHz to 2472 MHz for IEEE802.11b/g/n and

For Bluetooth function, operating at 2402 MHz to 2480 MHz for Bluetooth

3.4.1.1 Antenna Type:

External Antenna

Antenna Gain: 2.86 dBi

3.4.1.2 Results for FCC 47 CFR Part 1 Subpart I

Operating Mode	Freq.	Declared maximum conducted Average output power	Max. positive tolerance according manufacturer	Max. Antenna Gain	Calculated maximum EIRP	Declared maximum EIRP	MPE Limit	MPE Value
	(MHz)	(dBm)		(dBi)	(dBm)	(mW)	(mW/cm ²)	
IEEE 802.11b	2412-2472	16.5	1	2.86	20.36	108.6426	1	0.0216
IEEE 802.11g	2412-2467	15.0	1	2.86	18.86	76.9130	1	0.0153
	2472	4.5	1	2.86	8.36	6.8549	1	0.0014
IEEE 802.11n20	2412-2467	13.5	1	2.86	17.36	54.4503	1	0.0108
	2472	4.5	1	2.86	8.36	6.8549	1	0.0014
IEEE 802.11n40	2422-2457	13.5	1	2.86	17.36	54.4503	1	0.0108
	2462	8.0	1	2.86	11.86	15.3462	1	0.0031
Bluetooth	2402-2480	0.0	1	2.86	3.86	2.4322	1	0.0005

3.4.2 Simultaneous Multi-band Transmission MPE Analysis

3.4.2.1 List of Mode for Simultaneous Multi-band Transmission

No.	Configurations	Support/Not Support
1	2.4G _ WLAN + Bluetooth	Not Support

APPENDIX 1 PHOTOS OF TEST SETUP

N/A

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal Photos.

*** End of Report ***

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