



RF Exposure Report

Product Name: WIRELESS VIDEO TRANSMISSION SYSTEM
Trademark: HOLLYLAND
Model No: Mars 4K
Series Model: See section 2.1 for details
FCC ID.....: 2ADZC-9802GR
Report No: C220711010-RF10
Test Standards.....: FCC Part 1.1310
Applicant: Shenzhen Hollyland Technology Co.,Ltd
Address of Applicant.....: 8F,Building 5D,Skyworth Innovation Valley, Tangtou Road.
 Shiyan Street, Baoan District Shenzhen, China.
Manufacturer.....: Shenzhen Hollyland Technology Co.,Ltd
Manufacturer Address.....: 8F,Building 5D,Skyworth Innovation Valley, Tangtou Road.
 Shiyan Street, Baoan District Shenzhen, China.
Date of Test Date.....: N/A
Date of Issue.....: Aug.11,2022
Test Result.....: Compliance

Reviewed By : Adil - yang

Approved Signatory : Tom. Chen

The test results in the report only apply to the tested sample. The test report shall be invalid without all the signatures of testing engineers, reviewer and approver. Any objections must be raised to CSIC within 15 days since the date when the report is received. It will not be taken into consideration beyond this limit.

Table of Contents**Page**

1	TEST SUMMARY.....	3
1.1	TEST FACILITY	3
1.2	MEASUREMENT UNCERTAINTY	3
2	GENERAL INFORMATION.....	4
2.1	GENERAL DESCRIPTION OF EUT	4
2.2	DESCRIPTION OF TEST MODES AND TEST FREQUENCY.....	5
2.3	MEASUREMENT INSTRUMENTS LIST	6
2.4	DESCRIPTION OF THE TEST MODES.....	7
2.5	TEST SOFTWARE AND POWER LEVEL	7
2.6	BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	7
2.7	DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS	8
3	MAXIMUM PERMISSIBLE EXPOSURE (MPE).....	9
3.1	RF EXPOSURE MEASUREMENT	9

1 TEST SUMMARY

1.1 Test Facility

Shenzhen Central Standard International Center Co., Ltd.
Room 201, Building 1, Mogen Fashion Industrial Park, No. 10, Shilongzai Road, Xinshi Community, Dalang Street,
Longhua District, Shenzhen

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

CNAS – Registration NO.: L11671

FCC - Registration NO.: 0031378433 Designation Number: CN1317

IC – CAB identifier: CN0051

A2LA – Lab Cert. No.: 6426.01

1.2 Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements and is documented in the Shenzhen Central Standard International Center Co., Ltd. quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device. Below is the best measurement capability for Shenzhen Central Standard International Center Co.,Ltd.

Test Items	Measurement Uncertainty
RF output power, conducted	±0.59dB
Unwanted Emissions, conducted	±2.20dB
All emissions, radiated 30-1GHz	±1.76dB
All emissions, radiated 1G-6GHz	±2.34dB
All emissions, radiated>6G	±2.34dB
Conducted Emission (9KHz-150KHz)	±1.60dB
Conducted Emission (150KHz-30MHz)	±3.678dB
Remark: 1) This uncertainty represents an expanded uncertainty expressed at approximately the 95%. 2) Confidence level using a coverage factor of K=2.	

2 GENERAL INFORMATION

2.1 General Description of EUT

Product information	
Product Name:	WIRELESS VIDEO TRANSMISSION SYSTEM
Trademark:	HOLLYLAND
Model No:	Mars 4K
Series Model:	Mars 4K, Mars 4K Pro, Mars 4K Plus, Mars 4K s
Power supply:	Adapter DC 12V 1A, 12W
Hardware version:	9802G-RX-V18
Software version:	V1.0.8.8
WIFI information	
Modulation:	802.11n(OFDm): BPSK, QPSK,16-QAM, 64-QAM
Operation frequency:	IEEE 802.11n(HT20): 5.180GHz-5.240GHz, 5.745-5.825GHz
Operation bandwidth:	20 MHz
Channel separation:	IEEE 802.11n(HT20): 8
Antenna type:	Portable antenna
Antenna gain:	4.50dBi
Remark:	
<p>This document is only valid for the transmitting part of the EUT. For the receiving part of the EUT, please refer to parameter C220711010-RF10.</p> <p>The product communication is designed according to 802.11n protocol. This design only opens the frequency points provided in this document and only uses 20m nominal bandwidth.</p> <p>All models are same with each in hardware and electronic aspects, only model number are different for market strategy.</p> <p>The shape or color of the base of the EUT and the color of the frame do not affect the performance of the EUT. For details refer to the User Manual, Technical Description and Circuit Diagram.</p>	
Product factory information	
Factory Name:	Shenzhen Hollyland Technology Co.,Ltd
Factory address:	8F,Building 5D,Skyworth Innovation Valley, Tangtou Road. Shiyuan Street, Baoan District Shenzhen, China.

Remark: The above information and materials are provided by the Manufacturer.

2.2 Description of Test Modes and Test Frequency

The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing.

Operation Frequency List WIFI:

Operation Frequency of channel			
5.180GHz-5.240GHz		5.745GHz-5.825GHz	
Channel	Frequency	Channel	Frequency
36	5180	149	5745
40	5200	153	5765
44	5220	157	5785
48	5240	165	5825

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below.

Carrier Frequency Channel:

For 802.11n(HT20)		
Test Channel	EUT Channel	Test Frequency (MHz)
lowest	CH36	5180
middle	CH40	5200
highest	CH48	5240
...		
lowest	CH149	5745
middle	CH157	5785
highest	CH165	5825

Remark: Since the product contains two prototypes, the transmitter and receiver prototypes are used together, the false transmissions of TX and Rx of each prototype are tested respectively.

2.3 Measurement Instruments List

RF Connected Test					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY50200391	Jun. 13, 2023
2	Power sensor	KEYSIGHT	U2021XA	MY55080015	Jun. 13, 2023
3	Power sensor	KEYSIGHT	U2021XA	MY54250016	Jun. 13, 2023
4	Power sensor	KEYSIGHT	U2021XA	MY54250020	Jun. 13, 2023
5	Power sensor	KEYSIGHT	U2021XA	MY54210030	Jun. 13, 2023
6	Vector Signal Generator	Agilent	N5182A	MY50140130	Jun. 13, 2023
7	Signal generator	Agilent	SML03	100925	Jun. 13, 2023
8	Power sensor Box	MWRFTest	N/A	N/A	N/A
9	RF Switch Box	MWRFTest	MW100-RF CB	N/A	N/A
10	MTS 8310	MWRFTest	V: 2.0.0.0		

Radiation Test equipment					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI TEST RECEIVER	R&S	ESIB26	100342	Jun. 13, 2023
2	Amplifier	HP	8447F	2634A02050	Jun. 13, 2023
3	Amplifier	Agilent	8449B	4035A00116	Jun. 13, 2023
4	Bilog Antenna	Schwarzbeck	VULB-9168	VULB9168-250	Jul. 25, 2025
5	Horn Antenna	AARONIAAG	Powerlog 70180	3980	Jul. 04, 2025
6	EZ-EMC	Farad	V3.1		

Note:

1. The cable loss has calculated in test result which connection between each test instruments.

2.4 Description Of The Test Modes

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Worst Mode	Description	Data Rate
Mode 1	802.11n HT20 CH36&CH40&CH48	MCS 0
Mode 2	802.11n HT20 CH149&CH157&CH165	MCS 0

Note:

- (1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported.
- (2) The battery is full-charged during the radiated and RF conducted test.

For AC Conducted Emission

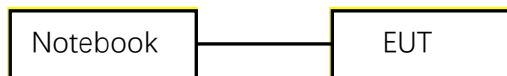
Test Case	
AC Conducted Emission	Mode3: Working

2.5 Test Software And Power Level

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

RF Function	Type	Mode Or Modulation type	Ant Gain(dBi)	Ant_A Power Class	Ant_B Power Class	Software For Testing
WIFI(5G)	5G WIFI Band1 (5150MHz-5250MHz)	802.11n(HT20)	4.50	11	11	AP22-art 2_ver_2_ 28_7BIN -6703
RF Function	Type	Mode Or Modulation type	Ant Gain(dBi)	Ant_A Power Class	Ant_B Power Class	Software For Testing
WIFI(5G)	5G WIFI Band4 (5725MHz-5850MHz)	802.11n(HT20)	4.50	11	11	AP22-art 2_ver_2_ 28_7BIN -6703

2.6 Block Digram Showing The Configuration Of System Tested



2.7 Description Of Necessary Accessories And Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Necessary accessories					
Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
N/A	N/A	N/A	N/A	N/A	N/A

Support units					
Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
E-1	Notebook	Dell	Vostro 3400	35845130379	AE

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

3 Maximum Permissible Exposure (MPE)

3.1 RF Exposure Measurement

3.1.1 Limit

The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. The gain of the antennas used in the product is extracted from the Antenna data sheets provided and also the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.

Although the Friis Transmission formula is far field assumption, the calculated result of that is an over-prediction for near field power density. It is taken as worst case to specify the safety range.

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of the human exposure to radio-frequency (RF) radiation as specified in 1.1307 (b).

Frequency Range [MHz]	Electric Field Strength [V/m]	Magnetic Field Strength [A/m]	Power Density [mW/cm ²]
Limits for Occupational / controlled Exposures			
300 - 1500	--	--	f/300
1500 - 100000	--	--	5.0
Limits for General population / Uncontrolled Exposure			
300 - 1500	--	--	f/1500
1500 - 100000	--	--	1.0

NOTE: f = Frequency in MHz

3.1.2 Friis Formula

Friis Transmission Formula: $P_d = (P_{out} * G) / (4 * \pi * r^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = Distance between observation point and the center of radiator in cm.

If we know the maximum gain of the antenna and the total output power to the antenna, through calculation, we will know MPE value at distance 20cm.

3.1.3 Classification

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. Warning statement to the user for keeping at least 20cm or more separation distance from the antenna should be included in the User manual. So, this device is classified as Mobile device.

3.1.4 EUT Operating Conditions

EUT was enabled to transmit and receive at lowest, middle and highest channels.

3.1.5 Evaluation Result

Protocol	Channel Frequency (MHz)	Output Power to Antenna (dBm)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit (mW/cm ²)
802.11n20	5200	13.54	22.5944	0.0127	1
802.11n20	5785	13.48	22.2844	0.0125	1

*****THE END*****