

## Maximum Permissible Exposure Report

### Product Information

FCC ID:	2AN3H-HDSWHD1100
Product name	Wireless HD multimedia system
Model number	HDS-WHD1100
Power supply	DC 5.0V adapter from AC 120V/60Hz
Modulation Type	OFDM
Antenna Type	External Antenna
Antenna Gain	5.00 dBi (maximum)
Directional Gain	$G+10\log(N) = 5.00 + 10\log(2) = 8.01$ dBi
Hardware version	VER1.0
Software version	VER1.0
WLAN FCC Operation frequency	5745.00 MHz – 5825.00 MHz
Modulation Technology	IEEE 802.11a / IEEE 802.11n HT20 / IEEE 802.11n HT40
Exposure category	General population/uncontrolled environment
EUT Type	Production Unit
Device Type	Mobile Device

### 2. Evaluation Method

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modelled or measured field strengths or power density, is  $\leq 1.0$ . The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

### 3. Limit

#### 3.1 Refer evaluation method

[ANSI C95.1-1999](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

[FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v06](#): Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

[FCC CFR 47 part1 1.1310](#): Radiofrequency radiation exposure limits.

[FCC CFR 47 part2 2.1091](#): Radiofrequency radiation exposure evaluation: mobile devices

### 3.2 Limit

#### Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	6
3.0 – 30	1842/f	4.89/f	(900/f <sup>2</sup> )*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

#### Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 30	824/f	2.19/f	(180/f <sup>2</sup> )*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	/	/	f/1500	30
1500 – 100,000	/	/	1.0	30

F=frequency in MHz

\*=Plane-wave equivalent power density

### 4. MPE Calculation Method

Predication of MPE limit at a given distance  
Equation from page 18 of OET Bulletin 65, Edition 97-01

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

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna

### 5. Antenna Information

HDS-WHD1100 can only use antennas certificated as follows provided by manufacturer;

Internal Identification	Antenna type and antenna number	Operate frequency band	Maximum antenna gain
Antenna 0	External Antenna	5000 MHz – 6000 MHz	5.00 dBi
Antenna 1	External Antenna	5000 MHz – 6000 MHz	5.00 dBi

### 6. Conducted Power

Mode	Channel	Frequency (MHz)	AVG Conducted Power (dBm)	
			Antenna 0	Antenna 1
IEEE 802.11a	149	5745	11.32	10.04
	157	5785	11.62	10.15
	165	5825	11.98	10.62
IEEE 802.11n HT20	149	5745	11.21	9.91
	157	5785	11.36	10.15
	165	5825	11.76	10.57
IEEE 802.11n HT40	151	5755	11.63	10.26
	159	5795	12.05	10.74

## 7. Manufacturing Tolerance

IEEE 802.11a (Average)						
Channel	Channel 149		Channel 157		Channel 165	
	Antenna 0	Antenna 1	Antenna 0	Antenna 1	Antenna 0	Antenna 1
Target (dBm)	11.0	10.0	11.0	10.0	11.0	10.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0	1.0	1.0	1.0
IEEE 802.11n HT20 (Average)						
Channel	Channel 149		Channel 157		Channel 165	
	Antenna 0	Antenna 1	Antenna 0	Antenna 1	Antenna 0	Antenna 1
Target (dBm)	11.0	10.0	11.0	10.0	11.0	10.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0	1.0	1.0	1.0
IEEE 802.11n HT40 (Average)						
Channel	Channel 151		-/-		Channel 159	
	Antenna 0	Antenna 1	-/-	-/-	Antenna 0	Antenna 1
Target (dBm)	11.0	10.0	-/-	-/-	11.0	10.0
Tolerance $\pm$ (dB)	1.0	1.0	-/-	-/-	1.0	1.0

## 8. Measurement Results

### 8.1 Standalone MPE

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance,  $r = 20\text{cm}$ , as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

Antenna 0

UNII Band 3

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE ( $\text{mW}/\text{cm}^2$ )	MPE Limits ( $\text{mW}/\text{cm}^2$ )
	dBm	mW					
IEEE 802.11a	12.00	15.8489	5.0000	3.1623	100%	0.0100	1.0000
IEEE 802.11n HT20	12.00	15.8489	5.0000	3.1623	100%	0.0100	1.0000
IEEE 802.11n HT40	12.00	15.8489	5.0000	3.1623	100%	0.0100	1.0000

Antenna 1

UNII Band 3

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE ( $\text{mW}/\text{cm}^2$ )	MPE Limits ( $\text{mW}/\text{cm}^2$ )
	dBm	mW					
IEEE 802.11a	11.00	12.5893	5.0000	3.1623	100%	0.0079	1.0000
IEEE 802.11n HT20	11.00	12.5893	5.0000	3.1623	100%	0.0079	1.0000
IEEE 802.11n HT40	11.00	12.5893	5.0000	3.1623	100%	0.0079	1.0000

Remark:

1. Output power including tune-up tolerance;
2. MPE evaluate distance is 20cm from user manual provide by manufacturer;

### 8.2 Simultaneous Transmission MPE

The sample only support one modular and two antenna, they can transmit simultaneous, no need consider simultaneous transmission;

According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;

$\sum$  of MPE ratios  $\leq 1.0$

**Antenna 0 and Antenna 1 for 5GWLAN Band 3**

Band	Mode	MPE Ratio Antenna 0	MPE Ratio Antenna 1	$\Sigma$ MPE ratios	Limit	Results
5.8GHz	IEEE 802.11a	0.0100	0.0079	N/A	1.000	PASS
	IEEE 802.11n HT20	0.0100	0.0079	0.1	1.000	PASS
	IEEE 802.11n HT40	0.0100	0.0079	0.1	1.000	PASS

**Remark:**

1. Output power including tune-up tolerance;
2. MPE evaluate distance is 20cm from user manual provide by manufacturer;

**9. Conclusion**

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

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