

# Maximum Permissible Exposure Evaluation

## FCC ID: 2AREL-MW312

### 1. Client Information

<b>Applicant</b>	:	Shenzhenshi DajieKejiYouxianGongsi
<b>Address</b>	:	Longhuaxinqu Minzhijiedao Huangjia shangyeguang chang B711 Shenzhen Guangdong 518000, CN
<b>Manufacturer</b>	:	Shenzhenshi DajieKejiYouxianGongsi
<b>Address</b>	:	Longhuaxinqu Minzhijiedao Huangjia shangyeguang chang B711 Shenzhen Guangdong 518000, CN

### 2. General Description of EUT

<b>EUT Name</b>	:	AC1200 Dual Band Home Mesh Wi-Fi System	
<b>Models No.</b>	:	MW312, MW312S, MW313, MW313S	
<b>Model Difference</b>	:	All these model product are identical the same, for commercial use with different model number.	
<b>S/N</b>	:	M1914000752, M1914000849	
<b>Brand Name</b>	:	Victure	
<b>Product Description</b>	:	Operation Frequency:	802.11b/g/n(HT20): 2412MHz~2462MHz 802.11n(HT40): 2422MHz~2452MHz U-NII-1: 5180MHz~5240MHz, U-NII-3: 5745MHz~5825MHz
<b>Power Rating</b>	:	Adapter(RD1201500-C55-153MG): Input: AC 100-240V, 50/60Hz, 0.6A max Output: DC 12V, 1.5A	
<b>Software Version</b>	:	V1.0.0	
<b>Hardware Version</b>	:	AR-M400 V3.0	
<b>Connecting I/O Port(S)</b>	:	Please refer to the User's Manual	
<b>Remark</b>	:	the MPE report used the EUT-2(S/N number: M1914000849).	

## MPE Calculations

### 1. Antenna Gain:

Antenna	Brand	Model Name	Type	2.4G Antenna Gain(dBi)
ANT. A	N/A	SLEingB400150135	copper tube	5
ANT. B	N/A	SLEingB400150135	copper tube	5
Note: For MIMO mode: Directional Gain=ANT. Gain+10*LOG(N <sub>ANT</sub> ) =8.01 dBi 2.4G working with 802.11g/n(HT20/HT40) has MIMO mode. the 802.11 b Mode only use Ant. A				

Antenna	Brand	Model Name	Type	Antenna Gain (dBi)	Directional Gain (dBi)
ANT. A	N/A	SLEingB400150135	copper tube	U-NII-1: 5	<b>U-NII-1: 8.01</b> <b>U-NII-3: 8.01</b>
				U-NII-3: 5	
ANT. B	N/A	SLEingB400150135	copper tube	U-NII-1: 5	
				U-NII-3: 5	
Note: For MIMO mode: Directional Gain=ANT. Gain+10*LOG(N <sub>ANT</sub> ).					

### 2. EUT Operation Condition:

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

### 3. Exposure Evaluation:

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 the 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

### 4. Simultaneous transmission MPE Considerations

According to KDB447498 :All transmitters and antennas in the host must be either evaluated for MPE compliance, by measurement or computational modeling, or qualify for the standalone MPE test exclusion in section 7.1.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 modeled or measured field strengths or power density, is  $\leq 1.0$ .

This means that:

$$\sum \text{ of MPE ratios } \leq 1.0$$

**5. Standalone MPE Evaluation:**
**[2.4GHz WLAN]**

Mode	Channel	Frequency	Peak Conducted Output Power (dBm)		Tolerance ± (dB)	Turn-up Power Tolerance (dB)	
			Ant.A	Ant.B		Ant.A	Ant.B
IEEE 802.11b	1	2412	24.91	/	1.0	25±1	/
	6	2437	24.48	/	1.0	25±1	/
	11	2462	25.05	/	1.0	25±1	/
IEEE 802.11g	1	2412	22.33	22.05	1.0	23±1	23±1
	6	2437	22.33	22.62	1.0	23±1	23±1
	11	2462	22.71	22.35	1.0	23±1	23±1
IEEE 802.11n HT20	1	2412	22.84	22.69	1.0	23±1	23±1
	6	2437	22.40	22.24	1.0	23±1	23±1
	11	2462	22.68	22.16	1.0	23±1	23±1
IEEE 802.11n HT40	3	2422	22.03	22.60	1.0	23±1	23±1
	6	2437	22.46	23.17	1.0	23±1	23±1
	9	2452	22.39	23.00	1.0	23±1	23±1

**[5GHz WLAN U-NII-1]**

Mode	Channel	Frequency	Peak Conducted Output Power (dBm)		Tolerance ± (dB)	Turn-up Power Tolerance (dB)	
			Ant.A	Ant.B		Ant.A	Ant.B
IEEE 802.11a	36	5180	17.63	17.74	1.0	18±1	18±1
	40	5200	17.91	17.71	1.0	18±1	18±1
	48	5240	18.31	18.29	1.0	18±1	18±1
IEEE 802.11n HT20	36	5180	17.68	18.41	1.0	18±1	18±1
	40	5200	17.52	18.26	1.0	18±1	18±1
	48	5240	17.85	18.32	1.0	18±1	18±1
IEEE 802.11ac VHT20	36	5180	17.72	18.33	1.0	18±1	18±1
	40	5200	18.14	17.57	1.0	18±1	18±1
	48	5240	18.29	17.57	1.0	18±1	18±1
IEEE 802.11n HT40	38	5190	20.36	20.62	1.0	20±1	20±1
	46	5230	20.86	20.23	1.0	20±1	20±1
IEEE 802.11ac VHT40	38	5190	19.98	20.53	1.0	20±1	20±1
	46	5230	20.89	20.23	1.0	20±1	20±1
IEEE 802.11ac VHT80	42	5210	21.36	21.71	1.0	21±1	21±1

**[5GHz WLAN U-NII-3]**

Mode	Channel	Frequency	Peak Conducted Output Power (dBm)		Tolerance $\pm$ (dB)	Turn-up Power Tolerance (dB)	
			Ant.A	Ant.B		Ant.A	Ant.B
IEEE 802.11a	149	5745	22.68	22.00	1.0	23 $\pm$ 1	23 $\pm$ 1
	157	5785	23.32	22.19	1.0	23 $\pm$ 1	23 $\pm$ 1
	165	5825	22.91	22.60	1.0	23 $\pm$ 1	23 $\pm$ 1
IEEE 802.11n HT20	149	5745	21.90	21.93	1.0	22 $\pm$ 1	22 $\pm$ 1
	157	5785	22.60	22.17	1.0	22 $\pm$ 1	22 $\pm$ 1
	165	5825	21.98	21.36	1.0	22 $\pm$ 1	22 $\pm$ 1
IEEE 802.11ac VHT20	149	5745	22.12	22.50	1.0	23 $\pm$ 1	23 $\pm$ 1
	157	5785	23.16	22.58	1.0	23 $\pm$ 1	23 $\pm$ 1
	165	5825	22.78	23.15	1.0	23 $\pm$ 1	23 $\pm$ 1
IEEE 802.11n HT40	151	5755	22.36	22.45	1.0	22 $\pm$ 1	22 $\pm$ 1
	159	5795	22.64	22.37	1.0	22 $\pm$ 1	22 $\pm$ 1
IEEE 802.11ac VHT40	151	5755	22.18	21.83	1.0	22 $\pm$ 1	22 $\pm$ 1
	159	5795	22.86	21.71	1.0	22 $\pm$ 1	22 $\pm$ 1
IEEE 802.11ac VHT80	155	5775	22.42	21.57	1.0	22 $\pm$ 1	22 $\pm$ 1

**2.4GHz WLAN ANT. A**

Modulation Type	Output power (Turn-up Procedure)		Antenna Gain (dBi)	Antenna Gain (Numeric)	Distance (cm) [R]	MPE (mW/cm <sup>2</sup> )	MPE Limits (mW/cm <sup>2</sup> )
	dBm	mW					
IEEE 802.11b	26.00	398.107	5	3.1623	20	0.2505	1.0000
IEEE 802.11g	24.00	251.189	5	3.1623	20	0.1580	1.0000
IEEE 802.11n HT20	24.00	251.189	5	3.1623	20	0.1580	1.0000
IEEE 802.11n HT40	24.00	251.189	5	3.1623	20	0.1580	1.0000

**2.4GHz WLAN ANT. B**

Modulation Type	Output power (Turn-up Procedure)		Antenna Gain (dBi)	Antenna Gain (Numeric)	Distance (cm) [R]	MPE (mW/cm <sup>2</sup> )	MPE Limits (mW/cm <sup>2</sup> )
	dBm	mW					
IEEE 802.11b	/	/	/	/	/	/	/
IEEE 802.11g	24.00	251.189	5	3.1623	20	0.1580	1.0000
IEEE 802.11n HT20	24.00	251.189	5	3.1623	20	0.1580	1.0000
IEEE 802.11n HT40	24.00	251.189	5	3.1623	20	0.1580	1.0000

**5GHz WLAN U-NII-1 ANT. A**

Modulation Type	Output power (Turn-up Procedure)		Antenna Gain (dBi)	Antenna Gain (Numeric)	Distance (cm) [R]	MPE (mW/cm <sup>2</sup> )	MPE Limits (mW/cm <sup>2</sup> )
	dBm	mW					
IEEE 802.11a	19.00	79.433	5	3.1623	20	0.0500	1.0000
IEEE 802.11n HT20	19.00	79.433	5	3.1623	20	0.0500	1.0000
IEEE 802.11ac VHT20	19.00	79.433	5	3.1623	20	0.0500	1.0000
IEEE 802.11n HT40	21.00	125.893	5	3.1623	20	0.0792	1.0000
IEEE 802.11ac VHT40	21.00	125.893	5	3.1623	20	0.0792	1.0000
IEEE 802.11ac VHT80	22.00	158.489	5	3.1623	20	0.0997	1.0000

**5GHz WLAN U-NII-1 ANT. B**

Modulation Type	Output power (Turn-up Procedure)		Antenna Gain (dBi)	Antenna Gain (Numeric)	Distance (cm) [R]	MPE (mW/cm <sup>2</sup> )	MPE Limits (mW/cm <sup>2</sup> )
	dBm	mW					
IEEE 802.11a	19.00	79.433	5	3.1623	20	0.0500	1.0000
IEEE 802.11n HT20	19.00	79.433	5	3.1623	20	0.0500	1.0000
IEEE 802.11ac VHT20	19.00	79.433	5	3.1623	20	0.0500	1.0000
IEEE 802.11n HT40	21.00	125.893	5	3.1623	20	0.0792	1.0000
IEEE 802.11ac VHT40	21.00	125.893	5	3.1623	20	0.0792	1.0000
IEEE 802.11ac VHT80	22.00	158.489	5	3.1623	20	0.0997	1.0000

## 5GHz WLAN U-NII-3 ANT. A

Modulation Type	Output power (Turn-up Procedure)		Antenna Gain (dBi)	Antenna Gain (Numeric)	Distance (cm) [R]	MPE (mW/cm <sup>2</sup> )	MPE Limits (mW/cm <sup>2</sup> )
	dBm	mW					
IEEE 802.11a	24.00	251.189	5	3.1623	20	0.1580	1.0000
IEEE 802.11n HT20	23.00	199.526	5	3.1623	20	0.1255	1.0000
IEEE 802.11ac VHT20	24.00	251.189	5	3.1623	20	0.1580	1.0000
IEEE 802.11n HT40	23.00	199.526	5	3.1623	20	0.1255	1.0000
IEEE 802.11ac VHT40	23.00	199.526	5	3.1623	20	0.1255	1.0000
IEEE 802.11ac VHT80	23.00	199.526	5	3.1623	20	0.1255	1.0000

## 5GHz WLAN U-NII-3 ANT. B

Modulation Type	Output power (Turn-up Procedure)		Antenna Gain (dBi)	Antenna Gain (Numeric)	Distance (cm) [R]	MPE (mW/cm <sup>2</sup> )	MPE Limits (mW/cm <sup>2</sup> )
	dBm	mW					
IEEE 802.11a	24.00	251.189	5	3.1623	20	0.1580	1.0000
IEEE 802.11n HT20	23.00	199.526	5	3.1623	20	0.1255	1.0000
IEEE 802.11ac VHT20	24.00	251.189	5	3.1623	20	0.1580	1.0000
IEEE 802.11n HT40	23.00	199.526	5	3.1623	20	0.1255	1.0000
IEEE 802.11ac VHT40	23.00	199.526	5	3.1623	20	0.1255	1.0000
IEEE 802.11ac VHT80	23.00	199.526	5	3.1623	20	0.1255	1.0000

## Remark:

1. Output power (Average) including turn-up tolerance;
2. Output power was adjust to duty cycle at 100% if measured duty cycle less than 98%;
3. MPE evaluate distance is 20cm from user manual provide by manufacturer.

## 6. Summary simultaneous transmission information

Modulation Type	Work Frequency Band	Transmit Antenna		Antenna A Antenna B Synchronization transmit
		Antenna A	Antenna B	
IEEE 802.11a	U-NII-1/U-NII-3	Yes	Yes	Yes
IEEE 802.11b	2.4GHz	Yes	No	No
IEEE 802.11g	2.4GHz	Yes	Yes	Yes
IEEE 802.11n HT20	2.4GHz	Yes	Yes	Yes
IEEE 802.11n HT20	U-NII-1/ U-NII-3	Yes	Yes	Yes
IEEE 802.11n HT40	2.4GHz	Yes	Yes	Yes
IEEE 802.11n HT40	U-NII-1/ U-NII-3	Yes	Yes	Yes
IEEE 802.11ac VHT20	U-NII-1/ U-NII-3	Yes	Yes	Yes
IEEE 802.11ac VHT40	U-NII-1/ U-NII-3	Yes	Yes	Yes
IEEE 802.11ac VHT80	U-NII-1/ U-NII-3	Yes	Yes	Yes

## 7. Summary simultaneous transmission results

### Antenna A and Antenna B for 2.4GWLAN

Modulation Type	MPE <sub>Antenna A</sub> (mW/cm <sup>2</sup> )	MPE <sub>Antenna B</sub> (mW/cm <sup>2</sup> )	ΣMPE ratios	Limit	Results
IEEE 802.11b	0.2505	/	0.2505	1.0	PASS
IEEE 802.11g	0.1580	0.1580	<b>0.3160</b>	1.0	PASS
IEEE 802.11n HT20	0.1580	0.1580	0.3160	1.0	PASS
IEEE 802.11n HT40	0.1580	0.1580	0.3160	1.0	PASS

### Antenna A and Antenna B for 5GWLAN U-NII-1

Modulation Type	MPE <sub>Antenna A</sub> (mW/cm <sup>2</sup> )	MPE <sub>Antenna B</sub> (mW/cm <sup>2</sup> )	ΣMPE ratios	Limit	Results
IEEE 802.11a	0.0500	0.0500	0.1000	1.0	PASS
IEEE 802.11n HT20	0.0500	0.0500	0.1000	1.0	PASS
IEEE 802.11ac VHT20	0.0500	0.0500	0.1000	1.0	PASS
IEEE 802.11n HT40	0.0792	0.0792	0.1584	1.0	PASS
IEEE 802.11ac VHT40	0.0792	0.0792	0.1584	1.0	PASS
IEEE 802.11ac VHT80	0.0997	0.0997	0.1994	1.0	PASS

### Antenna A and Antenna B for 5GWLAN U-NII-3

Modulation Type	MPE <sub>Antenna A</sub> (mW/cm <sup>2</sup> )	MPE <sub>Antenna B</sub> (mW/cm <sup>2</sup> )	ΣMPE ratios	Limit	Results
IEEE 802.11a	0.1580	0.1580	<b>0.3160</b>	1.0	PASS
IEEE 802.11n HT20	0.1255	0.1255	0.2510	1.0	PASS
IEEE 802.11ac VHT20	0.1580	0.1580	0.3160	1.0	PASS
IEEE 802.11n HT40	0.1255	0.1255	0.2510	1.0	PASS
IEEE 802.11ac VHT40	0.1255	0.1255	0.2510	1.0	PASS
IEEE 802.11ac VHT80	0.1255	0.1255	0.2510	1.0	PASS

### Maximum Simultaneous transmission MPE Ratios for 2.4GHz WLAN and 5G WLAN

Maximum MPE ratio 2.4GWLAN	Maximum MPE ratio 5GWLAN	ΣMPE ratios	Limit	Results
0.3160	0.3160	0.6320	1.0	PASS

## 8. 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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