

FCC:BV5SMALLENGINE

5.8 Maximum permissible exposure (MPE)

For test instruments and accessories used see section 6 Part **CPC 3**.

5.8.1 Description of the test location

Test location: AREA 4

5.8.2 Photo documentation of the test set-up



5.8.3 Applicable standard

According to FCC Part 15, Section 15.407(f):

U-NII devices are subject to the radio frequency radiation exposure requirements specified in Section 1.1307(b), 2.1091 and 2.1093 of this chapter, as appropriate. All equipment shall considered to operate in a “general population/uncontrolled” environment. The test methods used comply with ANSI/IEEE C95.1-2005, “IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”.

5.8.4 Description of Measurement

The maximum total power input to the antenna has been measured conducted as described in clause 5.3 of this document. Through the Friis transmission formula, which is a far field assumption and the known maximum gain of the antenna, the maximum MPE at a defined distance away from the product, can be calculated.

Friis transmission formula:

$$P_d = \frac{P_{out} * G}{4 * \Pi * r^2}$$

where

- P_d =power density in mW/cm²
- P_{out} = output power to antenna in mW
- G = gain of antenna (linear scale)
- r = distance between antenna and observation point (cm)

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5.8.5 Test result

For fixed equipment the distance $r = 20$ cm;

HT20, Ant1:

Channel No.	Frequency	Max power output to antenna		Antenna gain lin	Power density (mW/cm ²)	Limit of power density (mW/cm ²)
	(MHz)	(dBm)	(mW)			
36	5180	13.3	21.38	3.16	0.0060	1.0
40	5200	12.6	18.20	3.16	0.0051	1.0
48	5240	13.5	22.39	3.16	0.0063	1.0
52	5260	13.0	19.95	3.16	0.0056	1.0
56	5280	13.3	21.38	3.16	0.0060	1.0
64	5320	14.0	25.12	3.16	0.0071	1.0
100	5500	13.3	21.38	3.16	0.0060	1.0
120	5600	12.5	17.78	3.16	0.0050	1.0
140	5700	12.7	18.62	3.16	0.0052	1.0

HT20, Ant2:

Channel No.	Frequency	Max power output to antenna		Antenna gain lin	Power density (mW/cm ²)	Limit of power density (mW/cm ²)
	(MHz)	(dBm)	(mW)			
36	5180	13.6	22.91	3.16	0.0064	1.0
40	5200	13.3	21.38	3.16	0.0060	1.0
48	5240	13.7	23.44	3.16	0.0066	1.0
52	5260	13.5	22.39	3.16	0.0063	1.0
56	5280	14.0	25.12	3.16	0.0071	1.0
64	5320	12.9	19.50	3.16	0.0055	1.0
100	5500	15.1	32.36	3.16	0.0091	1.0
120	5600	15.0	31.62	3.16	0.0089	1.0
140	5700	12.7	18.62	3.16	0.0052	1.0

HT20, Ant1 + Ant2:

Channel No.	Frequency	Max power output to antenna		Antenna gain lin	Power density (mW/cm ²)	Limit of power density (mW/cm ²)
	(MHz)	(dBm)	(mW)			
36	5180				0.0124	1.0
40	5200				0.0111	1.0
48	5240				0.0129	1.0
52	5260				0.0119	1.0
56	5280				0.0131	1.0
64	5320				0.0125	1.0
100	5500				0.0151	1.0
120	5600				0.0139	1.0
140	5700				0.0105	1.0

Note: This is the mathematical summed power density of Ant1 and Ant2.

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HT40, Ant1:

Channel No.	Frequency (MHz)	Max power output to antenna		Antenna gain lin	Power density (mW/cm ²)	Limit of power density (mW/cm ²)
		(dBm)	(mW)			
38	5190	13.5	22.39	3.16	0.0063	1.0
46	5230	13.2	20.89	3.16	0.0059	1.0
54	5270	13.1	20.42	3.16	0.0057	1.0
62	5310	12.8	19.05	3.16	0.0054	1.0
102	5510	13.0	19.95	3.16	0.0056	1.0
110	5550	12.6	18.20	3.16	0.0051	1.0
134	5670	13.0	19.95	3.16	0.0056	1.0

HT40, Ant2:

Channel No.	Frequency (MHz)	Max power output to antenna		Antenna gain lin	Power density (mW/cm ²)	Limit of power density (mW/cm ²)
		(dBm)	(mW)			
38	5190	12.6	18.20	3.16	0.0051	1.0
46	5230	12.1	16.22	3.16	0.0046	1.0
54	5270	12.5	17.78	3.16	0.0050	1.0
62	5310	13.2	20.89	3.16	0.0059	1.0
102	5510	12.5	17.78	3.16	0.0050	1.0
110	5550	12.7	18.62	3.16	0.0052	1.0
134	5670	12.9	19.50	3.16	0.0055	1.0

HT40, Ant1 + Ant2:

Channel No.	Frequency (MHz)	Max power output to antenna		Antenna gain lin	Power density (mW/cm ²)	Limit of power density (mW/cm ²)
		(dBm)	(mW)			
38	5190				0.0114	1.0
46	5230				0.0104	1.0
54	5270				0.0107	1.0
62	5310				0.0112	1.0
102	5510				0.0106	1.0
110	5550				0.0103	1.0
134	5670				0.0111	1.0

Note: This is the mathematical summed power density of Ant1 and Ant2.

802.11a, Ant1:

Channel No.	Frequency (MHz)	Max power output to antenna		Antenna gain lin	Power density (mW/cm ²)	Limit of power density (mW/cm ²)
		(dBm)	(mW)			
36	5180	13.3	21.38	3.16	0.0060	1.0
40	5200	13.1	20.42	3.16	0.0057	1.0
48	5240	13.7	23.44	3.16	0.0066	1.0
52	5260	12.7	18.62	3.16	0.0052	1.0
56	5280	12.9	19.50	3.16	0.0055	1.0
64	5320	13.7	23.44	3.16	0.0066	1.0
100	5500	13.3	21.38	3.16	0.0060	1.0
120	5600	12.5	17.78	3.16	0.0050	1.0
140	5700	12.3	16.98	3.16	0.0048	1.0

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Limits for maximum permissible exposure (MPE):

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(B) Limits for General Population / Uncontrolled Exposure				
0.3 – 3.0	614	1.63	100	30
3.0 – 30	824/f	2.19/f	180/ f ²	30
30 - 300	27.5	0.073	0.2	30
300-1500	---	---	f/1500	30
1500-100000	---	---	1.0	30

f = Frequency (MHz)

The requirements are **FULFILLED**.

Remarks: This test report shows the compliance with the limits for maximum permissible exposure (MPE) specified in FCC 1.1310 and the criteria to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in FCC 1.1307(b).

