



# MPE REPORT

FCC ID: 2AO3C-M1BT

Date of issue: July 15, 2019

Report number: MTi180731E184

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Sample description: RADIO

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Model(s): MODEL ONE BT

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Applicant: Tivoli Audio, Inc.

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Address: 745 Atlantic Avenue Boston, MA 02111 USA

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Date of test: July 13, 2018 to Nov. 21, 2018

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Shenzhen Microtest Co., Ltd.

<http://www.mtitest.com>



TEST RESULT CERTIFICATION	
Applicant's name:	Tivoli Audio, Inc.
Address:	745 Atlantic Avenue Boston, MA 02111 USA
Manufacture's name:	Jwoodaudio Industry Co., Ltd
Address:	No.4 industrial District, Liuwu village, Yuanzhou Town, Huizhou City,Guangdong province, P.R.C 516123
Product name:	RADIO
Trademark:	Tivoli Audio
Model and/or type reference .:	MODEL ONE BT
Serial model.....:	N/A
RF exposure procedures.....:	KDB 447498 D01 v06

This device described above has been tested by Shenzhen Microtest Co., Ltd and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

Tested by:

Leo Su

Nov. 21, 2018

Reviewed by:

Blue Zheng

July 15, 2019

Approved by:

Smith Chen

July 15, 2019



## RF EXPOSURE EVALUATION

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

Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
<b>(A) Limits for Occupational/Controlled Exposure</b>				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*300/f <sup>2</sup>	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f <sup>2</sup>	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz \* = Plane-wave equivalent power density

### MPE Calculation Method

Friis transmission formula:  $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

$P_d$  = Power density in mW/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

G = Numeric gain of the antenna relative to isotropic antenna

$\pi$  = 3.1415926

R = distance between observation point and center of the radiator in cm (20cm)

$P_d$  the limit of MPE, 1mW/cm<sup>2</sup>. If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

## Measurement Result

**BT:**

Operation Frequency: BT GFSK,  $\pi/4$ -DQPSK, 8DPSK: 2402-2480MHz

Power density limited: 1mW/ cm<sup>2</sup>

Antenna Type: BT Antenna: PCB Antenna;

BT antenna gain: 1dBi

R=20cm

$mW=10^{(dBm/10)}$

antenna gain Numeric= $10^{(dBi/10)}=10^{(1/10)}=1.26$

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm <sup>2</sup> )	Power density Limits (mW/cm <sup>2</sup> )
		(dBm)		tune-up power		Gain			
				(dBm)	(dBm)	(mW)	(dBi)	Numeric	
2402	GFSK	0.906	1±1	2	1.585	1.00	1.26	0.0004	1
2441		0.995	1±1	2	1.585	1.00	1.26	0.0004	1
2480		1.766	1±1	2	1.585	1.00	1.26	0.0004	1
2402	$\pi/4$ -DQPSK	0.805	1±1	2	1.585	1.00	1.26	0.0004	1
2441		1.698	1±1	2	1.585	1.00	1.26	0.0004	1
2480		1.902	1±1	2	1.585	1.00	1.26	0.0004	1
2402	8DPSK	1.302	2±1	3	1.995	1.00	1.26	0.0005	1
2441		2.197	2±1	3	1.995	1.00	1.26	0.0005	1
2480		2.696	2±1	3	1.995	1.00	1.26	0.0005	1

### Conclusion:

For the max result: 0.0005 ≤ 1.0 for 1g SAR, No SAR is required.

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