

**IEEE C95.1**

**KDB 447498 D01 v06**

**47 C.F.R. Part 1, Subpart I, Section 1.1310**

**47 C.F.R. Part 2, Subpart J, Section 2.1091**

**RF EXPOSURE REPORT**

**For**

**WHITE DRIVE BOX**

**Model: TB4001**

**Issued for**

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**Issued Date: October 28, 2016**



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## Revision History

<b>Rev.</b>	<b>Issue Date</b>	<b>Revisions</b>	<b>Effect Page</b>	<b>Revised By</b>
00	10/28/2016	Initial Issue	All Page	Michelle Chiu

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**1. Limit**

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this chapter.

**2. EUT Specification**

<b>Product Name</b>	WHITE DRIVE BOX
<b>Model Number</b>	TB4001
<b>Identify Number</b>	T160801S01
<b>Received Date</b>	August 01, 2016
<b>Frequency band (Operating)</b>	802.11b/g/gn HT20 Mode: 2412MHz ~ 2462 MHz GSM / GPRS / EGPRS:850: 824.2 ~ 848.8 MHz GSM / GPRS / EGPRS:1900: 1850.2 ~ 1909.8 MHz
<b>Device category</b>	Mobile (>20cm separation)
<b>Exposure classification</b>	<input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm <sup>2</sup> ) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm <sup>2</sup> )
<b>Antenna Specification</b>	WiFi 2.4GHz Antenna, Internal Chip Antenna × 1, Antenna Gain: 3.05 dBi External YAGI Antenna × 2, Antenna Gain: 3.5 dBi LTE Antenna, PCB Antenna(WAG-F-LTE5-00-009) × 1, Antenna Gain: -0.98 dBi PCB Antenna(WAG-F-LTE5-00-009) × 1, Antenna Gain: 1.82 dBi PCB Antenna(WAG-F-LTE5-00-010) × 1, Antenna Gain: 0.47 dBi PCB Antenna(WAG-F-LTE5-00-010) × 1, Antenna Gain: 1.25 dBi
<b>Maximum average output power</b>	Direct Mode: IEEE 802.11b Mode: 16.65 dBm IEEE 802.11g Mode: 22.07 dBm IEEE 802.11gn HT20 MCS0 Mode: 21.93 dBm STA Mode : IEEE 802.11b Mode: 16.02 dBm IEEE 802.11g Mode: 20.63 dBm IEEE 802.11gn HT20 MCS0 Mode: 19.63 dBm GSM 850: 31.62 dBm GPRS 850: 31.64 dBm EGPRS 850: 27.57 dBm GSM 1900: 30.89 dBm GPRS 1900: 30.90 dBm EGPRS 1900: 27.23 dBm

<b>Power Target / Tolerance</b>	GSM 850: 33 dBm ± 3 dBm GPRS 850: 33 dBm ± 3 dBm EGPRS 850: 27 dBm ± 3 dBm GSM 1900: 30 dBm ± 3 dBm GPRS 1900: 30 dBm ± 3 dBm EGPRS 1900: 26 dBm ± 3 dBm																							
<b>Max tune up Power / Max time Average Power</b>	<table border="1"> <thead> <tr> <th data-bbox="502 497 705 584">System</th> <th data-bbox="711 497 1082 584">Max Tune up Power</th> <th data-bbox="1082 497 1442 584">Time Average Power</th> </tr> </thead> <tbody> <tr> <td data-bbox="502 584 705 629">GSM850</td> <td data-bbox="711 584 1082 629">36.0dBm (3981.072mW)</td> <td data-bbox="1082 584 1442 629">27.0dBm (501.187mW)</td> </tr> <tr> <td data-bbox="502 629 705 674">GPRS850</td> <td data-bbox="711 629 1082 674">36.0dBm (3981.072mW)</td> <td data-bbox="1082 629 1442 674">27.0dBm (501.187mW)</td> </tr> <tr> <td data-bbox="502 674 705 719">EGPRS850</td> <td data-bbox="711 674 1082 719">30.0dBm (1000.000mW)</td> <td data-bbox="1082 674 1442 719">21.0dBm (125.893mW)</td> </tr> <tr> <td data-bbox="502 719 705 763">GSM1900</td> <td data-bbox="711 719 1082 763">33.0dBm (1995.262mW)</td> <td data-bbox="1082 719 1442 763">24.0dBm (251.189mW)</td> </tr> <tr> <td data-bbox="502 763 705 808">GPRS1900</td> <td data-bbox="711 763 1082 808">33.0dBm (1995.262mW)</td> <td data-bbox="1082 763 1442 808">24.0dBm (251.189mW)</td> </tr> <tr> <td data-bbox="502 808 705 842">EGPRS1900</td> <td data-bbox="711 808 1082 842">29.0dBm (794.328mW)</td> <td data-bbox="1082 808 1442 842">20.0dBm (100.000mW)</td> </tr> </tbody> </table>	System	Max Tune up Power	Time Average Power	GSM850	36.0dBm (3981.072mW)	27.0dBm (501.187mW)	GPRS850	36.0dBm (3981.072mW)	27.0dBm (501.187mW)	EGPRS850	30.0dBm (1000.000mW)	21.0dBm (125.893mW)	GSM1900	33.0dBm (1995.262mW)	24.0dBm (251.189mW)	GPRS1900	33.0dBm (1995.262mW)	24.0dBm (251.189mW)	EGPRS1900	29.0dBm (794.328mW)	20.0dBm (100.000mW)		
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<b>Evaluation applied</b>	MPE Evaluation*																							

**Remark:**

1. For more details, please refer to the User's manual of the EUT.
2. This submittal(s) (test report) is intended for FCC ID: MCLTB4001 filing.

### 3. Test Results

*No non-compliance noted.*

#### Calculation

$$\text{Given } E = \frac{\sqrt{30 \times P \times G}}{d} \quad \& \quad S = \frac{E^2}{3770}$$

*Where*       $E = \text{Field strength in Volts / meter}$

$P = \text{Power in Watts}$

$G = \text{Numeric antenna gain}$

$d = \text{Distance in meters}$

$S = \text{Power density in milliwatts / square centimeter}$

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770d^2}$$

Changing to units of mW and cm, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = d \text{ (m)} / 100$$

Yields

$$S = \frac{30 \times (P/1000) \times G}{377 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \textbf{Equation 1}$$

*Where*       $d = \text{Distance in cm}$

$P = \text{Power in mW}$

$G = \text{Numeric antenna gain}$

$S = \text{Power density in mW / cm}^2$

#### 4. Maximum Permissible Exposure

Substituting the MPE safe distance using  $d = 20$  cm into Equation 1:

$$S = 0.000199 \times P \times G$$

Where

$P =$  Power in mW

$G =$  Numeric antenna gain

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

Mode	Frequency (MHz)	Power (dBm)	Ant. Gain (dBi)	Distance (cm)	Power density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
IEEE 802.11b	2462	16.65	3.5	20	0.0206	1
IEEE 802.11g	2462	22.07	3.5	20	0.0717	1
IEEE 802.11gn HT20 MCS0	2462	21.93	3.5	20	0.0695	1
GSM 850	824.2	27	1.82	20	0.1516	0.5495
GPRS 850	836.6	27	1.82	20	0.1516	0.5577
EGPRS 850	836.6	21	1.82	20	0.0381	0.5577
GSM 1900	1880.0	24	1.82	20	0.0760	1.2533
GPRS 1900	1909.8	24	1.82	20	0.0760	1.2732
EGPRS 1900	1909.8	20	1.82	20	0.0302	1.2732

#### Simultaneously MPE

Simultaneously MPE = MPE 1 / Limit 1 + MPE 2 / Limit 2 + .....

#### **WiFi 2.4GHz + 2G Mode**

Simultaneously MPE = (0.0717 / 1) + (0.1516 / 0.5577) = **0.3435 mW/cm<sup>2</sup>**