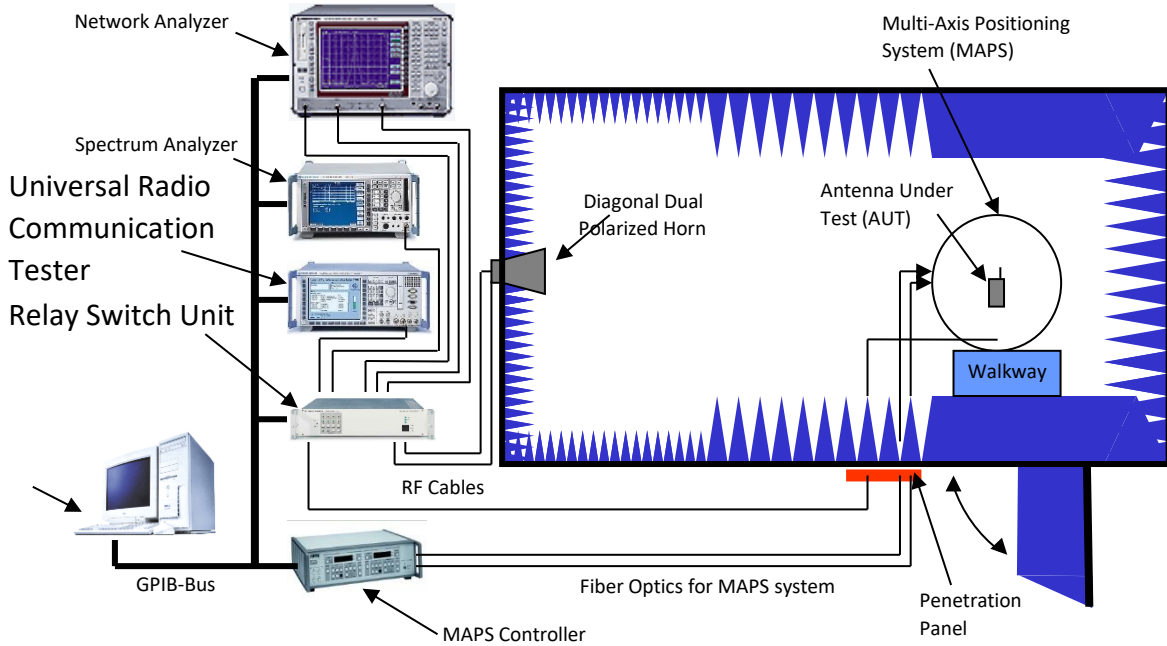


# ANTENNA TEST REPORT

<b>Applicant</b>	<b>Drowsy Digital, Inc</b>
<b>Address</b>	850 New Burton Road, Suite 201, Dover DE 19904
<b>Suppliers</b>	<b>Molex Interconnect (Shanghai) Co., Ltd.</b> 889 Yinglun Road, Waigaoqiao Free Trade Zone, Pudong, Shanghai
	<b>Shenzhen Top-link Technologies Co.,Ltd.</b> Bld.1, 11, Furui Rd., Fuhai Street, BaoAn District, Shenzhen City,GuangDong Province, China
<b>Product</b>	<b>OZLO Sleepbuds</b>
<b>Product No.</b>	<b>01001100201</b>
<b>Model</b>	<b>N/A</b>
<b>Peak Gain</b>	<b>Charge case antennae (PN: 1030042-01): 2dBi/open 0.8dBi/close</b>
	<b>Earbud L antenna (PN: 1030001-01) : -6dBi</b>
	<b>Earbud R antenna (PN :1030002-01) : -5.8dBi</b>
<b>Test person</b>	<b>Liu Hai</b>
<b>Date of test</b>	<b>2023/09/20</b>

<b>Approval</b>	<b>Written</b>	<b>Reviewed</b>	<b>Approved</b>
	<b>Liu Hai</b>	<b>Andy Zhang</b>	<b>Chris Zhong</b>
<b>Data</b>	<b>2023/09/20</b>	<b>2023/09/20</b>	<b>2023/09/20</b>

# 1. MEASUREMENTS SETUP



# 2. TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna chamber	ETS-LINDGREN	AMS-8500	4063	2023/2/7	2024/2/6
Signal Generator	Agilent	E5071C	MY46101560	2023/1/31	2024/1/30
Spectrum Analyzer	ROHDE&SCHWARZ	FSP	100878	2023/4/8	2024/4/7
Broad-Band Horn Antenna	ETS-LINDGREN	Model 3102	SN00066947	2023/8/26	2024/8/25
Broad-Band Horn Antenna	ETS-LINDGREN	Model 3164-03	SN00064049	2023/8/26	2024/8/25
Turn Table	ETS-LINDGREN	Model 2090	SN00105913	N/A	N/A
Controller	ROHDE&SCHWARZ	TS-RSP	100331	N/A	N/A
Test Software	ETS-LINDGREN	EMQUEST	EMQ-100	N/A	N/A

# 3. MEASUREMENTS DESCRIPTION

## 1. S Parameter Measurements

A testing method for evaluating the signal reflection performance of antennas. S Parameter measurements were done by using Network Analyzer –Agilent, the Return Loss of the antennas were obtained to ensure the efficiency over the operation frequency.

## 2. Antenna Radiation Pattern Measurements

The distribution of radiation power from antennas in different directions. Radiation Pattern Measurements were done in the ETS-Lindgren anechoic chamber through radiation, the earbuds were set to continuous radiation and the AMS-8500 receive the RF power from 360 degree angles by using rotation of DUT (Device under test).

## 3. Antenna Gain Calculation

Antenna gain is an important parameter for measuring antenna radiation. The antenna gains will be calculated by ETS chamber software when radiation pattern tests are done.

# 4. TEST RESULTS

## 4.1 CHARGE CASE ANTENNA VSWR

Frequency (MHz)	2400	2485
Open state	2.6	1.5
Close state	1.1	1.3

## 4.2 EARBUD LEFT ANTENNA VSWR

Frequency (MHz)	2400	2485
Earbud Left	3.1	2.8

## 4.3 EARBUD RIGHT ANTENNA VSWR

Frequency (MHz)	2400	2485
Earbud Right	2.4	2.0

## 4.4 CHARGE CASE ANTENNA EFFICIENCY

Frequency (MHz)	2400~2485
Open state	29.7

<b>Close state</b>	<b>30.3</b>
--------------------	-------------

#### 4.5 EARBUD LEFT ANTENNA EFFICIENCY

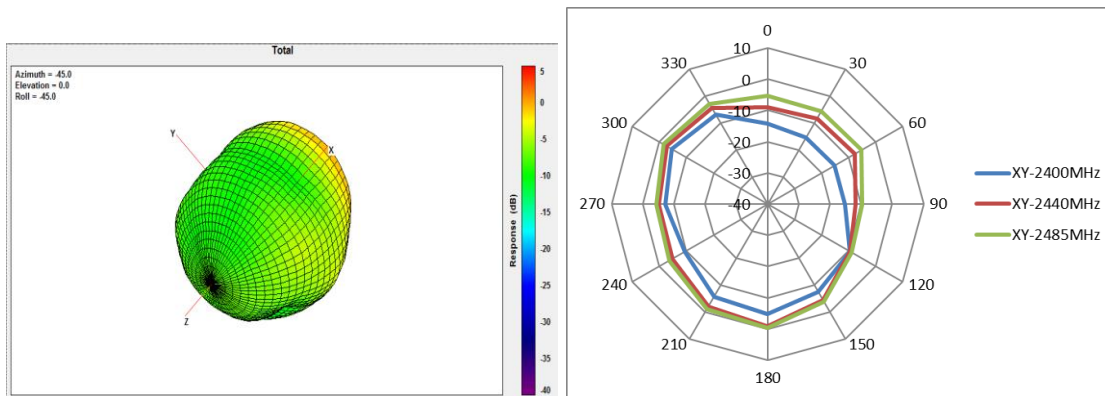
<b>Frequency (MHz)</b>	<b>2400~2485</b>
<b>Earbud Left</b>	<b>8.2</b>

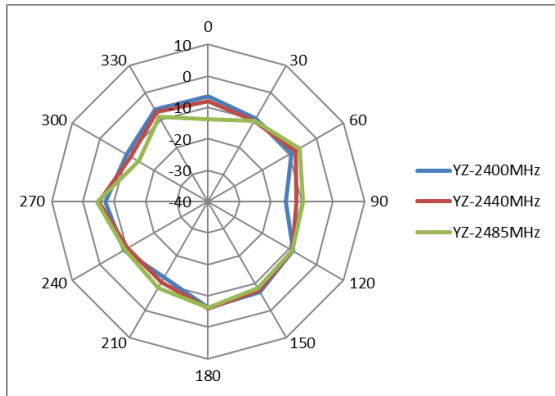
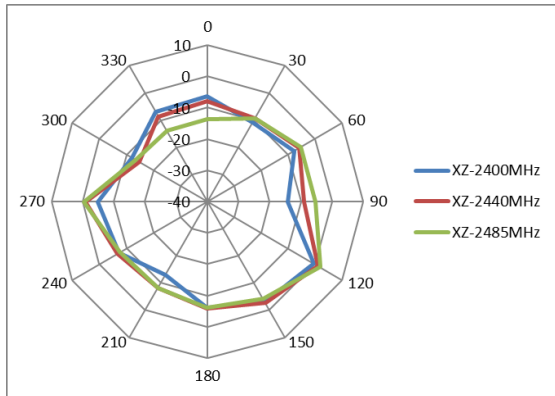
#### 4.6 EARBUD RIGHT ANTENNA EFFICIENCY

<b>Frequency (MHz)</b>	<b>2400~2485</b>
<b>Earbud Right</b>	<b>8.4</b>

#### 4.7 CHARGE CASE ANTENNA (BT)

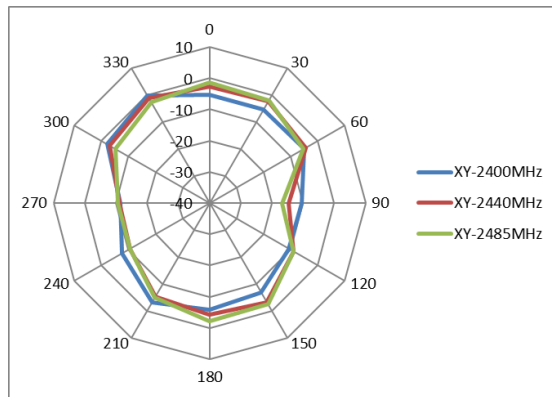
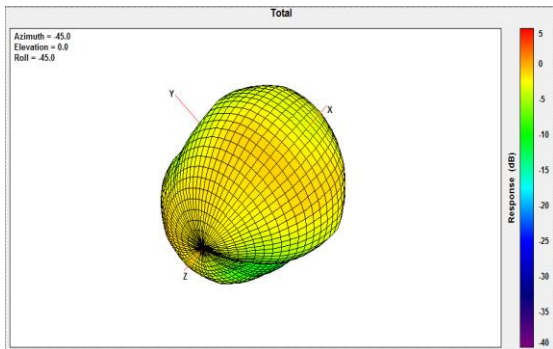
<b>Frequency (MHz)</b>		<b>XY</b>	<b>XZ</b>	<b>YZ</b>
<b>2400</b>	Peak Gain (dBi)	-4.5	-0.6	-6
	Degree	300°	120°	330°
<b>2440</b>	Peak Gain (dBi)	-0.9	1.1	-5
	Degree	180°	120°	270°
<b>2485</b>	Peak Gain (dBi)	-0.3	2	-4.4
	Degree	180°	120°	270°

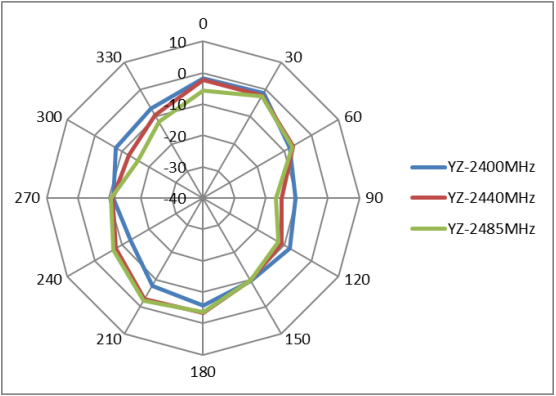
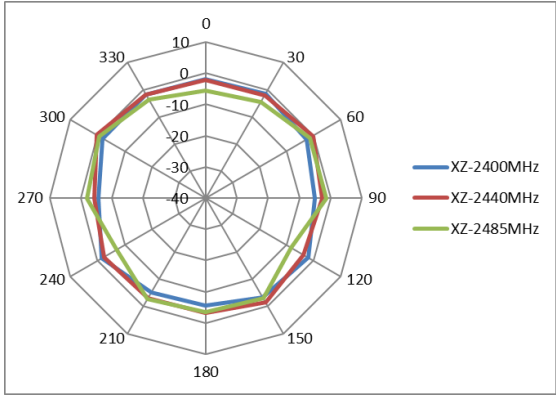




#### 4.8 CHARGE CASE ANTENNA (BLE)

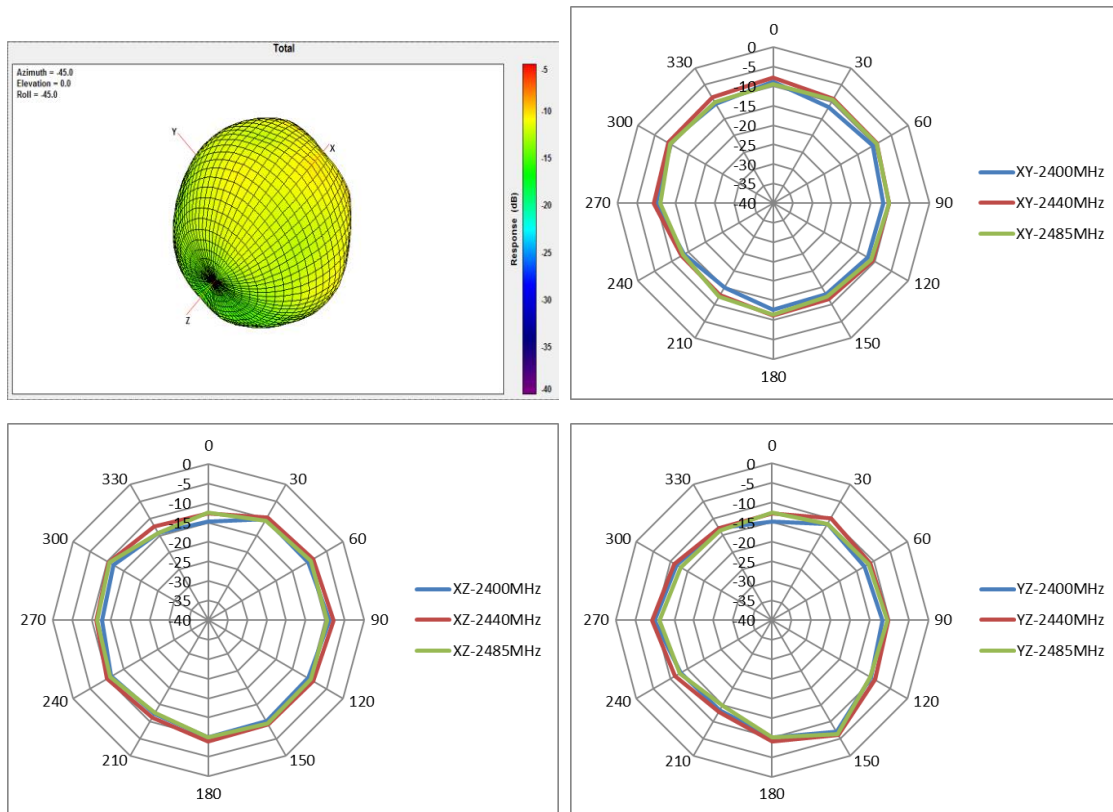
Frequency (MHz)		XY	XZ	YZ
<b>2400</b>	Peak Gain (dBi)	-1	-1.4	-1.2
	Degree	330°	240°	30°
<b>2440</b>	Peak Gain (dBi)	-1.1	0.5	-2.1
	Degree	330°	180°	0°
<b>2485</b>	Peak Gain (dBi)	-1.4	-0.6	-2.2
	Degree	0°	180	210°





## 4.9 EARBUD LEFT ANTENNA 2D

Frequency (MHz)		XY	XZ	YZ
2400	Peak Gain (dBi)	-8.9	-8.9	-7
	Degree	0°	90°	150°
2440	Peak Gain (dBi)	-7.7	-7.7	-6
	Degree	0°	90°	150°
2485	Peak Gain (dBi)	-9.4	-9.4	-6.4
	Degree	60°	120°	150°



## 4.10 EARBUD RIGHT ANTENNA 2D

Frequency (MHz)		XY	XZ	YZ
2400	Peak Gain (dBi)	-10.2	-7.1	-6.5
	Degree	300°	240°	240°
2440	Peak Gain (dBi)	-8.3	-5.8	-6
	Degree	180°	240°	240°
2485	Peak Gain (dBi)	-8.9	-6.2	-7
	Degree	180°	240°	240°

