

FCC 15.247 2.4GHz Test Report

for

Tyson Bioresearch, Inc.

**5F., No. 16, 18, 20, 22, Kedong 3rd Rd., Zhunan Township,
Miaoli County 35053, Taiwan**

Product Name : Blood Glucose Meter
Model Name : (1)Tyson Bio HT100-B
(2)JT100-B
Brand : Tyson Bio
FCC ID : 2AJZ6HT100B

**Prepared by: : AUDIX Technology Corporation,
EMC Department**



The test report is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo.

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Audix Technology Corp.
No. 491, Zhongfu Rd., Linkou Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

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APPENDIX A TEST DATA AND PLOTS
APPENDIX B TEST PHOTOGRAPHS



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No. 491, Zhongfu Rd., Linkou Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

TEST REPORT

Applicant : Tyson Bioresearch, Inc.
Manufacturer : Tyson Bioresearch, Inc.
EUT Description
(1) Product : Blood Glucose Meter
(2) Model Number : (1)Tyson Bio HT100-B (2)JT100-B
(3) Brand : Tyson Bio
(4) Power Rating : DC 3V

Applicable Standards:

Title 47 CFR FCC Part 15 Subpart C
ANSI C63.10:2013

Audix Technology Corp. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

Audix Technology Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Report: 2023. 03. 22

Reviewed by: Sabrina Wang (Sabrina Wang/Administrator)

Approved by: Johnny Hsueh (Johnny Hsueh/Section Manager)



Audix Technology Corp.
No. 491, Zhongfu Rd., Linkou Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

1. REVISION RECORD OF TEST REPORT

Edition No	Issued Date	Revision Summary	Report Number
0	2023. 03. 22	Original Report	EM-F230171

2. SUMMARY OF TEST RESULTS

Rule	Description	Results
15.207	Conducted Emission	N/A
15.247(d)/ 15.205	Radiated Band Edge and Radiated Spurious Emission	PASS
15.247(a)(2)	DTS/Occupied Bandwidth	PASS
15.247(b)(3)	Maximum Peak Output Power	PASS
15.247(d)	Conducted Band Edges and Conducted Spurious Emission	PASS
15.247 (e)	Peak Power Spectral Density	PASS
15.203	Antenna Requirement	Compliance
Note: 1. Decision rule according to the limit of the test standard chapter, the test value is lower than the limit specified in the test chapter, and it is judged as Pass. 2. The uncertainties value is not used in determining the result. 3. N/A is an abbreviation for Not Applicable.		

3. GENERAL INFORMATION

3.1. Description of Application

Applicant	Tyson Bioresearch, Inc. 5F., No. 16, 18, 20, 22, Kedong 3rd Rd., Zhunan Township, Miaoli County 35053, Taiwan
Manufacturer	Tyson Bioresearch, Inc. 5F., No. 16, 18, 20, 22, Kedong 3rd Rd., Zhunan Township, Miaoli County 35053, Taiwan
Product	Blood Glucose Meter
Brand	Tyson Bio
Model Number	(1)Tyson Bio HT100-B (2)JT100-B The differences between models please refer to the following table.

Table: Model different list

Item Model Number	Bluetooth (BLE) function	Colors of Appearance	Sales Customers
Tyson Bio HT100-B	Support	White	Different
JT100-B	Support	White, Eject Button Color Different	

3.2. Description of EUT

Test Model	Tyson Bio HT100-B		
Serial Number	N/A		
Power Rating	DC 3V		
Sample Status	Trial Sample		
RF Features	BLE		
Transmit Type	1T1R		
Date of Receipt	2023. 03. 07		
Date of Test	2023. 03. 17 ~ 21		
Interface Ports of EUT	• USB-C Port x1		
Accessories Supplied	• USB-C Cable: Shielded, Detached, 2.0m		
Test Sample	Sample No.	Test Item	Firmware
	05	All test Item	N/A

Note: Pursuant ISO 17025:2017 section 7.8.2, Audix Technology Corp. does not assume responsibility for all EUT's information including RF features, transmit type, antenna information...etc are provided by customer.

3.3. Antenna Information

Model	Brand	Antenna Type	Frequency (MHz)	Max Gain (dBi)
---	Tyson Bio	PCB Antenna	2400-2480	0.72

3.4. EUT Specifications Assessed in Current Report

Mode	Fundamental Range (MHz)	Channel Number	Modulation	Data Rate (Mbps)
BLE	2402-2480	40	GFSK	1

Channel List							
BLE							
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
37	2402	09	2422	18	2442	28	2462
00	2404	10	2424	19	2444	29	2464
01	2406	38	2426	20	2446	30	2466
02	2408	11	2428	21	2448	31	2468
03	2410	12	2430	22	2450	32	2470
04	2412	13	2432	23	2452	33	2472
05	2414	14	2434	24	2454	34	2474
06	2416	15	2436	25	2456	35	2476
07	2418	16	2438	26	2458	36	2478
08	2420	17	2440	27	2460	39	2480

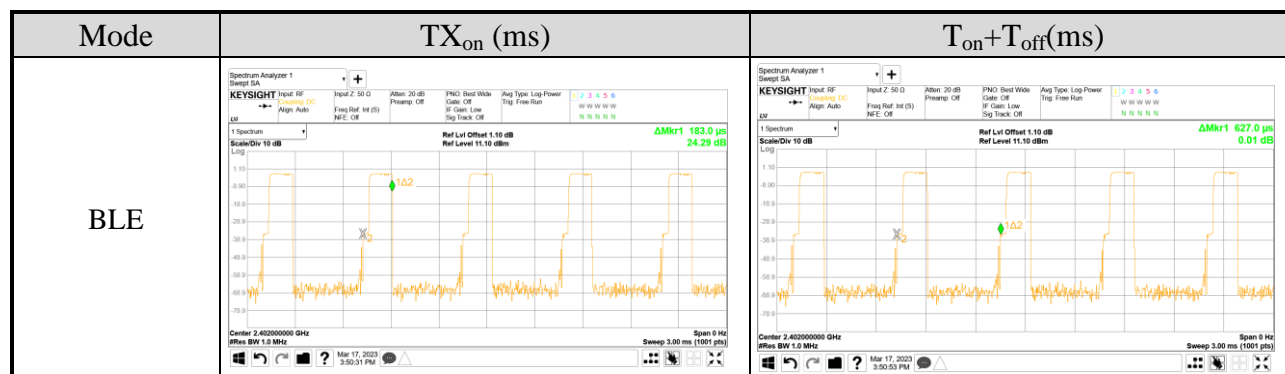
3.5. Descriptions of Key Components

Item	Supplier/Brand	Model	Specification
Bluetooth Module	Tyson Bio	MT-B	Bluetooth (BLE)

3.6. Test Configuration

Mode	TX _{on} (ms)	1/ TX _{on} (kHz)	Duty Cycle (x)	Duty Cycle Factor [10log(1/x)] (dB)
BLE	0.183	5.464	0.292	5.346

Note: When duty cycle is less than 98% (0.98) that duty cycle factor 10log(1/x) is needed to add in conducted test items measured in average detector.



Item	Mode	Data Rate	Test Channel
Radiated Test Case	Radiated Band Edge	BLE	1Mbps
	Radiated Spurious Emission	BLE	1Mbps
Conducted Test Case	6dB/Occupied Bandwidth	BLE	1Mbps
	Peak Output Power	BLE	1Mbps
	Band Edge	BLE	1Mbps
	Spurious Emission	BLE	1Mbps
	Peak Power Spectral Density	BLE	1Mbps

Note: ☐ Mobile Device ☒ Portable Device
and 3 axis were assessed. The worst scenario for Radiated Spurious Emission as follow:
☒ Lie ☐ Side ☐ Stand

3.7. Output Power Setting

Mode	Centre Frequency (MHz)	Power Setting
BLE	2402	default
	2440	default
	2480	default

3.8. Tested Supporting System List

3.8.1. Support Peripheral Unit

No.	Product	Brand	Model No.	Serial No.	Approval
1.	Notebook PC	ASUS	E403SA	N/A	N/A
2.	DC Power Supply	TOP WARD	3303A	N/A	N/A

3.8.2. Cable Lists

No.	Cable Description Of The Above Support Units
1.	Adapter: ASUS, M/N AD890526 DC Power Cord: Unshielded, Undetachable, 2.0m
2.	DC Power Cord*2: Unshielded, Detachable, 1.0m AC Power Cord: Unshielded, Undetachable, 1.8m

3.9. Setup Configuration

3.9.1. EUT Configuration for Radiated Emission



3.9.2. EUT Configuration for RF Conducted Test Items



3.10. Operating Condition of EUT

The notebook PC run the test program “TBGM4HID” is used for enabling EUT BLE function under continues transmitting and choosing channel.

3.11. Description of Test Facility

Name of Test Firm	Audix Technology Corporation / EMC Department No. 491, Zhongfu Rd., Linkou Dist., New Taipei City 244, Taiwan Tel: +886-2-26092133 Fax: +886-2-26099303 Website : www.audixtech.com Contact e-mail: attemc_report@audixtech.com
Accreditations	The laboratory is accredited by following organizations under ISO/IEC 17025:2017 (1) NVLAP(USA) NVLAP Lab Code 200077-0 (2) TAF(Taiwan) No. 1724
Test Facilities	FCC OET Designation Number under APEC MRA by NCC is : TW1724 ISED CAB Identifier Number under APEC TEL MRA by NCC is TW1724 (1) No.1 3m Semi Anechoic Chamber

3.12.Measurement Uncertainty

The measurement uncertainty levels have been estimated as specified in ETSI TR 100 028-2001

Test Items/Facilities			Frequency Range	Uncertainty
Conduction Test	<input type="checkbox"/>	No. 7 Shielded Room	9kHz-150kHz	±3.7dB
			150kHz-30MHz	±3.4dB
	<input type="checkbox"/>	No. 8 Shielded Room	9kHz-150kHz	±3.7dB
			150kHz-30MHz	±3.5dB
Radiation Test	<input checked="" type="checkbox"/>	No.1 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±3.6dB
			200MHz-1000MHz, 3m, Horizontal	±4.3dB
			30MHz-200MHz, 3m, Vertical	±4.4dB
			200MHz-1000MHz, 3m, Vertical	±4.8dB
			1GHz-6GHz, 3m	±4.8dB
			6GHz-18GHz, 3m	±4.5dB
	<input type="checkbox"/>	No.3 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±4.0dB
			200MHz-1000MHz, 3m, Horizontal	±4.4dB
			30MHz-200MHz, 3m, Vertical	±4.7dB
			200MHz-1000MHz, 3m, Vertical	±4.5dB
			1GHz-6GHz, 3m	±4.8dB
			6GHz-18GHz, 3m	±4.5dB
	<input type="checkbox"/>	No.4 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±4.3dB
			200MHz-1000MHz, 3m, Horizontal	±4.2dB
			30MHz-200MHz, 3m, Vertical	±4.8dB
			200MHz-1000MHz, 3m, Vertical	±4.7dB
			1GHz-6GHz, 3m	±4.6dB
			6GHz-18GHz, 3m	±4.4dB
	<input type="checkbox"/>	No.5 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±4.6dB
			200MHz-1000MHz, 3m, Horizontal	±4.4dB
			30MHz-200MHz, 3m, Vertical	±4.5dB
			200MHz-1000MHz, 3m, Vertical	±4.9dB
			1GHz-6GHz, 3m	±4.9dB
			6GHz-18GHz, 3m	±4.6dB
	Radiated emissions (18GHz-40GHz)		18GHz-40GHz, 3m	±3.4dB

Remark : Uncertainty = $kuc(y)$

Test Item	Uncertainty
6dB Bandwidth	± 0.05kHz
Maximum peak output power	± 0.33dB
Power spectral density	± 0.13dB
Conducted Emission Limitations	± 0.13dB

4. MEASUREMENT EQUIPMENT LIST

4.1. Radiated Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2022.08.24	1 Year
2.	Test Receiver	R&S	ESCS30	100039	2022.06.01	1 Year
3.	Amplifier	HP	8447D	2944A06305	2022.12.29	1 Year
4.	Microwave Amplifier	HP	8449B	3008A01284	2022.06.01	1 Year
5.	Microwave Amplifier	Keysight	83051A	MY56480113	2022.09.07	1 Year
6.	Loop Antenna	TESEQ	HLA 6121	60478	2023.02.21	1 Year
7.	Bilog Antenna	TESEQ	CBL6112D	33821	2022.07.01	1 Year
8.	Horn Antenna	EMCO	3115	9112-3775	2022.05.18	1 Year
9.	Horn Antenna	COM-POWER	AH-840	101092	2022.12.30	1 Year
10.	2.4GHz Notch Filter	K&L Microwave	7NSL10-2441.5/E 130.5-O/O	2	2022.07.23	1 Year
11.	3GHz Notch Filter	Microwave	H3G018G1	484796	2022.07.23	1 Year
12.	Coaxial Cable	MIYAZAKI	5D2W	RE-11	2023.01.07	1 Year
13.	Coaxial Cable	HUBER+SUHNER	SUCOFLEX 106	RE-14	2023.01.07	1 Year
14.	Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	RE-30	2022.08.22	1 Year
15.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.1 3m A/C	2022.04.14	1 Year
16.	Test Software	Audix	e3	V9 18621a	N.C.R.	N.C.R.

4.2. RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Keysight	N9020B-544	MY57120357	2023.02.22	1 Year
2.	Digital Thermo-Hygro Meter	iMax	HTC-1	RF-03	2022.04.14	1 Year



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New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

5. CONDUCTED EMISSION

The conducted disturbance voltage limits are not required for EUT which only employ DC power for operation

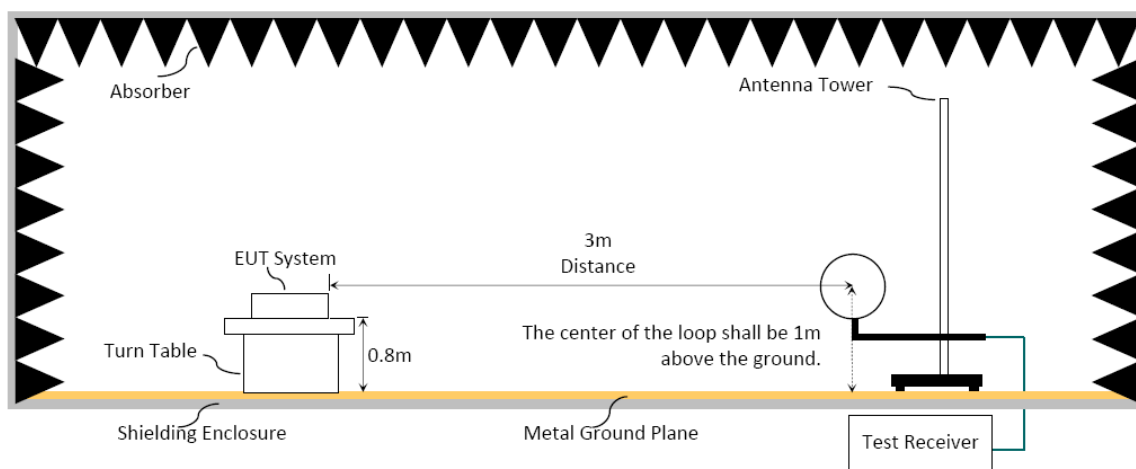
6. RADIATED EMISSION

6.1. Block Diagram of Test Setup

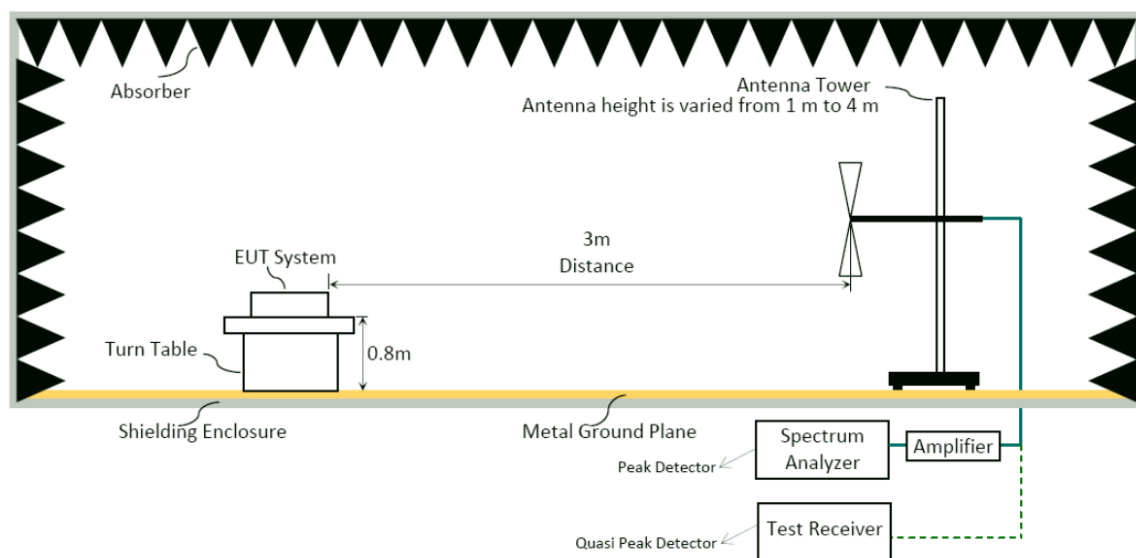
6.1.1. Block Diagram of EUT

Indicated as section 3.9

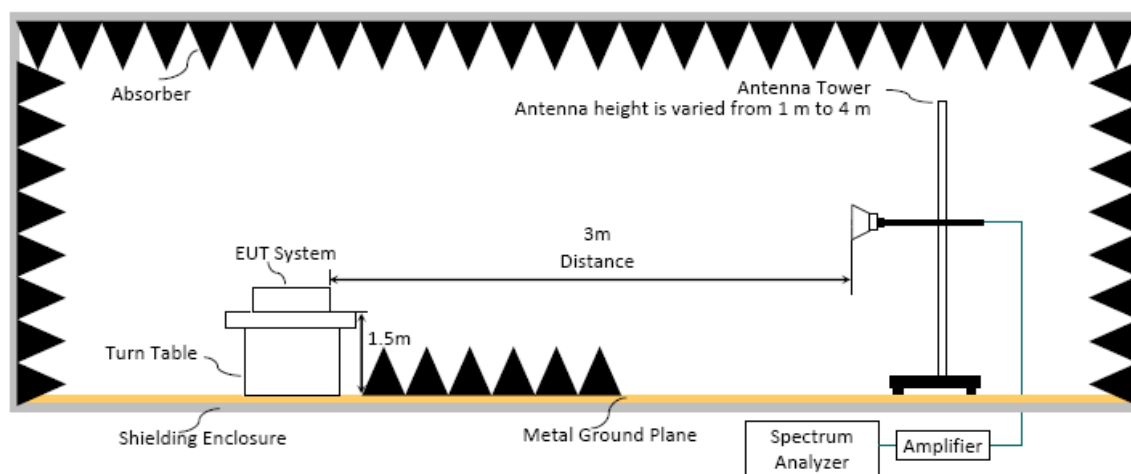
6.1.2. Setup Diagram for 9kHz-30MHz



6.1.3. Setup Diagram for 30-1000MHz



6.1.4. Setup Diagram for above 1GHz



6.2. Radiated Emission Limits

In any 100kHz bandwidth outside the frequency band, the radio frequency power produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205/RSS-Gen Section 8.10 table 6, must also comply with the radiated emission limits specified as below.

Frequency (MHz)	Distance(m)	Limits	
		dBμV/m	μV/m
0.009 - 0.490	300	67.6-20 log f(kHz)	2400/f kHz
0.490 - 1.705	30	87.6-20 log f(kHz)	24000/f kHz
1.705 - 30	30	29.5	30
30 - 88	3	40.0	100
88- 216	3	43.5	150
216- 960	3	46.0	200
Above 960	3	54.0	500
Above 1000	3	74.0 dBμV/m (Peak) 54.0 dBμV/m (Average)	

Remark : (1) $\text{dB}\mu\text{V/m} = 20 \log (\mu\text{V/m})$

- (2) The tighter limit applies to the edge between two frequency bands.
- (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
- (4) Fundamental and emission fall within operation band are exempted from this section.
- (5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

6.3. Test Procedure

Frequency Range 9kHz~30MHz:

The EUT setup on the turntable which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

- (1) RBW = 9kHz with peak and average detector.
- (2) Detector: average and peak (9kHz-490kHz)
Q.P. (490kHz-30MHz)

Frequency Range 30MHz ~ 25GHz:

The EUT setup on the turn table which has 80cm (for 30-1000MHz) and 1.5m (for above 1GHz) height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

Frequency below 1GHz:

Spectrum Analyzer is used for pre-testing with following setting:

- (1) RBW = 120KHz
- (2) VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.

Note 1: When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required, otherwise using Q.P. for final measurement.

Note 2: When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.

Frequency above 1GHz to 10th harmonic (up to 25 GHz):

Peak Detector:

- (1) RBW = 1MHz
- (2) VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.

Note: When peak-detected value is lower than limit that the measurement using the average detector is not required, otherwise using average detector for final measurement.

Average Detector:**■ Option 1:**

(1) RBW = 1MHz

(2) VBW $\geq 1/T$. (Duty Cycle < 98%, when duty cycle presented in section 3.7)

Modulation Type	VBW Setting (VBW $\geq 1/T$)
BLE	5.6kHz

(3) VBW = 10Hz (Duty Cycle $\geq 98\%$, when duty cycle presented in section 3.7)

Modulation Type	VBW Setting
---	---

(4) Detector = Peak.

(5) Sweep time = auto.

(6) Trace mode = max hold.

(7) Allow sweeps to continue until the trace stabilizes.

□ Option 2:

Average Emission Level = Peak Emission Level + D.C.C.F.

6.4. Measurement Result Explanation

■ Peak Emission Level (dB μ V/m) = Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) + Reading (dB μ V).

■ Average Emission Level (dB μ V/m) = Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) + Reading (dB μ V).

□ Average Emission Level (dB μ V/m) = Peak Emission Level (dB μ V/m) + DCCF (dB)
Duty Cycle Correction Factor (DCCF) (dB) = $20\log(TX_{on}/TX_{on+off})$ presented in section 3.6.

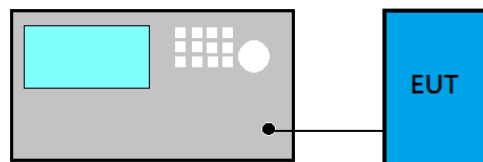
□ ERP (dBm) = Peak Emission Level (dB μ V/m) - 95.2dB - 2.14dB

6.5. Test Results

Please refer to Appendix A.

7. DTS/OCCUPIED BANDWIDTH

7.1. Block Diagram of Test Setup



7.2. Specification Limits

The minimum 6dB bandwidth shall be at least 500kHz.

7.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

For DTS Bandwidth

- (1) Set RBW = 100 kHz.
- (2) Set the video bandwidth (VBW) $\geq 3 \times \text{RBW}$.
- (3) Detector = Peak.
- (4) Trace mode = max hold.
- (5) Sweep = auto couple.
- (6) Allow the trace to stabilize.
- (7) Setting channel bandwidth function x to -6dB power to record the final bandwidth..

For 99% Occupied Bandwidth

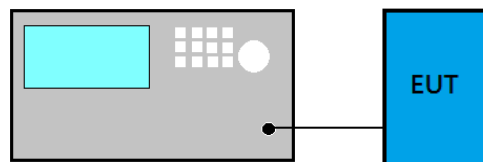
- (1) Set Span range 1.5~5 times the OBW
- (2) Set RBW close to 1% to 5% of OBW.
- (3) Set $\text{VBW} \geq 3 \times \text{RBW}$.
- (4) Detector = Peak.
- (5) Trace mode = Max hold
- (6) Sweep = Auto couple.
- (7) Allow the trace to stabilize.

7.4. Test Results

Please refer to Appendix A

8. MAXIMUM PEAK OUTPUT POWER

8.1. Block Diagram of Test Setup



8.2. Specification Limits

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5MHz is : 1Watt. (30dBm), and E.I.R.P.: 4Watt (36dBm)

8.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

■ PKPM1 Peak power meter method:

EUT is connected to power sensor and record the maximum output power.

■ Maximum peak conducted output power method:

- (1) Set the RBW \geq DTS bandwidth
- (2) Set VBW $\geq 3 \times$ RBW
- (3) Set span $\geq 3 \times$ RBW.
- (4) Sweep time = auto couple
- (5) Detector = peak.
- (6) Trace mode = max hold.
- (7) Allow trace to fully stabilize.
- (8) Use peak marker function to determine the peak amplitude level.

■ Method AVGPM (Measurement using an RF average power meter):

EUT is connected to power sensor and record the maximum average output power and duty cycle factor is added when duty cycle presented in section 3.7 is $< 98\%$.

□ Method AVGSA-2 (Spectrum channel power)

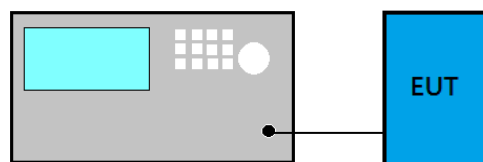
- (1) Set span to at least 1.5 times the OBW
- (2) Set RBW = 1 -5% of OBW
- (3) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- (4) Detector = RMS.
- (5) Trace mode = trace average at least 100 traces
- (6) Sweep = auto couple.
- (7) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges.
- (8) Duty cycle factor is added when duty cycle presented in section 3.6 is $< 98\%$.

8.4. Test Results

Please refer to Appendix A

9. EMISSION LIMITATIONS

9.1. Block Diagram of Test Setup



9.2. Specification Limits

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, that the required attenuation shall be 30 dB instead of 20 dB.

Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

9.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

■ Reference Level

- (1) Set analyzer center frequency to DTS channel center frequency.
- (2) Set the span to 1.5 times the DTS bandwidth.
- (3) Set the RBW to: 100 kHz.
- (4) Set the VBW $\geq 3 \times$ RBW.
- (5) Detector = peak.
- (6) Sweep time = auto couple.
- (7) Trace mode = max hold.
- (8) Allow trace to fully stabilize to find the max PSD as reference level.

■ Emission Level Measurement

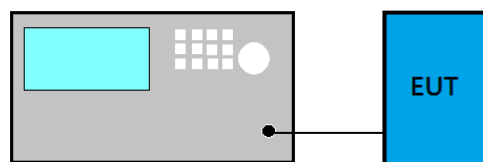
- (1) Set analyzer center frequency to DTS channel center frequency.
- (2) Set the span to 1.5 times the DTS bandwidth.
- (3) Set the RBW to: 100 kHz.
- (4) Set the VBW $\geq 3 \times$ RBW.
- (5) Detector = peak.
- (6) Sweep time = auto couple.
- (7) Trace mode = max hold.
- (8) Allow trace to fully stabilize to find the max level.

9.4. Test Results

Please refer to Appendix A

10. POWER SPECTRAL DENSITY

10.1. Block Diagram of Test Setup



10.2. Specification Limits

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band.

10.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

☒ Method PKPSD (peak PSD)

- (1) Set analyzer center frequency to DTS channel center frequency.
- (2) Set the span to 1.5 times the DTS bandwidth.
- (3) Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- (4) Set the VBW $\geq 3 \times \text{RBW}$.
- (5) Detector = peak.
- (6) Sweep time = auto couple.
- (7) Trace mode = max hold.
- (8) Allow trace to fully stabilize.
- (9) Use the peak marker function to determine the maximum amplitude level.
- (10) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

☐ Method AVGPSD-2

- (1) Using peak PSD procedure step 1 to step 4.
- (2) Detector = RMS detector
- (3) Sweep time = auto couple
- (4) Trace mode = trace averaging over a minimum of 100 traces
- (5) Use the peak marker function to determine the maximum amplitude level.
- (6) Duty cycle factor is added when duty cycle presented in section 3.7 < 98%.
- (7) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

10.4. Test Results

Please refer to Appendix A



Audix Technology Corp.
No. 491, Zhongfu Rd., Linkou Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

11.DEVIATION TO TEST SPECIFICATIONS

【NONE】



Audix Technology Corp.
No. 491, Zhongfu Rd., Linkou Dist.,
New Taipei City 244, Taiwan

APPENDIX A

Tel: +886 2 26099301
Fax: +886 2 26099303

APPENDIX A

TEST DATA AND PLOTS

(Model: Tyson Bio HT100-B)



Audix Technology Corp.
No. 491, Zhongfu Rd., Linkou Dist.,
New Taipei City 244, Taiwan

APPENDIX B

Tel: +886 2 26099301
Fax: +886 2 26099303

APPDNDIX B

TEST PHOTOGRAPHS

(Model: Tyson Bio HT100-B)