



SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

SZEMC-TRF-01 Rev. A/1

Report No.: SZCR240100012001

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TEST REPORT

Application No.: SZCR2401000120AT
Applicant: Delaval International AB
Address of Applicant: Gustaf de Lavals vag 15, 14641 Tumba, SWEDEN, 39, Tumba, 14621, Sweden
Manufacturer: Delaval International AB
Address of Manufacturer: Gustaf de Lavals vag 15, 14641 Tumba, SWEDEN, 39, Tumba, 14621, Sweden
Factory: Orbit One AB
Address of Factory: Fridhemsvägen 15, SE-372 38 Ronneby, Sweden
Equipment Under Test (EUT):
EUT Name: Biosensors ear tag
Model No.: BAT1
FCC ID: UCSBAT1
Trade Mark: 
Standard(s) : 47 CFR Part 15 Subpart C 15.250
Date of Receipt: 2024-01-11
Date of Test: 2024-01-11 to 2024-01-18
Date of Issue: 2024-01-25

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu
EMC Laboratory Manager



SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch, EMC Laboratory

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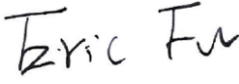
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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2024-01-25		Original

Authorized for issue by:				
				
		Leo Lai/Project Engineer		
				
		Eric Fu/Reviewer		

2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15 Subpart C 15.250	N/A	47 CFR Part 15C Section 15.250(c), 15.203	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
EIRP	47 CFR Part 15 Subpart C 15.250	ANSI C63.10: 2013 section 10.3	47 CFR Part 15, Subpart C Section 15.250 (d)(1),(d)(3)	Pass
Spurious Emissions Below 1GHz		ANSI C63.10: 2013 section 10.2	47 CFR Part 15, Subpart C Section 15.250 (d)(4),15.209	Pass
Spurious Emissions Above 1GHz		ANSI C63.10: 2013 section 10.3	47 CFR Part 15, Subpart C Section 15.250 (d)(1),(d)(2)	Pass

Note:

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.



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Shenzhen Branch Testing Center EUT Laboratory

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4 General Information

4.1 Details of E.U.T.

Power supply: DC3.6V by battery
 Operating Frequency: 6489.6MHz
 Modulation Type: PM
 Number of Channels: 1
 Sample Type: Hand Held Use
 Antenna Type: Ceramic Chip Antenna
 Antenna Gain: 4.16dBi

Remark: The information in this section is provided by the applicant or manufacturer, SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	L480	REF. No.SEA18C01F

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
EIRP	5.08dB
Spurious Emissions Below 1GHz	5.14dB
Spurious Emissions Above 1GHz	5.08dB

4.4 Test Location

All tests were performed at:

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No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• VCCI (Member No. 1937)

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd.

Shenzhen EMC laboratory have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• FCC –Designation Number: CN1336

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1336. Test Firm Registration Number: 787754.

• Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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5 Equipment List

EIRP					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2021-03-26	2024-03-25
DC Power Supply	Zhaoxin	PS-3005D	SEM011-10	2023-09-20	2024-09-19
Signal Analyzer	Rohde & Schwarz	FSV40	SEM008-04	2023-03-20	2024-03-19
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2023-07-23	2025-07-22
Microwave system amplifier	Agilent	83017A	SEM005-25	2023-09-19	2024-09-18
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2023-07-07	2024-07-06
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2022-08-10	2024-08-09
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2023-03-20	2024-03-19

Spurious Emissions Below 1GHz					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2023-06-19	2026-06-18
MXE EMI Receiver	Agilent Technologies	N9038A	SEM004-15	2023-10-19	2024-10-18
BiConiLog Antenna	ETS-LINDGREN	3142C	SEM003-01	2023-09-16	2025-09-15
Pre-Amplifier	Agilent Technologies	8447D	SEM005-01	2023-03-20	2024-03-19
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2023-07-07	2024-07-06

Spurious Emissions Above 1GHz					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2021-03-26	2024-03-25
DC Power Supply	Zhaoxin	PS-3005D	SEM011-10	2023-09-20	2024-09-19
Signal Analyzer	Rohde & Schwarz	FSV40	SEM008-04	2023-03-20	2024-03-19
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2023-07-23	2025-07-22
Microwave system amplifier	Agilent	83017A	SEM005-25	2023-09-19	2024-09-18



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Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2023-07-07	2024-07-06
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2022-08-10	2024-08-09
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2023-03-20	2024-03-19

General used equipment

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	deli	8838	SEM002-32	2023-07-28	2024-07-27
Humidity/ Temperature Indicator	deli	8838	SEM002-33	2023-07-28	2024-07-27
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2023-03-23	2024-03-22



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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15C Section 15.250(c), 15.203

Limit:

15.203 Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of 15.211, 15.213, 15.217, 15.219, 15.221, or 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded. 15.247(b) (4) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

15.250(c) requirement:

Operation on board an aircraft or a satellite is prohibited. Devices operating under this section may not be employed for the operation of toys. Except for operation onboard a ship or a terrestrial transportation vehicle, the use of a fixed outdoor infrastructure is prohibited. A fixed infrastructure includes antennas mounted on outdoor structures, e.g., antennas mounted on the outside of a building or on a telephone pole.

6.1.2 Conclusion

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 4.16dBi for 6489.6MHz.

Please refer to internal photos of EUT.



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7 Radio Spectrum Matter Test Results

7.1 EIRP

Test Requirement 47 CFR Part 15, Subpart C Section 15.250 (d)(1),(d)(3)

Test Method: ANSI C63.10: 2013 section 10.3

Measurement Distance: 3m

Limit:

Frequency	Limit	Detector	Measurement distance (m)
960MHz-1610MHz	-75.3 dBm (EIRP, RBW=1MHz)	AV	3
1610MHz-1990MHz	-63.3 dBm (EIRP, RBW=1MHz)	AV	3
1990MHz-3100MHz	-61.3 dBm (EIRP, RBW=1MHz)	AV	3
3100MHz-5925MHz	-51.3 dBm (EIRP, RBW=1MHz)	AV	3
5925MHz-7250MHz	-41.3 dBm (EIRP, RBW=1MHz)	AV	3
7250MHz-10600MHz	-51.3 dBm (EIRP, RBW=1MHz)	AV	3
Above 10600MHz	-61.3 dBm (EIRP, RBW=1MHz)	AV	3
Fundamental	-15.92 dBm (EIRP, RBW=8MHz)	Peak	3

According to ANSI 63.10 Clause 10.3.9, the EIRP to field strength at a specified measurement distance of 3 m is below:

$$E \text{ (dBuV/m)} = \text{EIRP(dBm)} + 95.3$$

Thus, the field strength limit for the test above 1GHz is below:

Frequency	Limit	Detector	Measurement Distance
	Field Strength (dBuV/m)		
960MHz-1610MHz	20.00	AV	3
1610MHz-1990MHz	32.00	AV	3
1990MHz-3100MHz	34.00	AV	3
3100MHz-5925MHz	44.00	AV	3
5925MHz-7250MHz	54.00	AV	3
7250MHz-10600MHz	44.00	AV	3
Above 10600MHz	34.00	AV	3
Fundamental	79.38	Peak	3

7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 21.7 °C

Humidity: 50.2 % RH

Atmospheric Pressure: 1015 mbar

7.1.2 Test Mode Description

Pre-scan / Mode

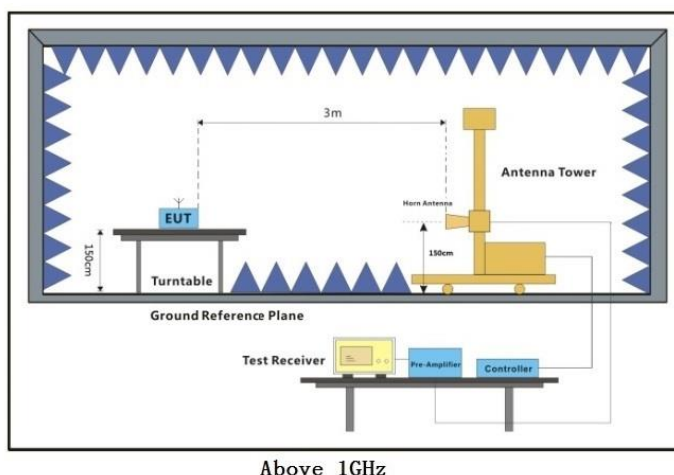
Final test Code

Description

Final test 00

Continuous Tx Mode: Keep the EUT Transmitting with Modulation

7.1.3 Test Setup Diagram



Above 1GHz

7.1.4 Measurement Procedure and Data

- 1) The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 3) The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 5) The test-receiver system was set to Peak detector with Maximum Hold Mode for Max Peak EIRP measurement and AV detector for Average EIRP measurement.
- 7) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case.
- 8) Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

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Calculated Peak Field Strength of fundamental @ RBW=50MHz					
Frequency (MHz)	Measured Field Strength of fundamental (FS _M) (dBm)	Calculated Field Strength of fundamental (FS _C) (dBm)	Limit (dBm)	Margin (dB)	Polarization
6492.33	-15.06	-1.08	0	1.08	Horizontal
6489.32	-17.30	-3.32	0	3.32	Vertical

Note: $FS_C = FS_M + 20\log(50\text{MHz}/10\text{MHz}) = FS_M + 13.98$

Average Field Strength for fundamental @ RBW=1MHz				
Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Polarization
6498.34	-51.21	-41.30	9.91	Horizontal
6422.54	-52.28	-41.30	10.98	Vertical



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7.2 Spurious Emissions Below 1GHz

Test Requirement 47 CFR Part 15, Subpart C Section 15.250 (d)(4),15.209

Test Method: ANSI C63.10: 2013 section 10.2

Limit:

Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1000MHz	-	20	RMS/AV	3

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 21.7 °C

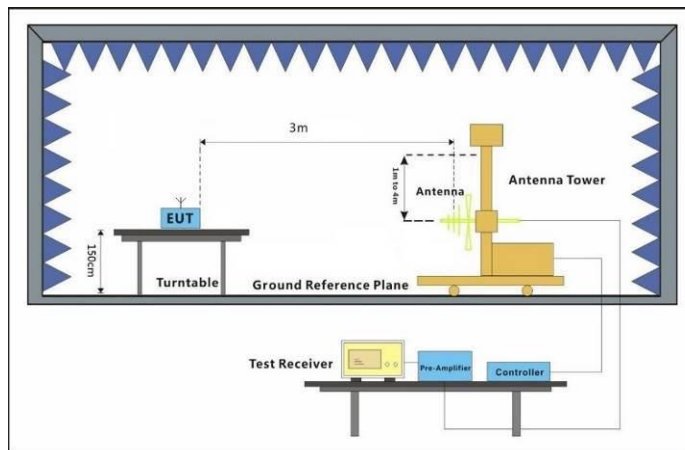
Humidity: 50.2 % RH

Atmospheric Pressure: 1015 mbar

7.2.2 Test Mode Description

Pre-scan /	Mode	Description
Final test	Code	
Final test	00	Continuous Tx Mode: Keep the EUT Transmitting with Modulation

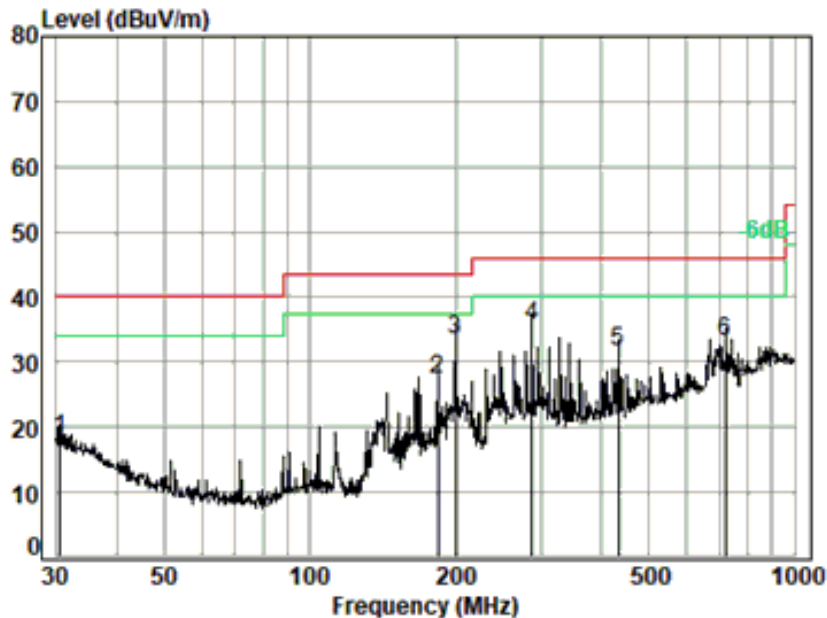
7.2.3 Test Setup Diagram



7.2.4 Measurement Procedure and Data

- 1) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
 - 2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
 - 3) The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
 - 4) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
 - 5) The test-receiver system was set to Peak detector with Maximum Hold Mode. And use Quasi-Peak to measure the six highest frequencies.
 - 6) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case.
 - 7) Repeat above procedures until all frequencies measured was complete
- Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

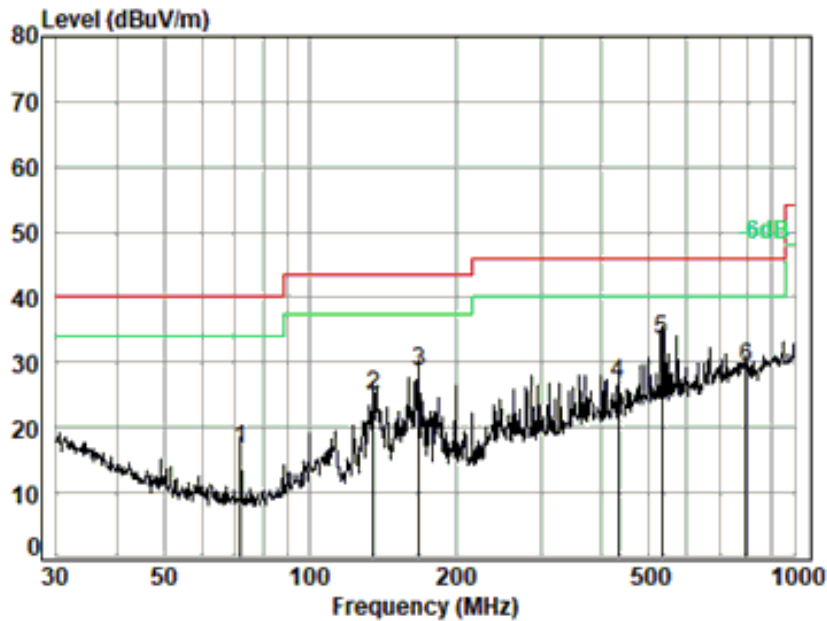
Test Mode: 00; Polarity: Horizontal



Site : chamber
Condition: 3m HORIZONTAL
Job No. : 00120AT/00133AT
Test Mode: 00

	Ant	Cable	Preamp	Read		Limit	Over	
Freq	Factor	Loss	Factor	Level	Level	Line	Limit	Remark
MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	30.53	20.95	0.65	27.80	24.53	18.33	40.00	-21.67 QP
2	183.84	14.22	1.64	27.31	38.98	27.53	43.50	-15.97 QP
3 q	199.99	14.10	1.73	27.25	45.02	33.60	43.50	-9.90 QP
4	287.99	16.95	2.12	26.93	43.33	35.47	46.00	-10.53 QP
5	432.55	21.00	2.66	27.48	35.33	31.51	46.00	-14.49 QP
6	721.73	26.24	3.58	27.85	31.23	33.20	46.00	-12.80 QP

Test Mode: 00; Polarity: Vertical



Site : chamber
Condition: 3m VERTICAL
Job No. : 00120AT/00133AT
Test Mode: 00

		Ant	Cable	Preamp	Read		Limit	Over	
	Freq	Factor	Loss	Factor	Level	Level	Line	Limit	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	71.83	10.50	1.00	27.69	32.87	16.68	40.00	-23.32	QP
2	135.51	11.43	1.38	27.48	39.72	25.05	43.50	-18.45	QP
3	167.82	13.17	1.56	27.37	41.08	28.44	43.50	-15.06	QP
4	432.55	21.00	2.66	27.48	30.59	26.77	46.00	-19.23	QP
5 q	531.96	23.32	2.99	27.93	35.22	33.60	46.00	-12.40	QP
6	796.18	26.95	3.82	27.62	26.02	29.17	46.00	-16.83	QP

7.3 Spurious Emissions Above 1GHz

Test Requirement 47 CFR Part 15, Subpart C Section 15.250 (d)(1),(d)(2)

Test Method: ANSI C63.10: 2013 section 10.3

Limit:

Frequency	Limit (dBuV/m) @3m	RBW	Detector	Measurement distance (m)
1000MHz-1610MHz	20.00	1MHz	AV	0.5
1610MHz-1990MHz	32.00	1MHz	AV	0.5
1990MHz-3100MHz	34.00	1MHz	AV	0.5
3100MHz-5925MHz	44.00	1MHz	AV	0.5
5925MHz-7250MHz	54.00	1MHz	AV	0.5
7250MHz-10600MHz	44.00	1MHz	AV	0.5
Above 10600MHz	34.00	1MHz	AV	0.5
1164MHz-1240MHz	10.0	1KHz	AV	3
1559MHz-1610MHz	10.0	1KHz	AV	3

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 21.5 °C

Humidity: 45.5 % RH

Atmospheric Pressure: 1003 mbar

7.3.2 Test Mode Description

Pre-scan / Mode

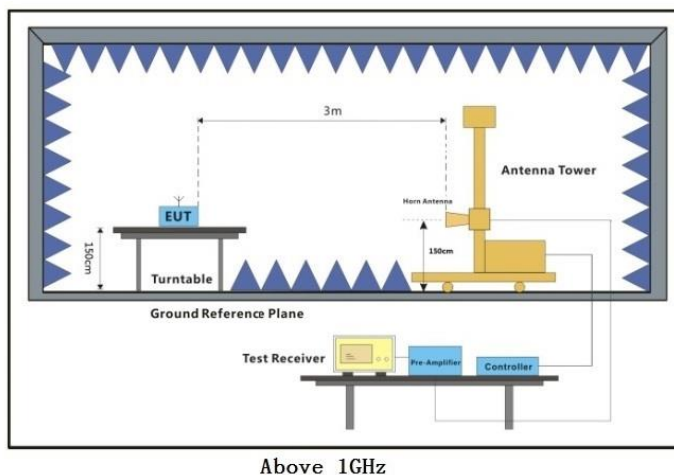
Final test Code

Description

Final test 00

Continuous Tx Mode: Keep the EUT Transmitting with Modulation

7.3.3 Test Setup Diagram



7.3.4 Measurement Procedure and Data

- 1) The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2) The EUT was set 0.5 meters / 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 3) The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 5) The test-receiver system was set to AV detector with Maximum Hold Mode.
- 6) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case.
- 7) Repeat above procedures until all frequencies measured was complete

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor+ Distance Factor - Preamp Factor

Distance factor = $20 \cdot \log(0.5/3) = -15.56\text{dB}$

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Average Field Strength within 1164-1240MHz & 1559-1610MHz @ RBW=1KHz								
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin	Polarization
1237.884	25.18	2.83	37.28	9.75	0.48	10.00	9.52	Horizontal
1583.224	26.13	3.35	36.26	4.61	-2.17	10.00	12.17	Horizontal
1233.273	25.17	2.83	37.30	9.84	0.54	10.00	9.46	Vertical
1586.438	26.15	3.34	36.31	5.09	-1.73	10.00	11.73	Vertical

Average Field Strength out of 1164-1240MHz & 1559-1610MHz @ RBW=1MHz									
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Distance factor (dBuV)	Read Level (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin	Polarization
1029.325	24.64	2.5	38.29	-15.56	32.3	5.59	20	14.41	Horizontal
1443.509	25.17	3.17	37.02	-15.56	30.5	6.21	20	13.79	Horizontal
1813.786	27.08	3.62	36.16	-15.56	30.2	9.14	32	22.86	Horizontal
2610.661	29.6	4.47	35.57	-15.56	29.2	12.14	34	21.86	Horizontal
5392.918	34.47	7.6	35	-15.56	28.5	20.05	54	33.95	Horizontal
13717.56	39.02	12.87	37.3	-15.56	26.1	28.16	34	8.84	Horizontal
1035.293	24.57	2.51	38.27	-15.56	32.0	5.21	20	14.79	Vertical
1431.047	25.13	3.15	37.05	-15.56	30.5	6.16	20	13.84	Vertical
1856.215	27.31	3.66	36.07	-15.56	30.0	9.31	32	22.69	Vertical
2633.397	29.6	4.49	35.56	-15.56	29.8	12.78	34	21.22	Vertical
5519.072	34.6	7.72	35.01	-15.56	28.7	20.47	54	33.53	Vertical
15804.66	41.31	13.93	37.57	-15.56	24.5	29.58	34	7.42	Vertical



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8 Test Setup Photo

Refer to Appendix - Test Setup Photo for SZCR2401000120AT

9 EUT Constructional Details (EUT Photos)

Refer to Appendix - Photographs of EUT Constructional Details for SZCR2401000120AT

- End of the Report -



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