

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

SZEMC-TRF-01 Rev. A/1

Report No.: SZCR240400116906

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TEST REPORT

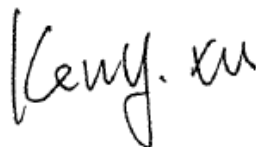
Application No.: SZCR2404001169AT
Applicant: Vanstone Electronic (Beijing) Co., Ltd.
Address of Applicant: 3F No.2 Building, Aisino Corporation Park 18A, Xingshikou Road, Haidian District, Beijing, China 100195
Manufacturer: Vanstone Electronic (Beijing) Co., Ltd.
Address of Manufacturer: 3F No.2 Building, Aisino Corporation Park 18A, Xingshikou Road, Haidian District, Beijing, China 100195

Equipment Under Test (EUT):

EUT Name: Unattended Payment Terminal
Model No.: A80
FCC ID: OWL-A80-U
Standard(s) : 47 CFR Part 15, Subpart C 15.225
Date of Receipt: 2024-04-03
Date of Test: 2024-04-26 to 2024-05-30
Date of Issue: 2024-06-21

Test Result:	Pass*
---------------------	--------------

* In the configuration tested, the EUT complied with the standards specified above.



Keny Xu
EMC Laboratory Manager



Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2024-06-21		Original

Authorized for issue by:			
		Calvin Weng	
		Calvin Weng/Project Engineer	
		Eric Fu	
		Eric Fu/Reviewer	



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2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.225	N/A	47 CFR Part 15, Subpart C 15.203	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
20dB Bandwidth		ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.215	Pass
Emission Mask		ANSI C63.10 (2013) Section 6.4	47 CFR Part 15, Subpart C 15.225(a)&(b)&(C)	Pass
Frequency tolerance		ANSI C63.10 (2013) Section 6.8	47 CFR Part 15, Subpart C 15.225(e)	Pass
Radiated Emissions (9kHz-30MHz)		ANSI C63.10 (2013) Section 6.4	47 CFR Part 15, Subpart C 15.225(d) & 15.209	Pass
Radiated Emissions (30MHz-1GHz)		ANSI C63.10 (2013) Section 6.5	47 CFR Part 15, Subpart C 15.225(d) & 15.209	Pass



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4 General Information

4.1 Details of E.U.T.

Power supply:	DC12-48V, 3A
Operation Frequency:	13.56MHz
Modulation Type:	ASK
Antenna Type:	Loop Antenna

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.
--	--	--	--

The EUT has been tested as an independent unit.

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
20dB Bandwidth	± 3%
Emission Mask	± 4.5dB (Below 1GHz)
Frequency tolerance	± 3%
Radiated Emissions (9kHz-30MHz)	± 3.6dB
Radiated Emissions (30MHz-1GHz)	± 6.0dB for 3m; ± 5.0dB for 10m



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4.4 Test Location

All tests were performed at:

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

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



5 Equipment List

20dB Bandwidth					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
DC Power Supply	Zhao Xin	PS-305D	SEM011-13	2023-09-20	2024-09-19
Spectrum Analyzer	Rohde & Schwarz	FSP30	SEM004-06	2023-09-19	2024-09-18
Measurement Software	TST PASS	TST PASS V2.0	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-01	2023-07-07	2024-07-06
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2024-03-27	2025-03-26

Emission Mask					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2024-03-26	2025-03-25
MXE EMI receiver	KEYSIGHT	N9038A	SEM004-16	2023-10-19	2024-10-18
Trilog-Broadband Antenna	Schwarzbeck	VULB9168	SEM003-18	2023-09-23	2025-09-22
Pre-amplifier	Sonoma Instrument Co	310N	SEM005-04	2024-03-27	2025-03-26
Loop Antenna	ETS-Lindgren	6502	SEM003-08	2023-11-20	2025-11-19
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM029-01	2023-07-07	2024-07-06

Frequency tolerance					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
DC Power Supply	Zhao Xin	PS-305D	SEM011-13	2023-09-20	2024-09-19
Spectrum Analyzer	Rohde & Schwarz	FSP30	SEM004-06	2023-09-19	2024-09-18
Measurement Software	TST PASS	TST PASS V2.0	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-01	2023-07-07	2024-07-06
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2024-03-27	2025-03-26
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2024-03-19	2025-03-18



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Radiated Emissions (9kHz-30MHz)					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2024-03-26	2025-03-25
MXE EMI receiver	KEYSIGHT	N9038A	SEM004-16	2023-10-19	2024-10-18
Trilog-Broadband Antenna	Schwarzbeck	VULB9168	SEM003-18	2023-09-23	2025-09-22
Pre-amplifier	Sonoma Instrument Co	310N	SEM005-04	2024-03-27	2025-03-26
Loop Antenna	ETS-Lindgren	6502	SEM003-08	2023-11-20	2025-11-19
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM029-01	2023-07-07	2024-07-06

Radiated Emissions (30MHz-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	2024-03-14	2025-03-13
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
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2023-06-19	2026-06-18

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	2024-03-18	2025-03-17



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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

6.1.2 Conclusion

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, 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.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement.

Antenna location: Refer to Internal photos



7 Radio Spectrum Matter Test Results

7.1 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.215
 Test Method: ANSI C63.10 (2013) Section 6.9

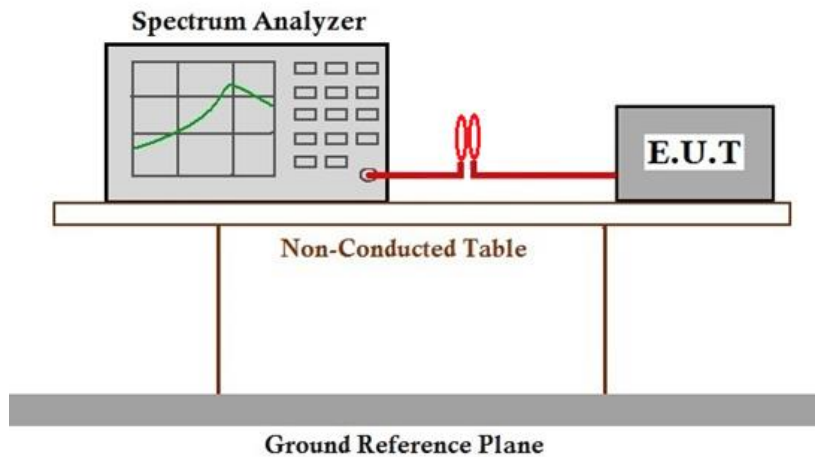
7.1.1 E.U.T. Operation

Operating Environment:
 Temperature: 23.7 °C Humidity: 40.6 % RH Atmospheric Pressure: 1020 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	10	TX mode with modulation

7.1.3 Test Setup Diagram



7.1.4 Measurement Procedure and Data

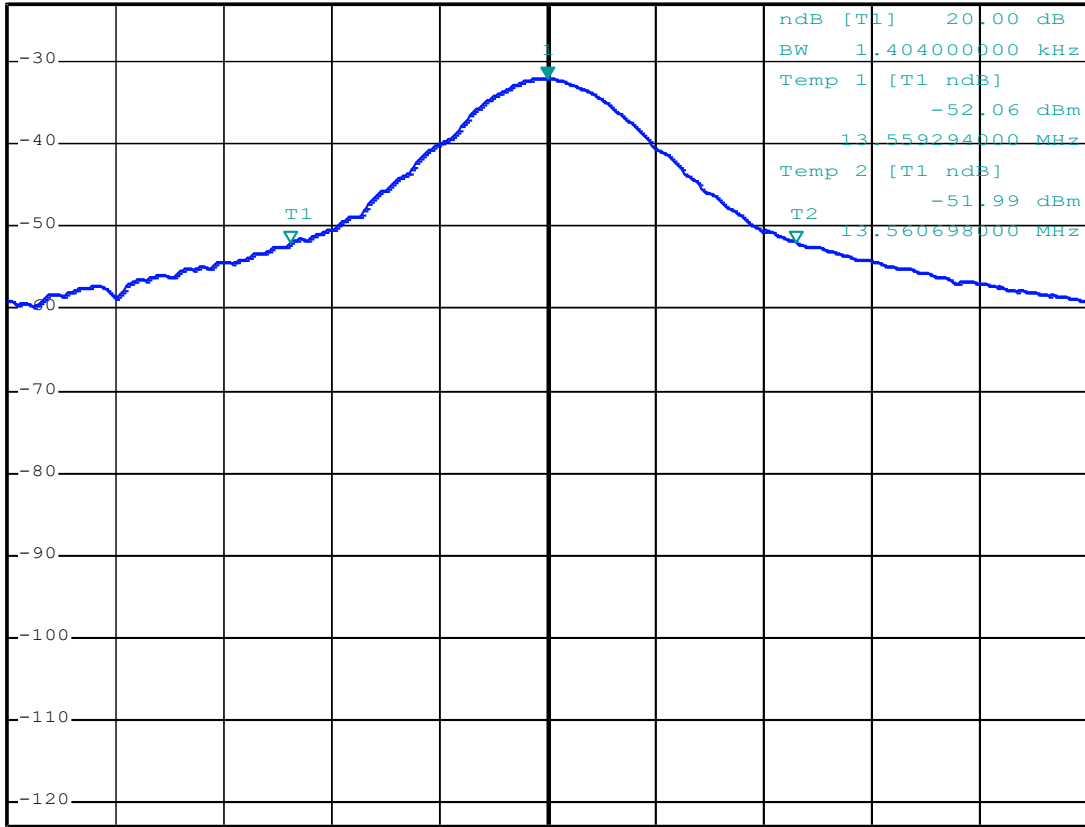
The useful radiated emission from the EUT was detected by the spectrum analyser with peak detector.





*RBW 300 Hz Marker 1 [T1] -32.08 dBm
 *VBW 1 kHz
 Ref -23 dBm Att 10 dB SWT 35 ms 13.560008000 MHz

1 PK
VIEW



Center 13.560008 MHz 300 Hz/ Span 3 kHz



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7.2 Emission Mask

Test Requirement 47 CFR Part 15, Subpart C 15.225(a)&(b)&(C)
 Test Method: ANSI C63.10 (2013) Section 6.4
 Measurement Distance: 3m

Limit:

- (a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
- (b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- (c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
- (d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

Below 30MHz

The limit at 30m test distance is below:

$$FS_{\text{limit}} = FS_{\text{max}} - 40 \log \left(\frac{d_{\text{limit}}}{d_{\text{measure}}} \right)$$

where

FS_{limit} is the calculation of field strength at the limit distance, expressed in dB μ V/m
 FS_{max} is the measured field strength, expressed in dB μ V/m
 d_{measure} is the distance of the measurement point from the EUT
 d_{limit} is the reference distance or the distance of the $\lambda/2\pi$ point

The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 84dB μ V/m at 30 meters.

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 23.6 °C Humidity: 51.5 % RH Atmospheric Pressure: 1020 mbar

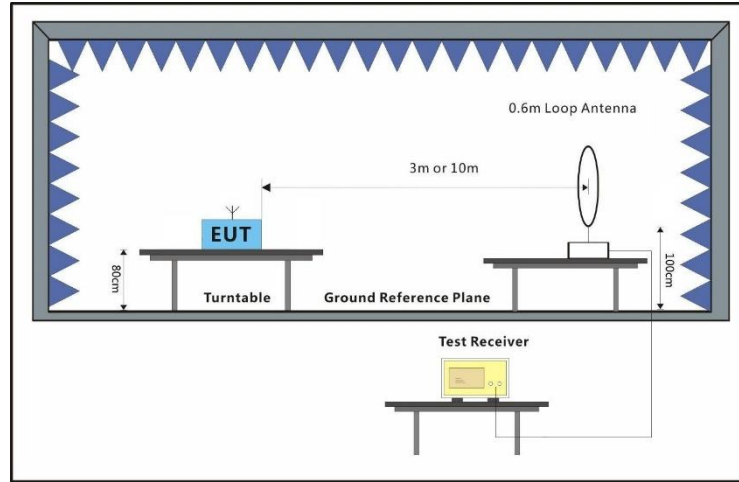
7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	10	TX mode with modulation



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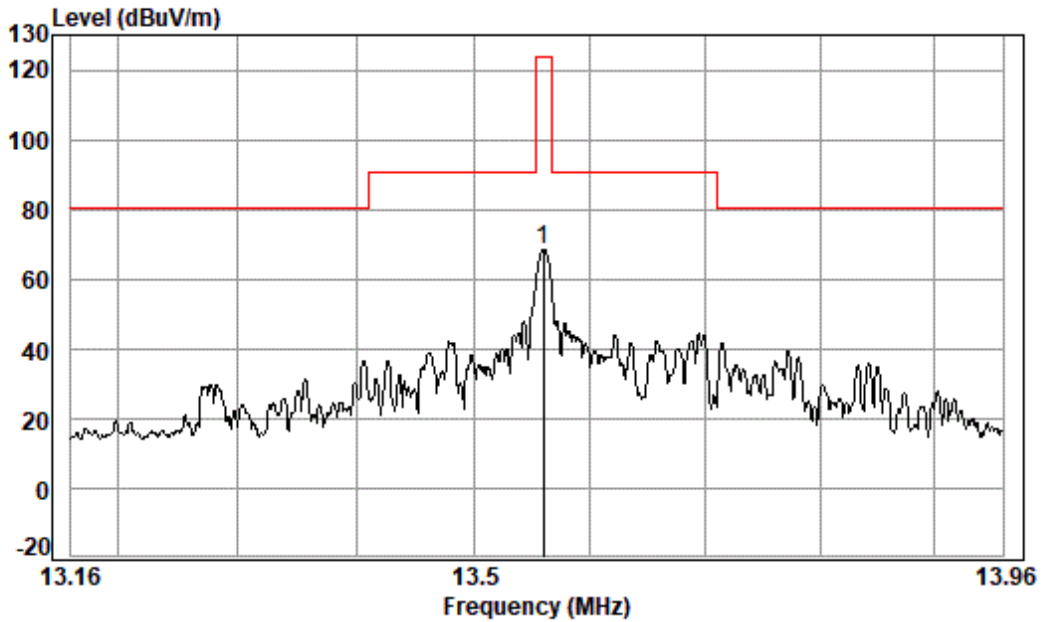
7.2.3 Test Setup Diagram



7.2.4 Measurement Procedure and Data

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane. Only the worst position of vertical was shown in the report.





Condition: 3m

Job No. : 01169AT

Test Mode: 10

	Read	Ant	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1 pp 13.560	91.14	8.66	1.13	32.50	68.43	124.00	-55.57 QP



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 中国·广东·深圳市南山区科技园中区M-10栋1号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

7.3 Frequency tolerance

Test Requirement 47 CFR Part 15, Subpart C 15.225(e)

Test Method: ANSI C63.10 (2013) Section 6.8

Limit:

±0.01%

7.3.1 E.U.T. Operation

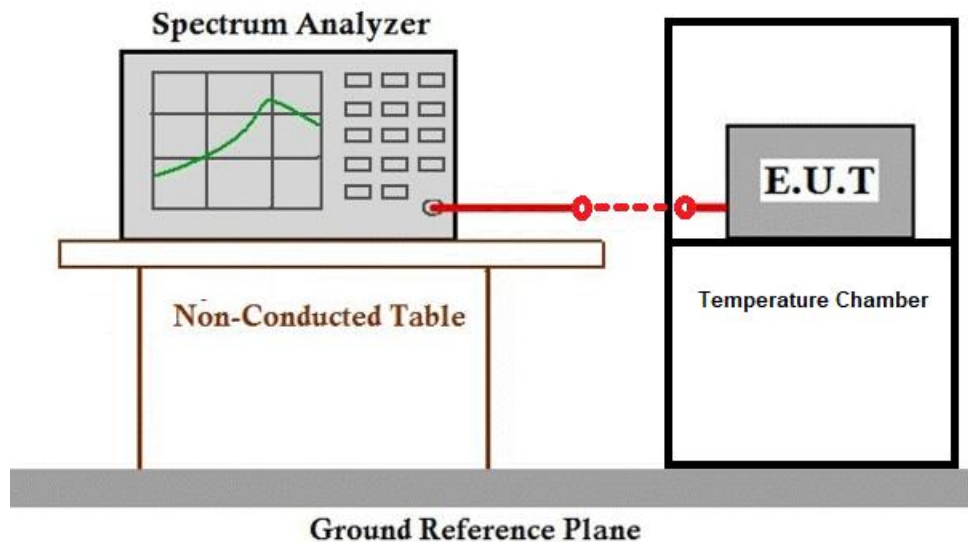
Operating Environment:

Temperature: 23.7 °C Humidity: 40.6 % RH Atmospheric Pressure: 1020 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	10	TX mode with modulation

7.3.3 Test Setup Diagram



7.3.4 Measurement Procedure and Data

The EUT was placed in an environmental test chamber and powered such that control element received normal voltage and the transmitter provided maximum RF output.



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Declared Frequency (MHz)	13.56MHz	@10 minutes
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Temperature (°C)	Voltage(Vdc)	Measurement Frequency(MHz)	Frequency Tolerance (%)	Limit (%)	Result	
50	24	13.560207	0.001527	±0.01	Pass	
40		13.560209	0.001541		Pass	
30		13.560206	0.001519		Pass	
20		13.560203	0.001497		Pass	
10		13.560201	0.001482		Pass	
0		13.560200	0.001475		Pass	
-10		13.560207	0.001527		Pass	
-20		13.560201	0.001482		Pass	
20		12	13.560207		0.001527	Pass
		48	13.560208		0.001534	Pass



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7.4 Radiated Emissions (9kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.225(d) & 15.209

Test Method: ANSI C63.10 (2013) Section 6.4

Measurement Distance: 3m

Limit:

Frequency(MHz)	Field strength (microvolts/meter)	Limit (dBuV/m)	Detector	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	-	-	300
0.490-1.705	24000/F(kHz)	-	-	30
1.705-30	30	-	-	30

Below 30MHz

If field strength is measured at only a single point, then that point shall be at the radial from the EUT that produces the maximum emission at the frequency being measured, as described in 5.4. If that point is closer to the EUT than $\lambda/2\pi$ and the limit distance is greater than $\lambda/2\pi$, the measurement shall be extrapolated to the limit distance by conservatively presuming that the field strength decreases at a 40 dB/decade of distance rate to the $\lambda/2\pi$ distance, and at a 20 dB/decade of distance rate beyond $\lambda/2\pi$. This shall be accomplished using Equation (2):

$$FS_{(10m)} = FS_{(30/300m)} + 40\log\{d_{(near\ field)}/d_{(10m)}\} + 20\log\{d_{(30/300m)}/d_{(near\ field)}\} \quad (2)$$

If the single point measured is at a distance greater than $\lambda/2\pi$, then extrapolation to the limit distance shall be calculated using Equation (3):

$$FS_{(10m)} = FS_{(30/300m)} + 20\log\{d_{(30/300m)}/d_{(10m)}\} \quad (3)$$

If both the single point and the limit distance are equal to or closer to the EUT than $\lambda/2\pi$, then extrapolation to the limit distance shall be calculated using Equation (4):

$$FS_{(10m)} = FS_{(30/300m)} + 40\log\{d_{(30/300m)}/d_{(10m)}\} \quad (4)$$

Remark:

$$d_{near\ field} = 47.77 / f_{MHz}$$

where f_{MHz} is the frequency of the emission being measured in MHz.

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor



$$FS_{\text{limit}} = FS_{\text{max}} - 40 \log \left(\frac{d_{\text{limit}}}{d_{\text{measure}}} \right)$$

where

FS_{limit} is the calculation of field strength at the limit distance, expressed in dB μ V/m
 FS_{max} is the measured field strength, expressed in dB μ V/m
 d_{measure} is the distance of the measurement point from the EUT
 d_{limit} is the reference distance or the distance of the $\lambda/2\pi$ point

r

7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 23.6 °C

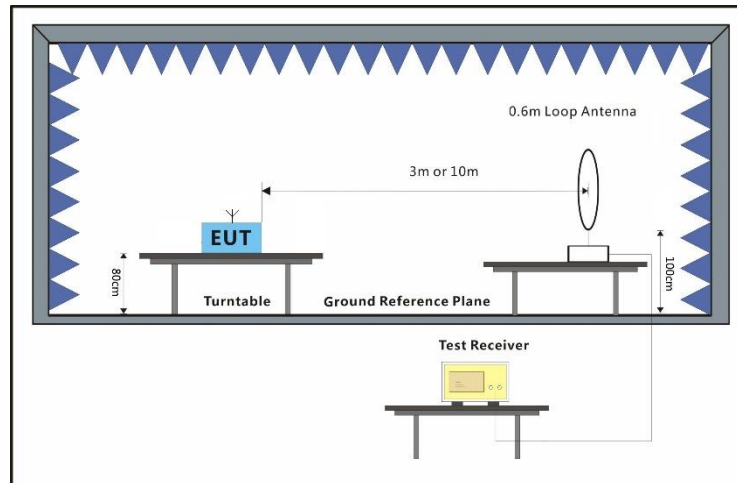
Humidity: 51.5 % RH

Atmospheric Pressure: 1020 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	10	TX mode with modulation

7.4.3 Test Setup Diagram



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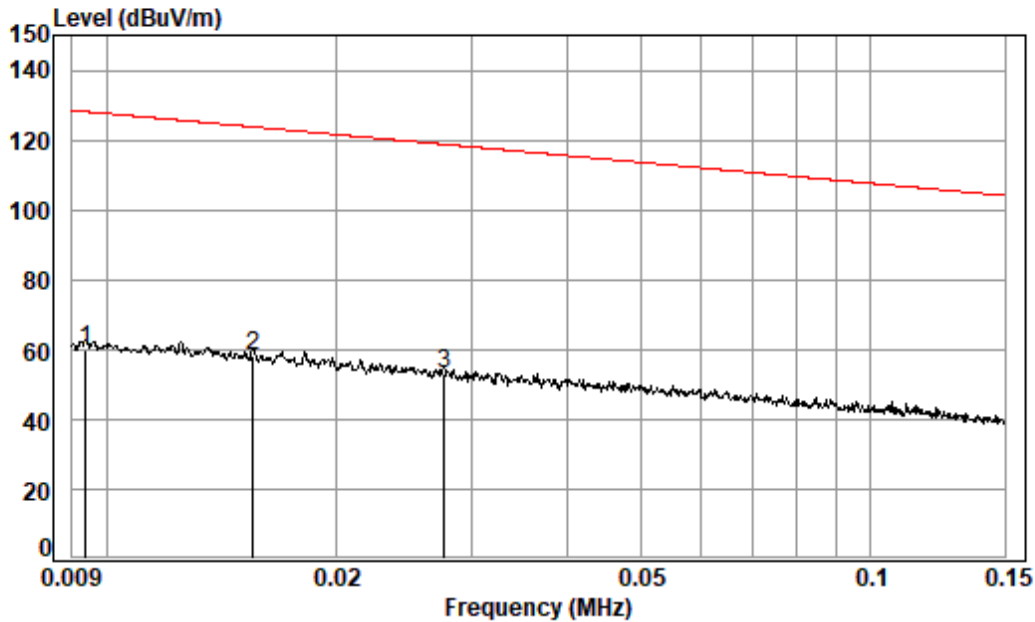
7.4.4 Measurement Procedure and Data

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane. Only the worst position of vertical was shown in the report.



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Condition: 3m

Job No. : 01169AT

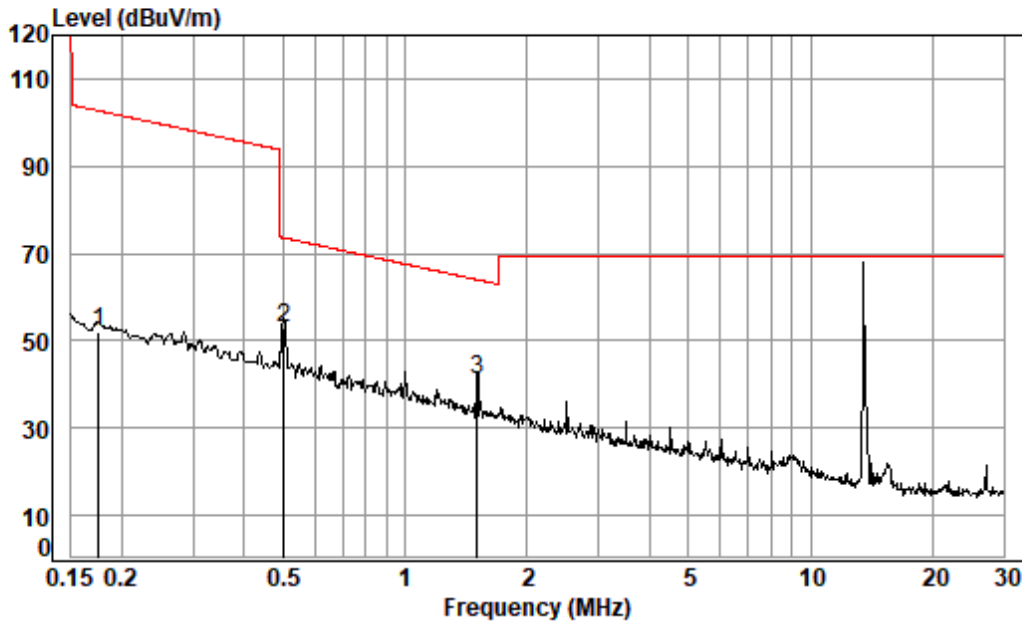
Test Mode: 10

	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	Level	Limit	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	0.009	72.44	18.72	0.31	31.35	60.12	128.13	-68.01	Average
2	pp 0.016	74.24	15.72	0.31	31.89	58.38	123.76	-65.38	Average
3	0.028	72.70	12.44	0.31	32.41	53.04	118.76	-65.72	Average



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Condition: 3m

Job No. : 01169AT

Test Mode: 10

		Read	Ant	Cable	Preamp	Limit	Over		
	Freq	Level	Factor	Loss	Factor	Level	Line	Limit Remark	
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	av	0.176	73.96	10.40	0.30	32.50	52.16	102.70	-50.54 Average
2	pp	0.502	74.90	10.32	0.35	32.50	53.07	73.59	-20.52 QP
3		1.503	62.69	10.30	0.46	32.50	40.95	64.00	-23.05 QP



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7.5 Radiated Emissions (30MHz-1GHz)

Test Requirement 47 CFR Part 15, Subpart C 15.225(d) & 15.209

Test Method: ANSI C63.10 (2013) Section 6.5

Measurement Distance: 3m

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 23.6 °C Humidity: 51.5 % RH Atmospheric Pressure: 1020 mbar

7.5.2 Test Mode Description

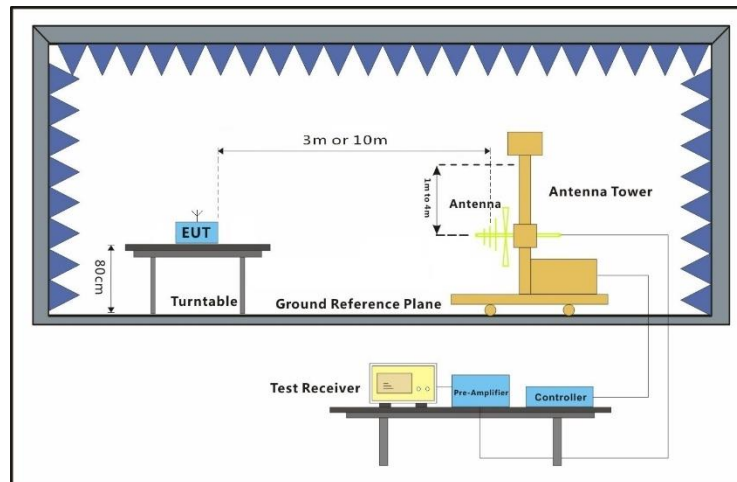
Pre-scan / Final test	Mode Code	Description
Final test	10	TX mode with modulation



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7.5.3 Test Setup Diagram



7.5.4 Measurement Procedure and Data

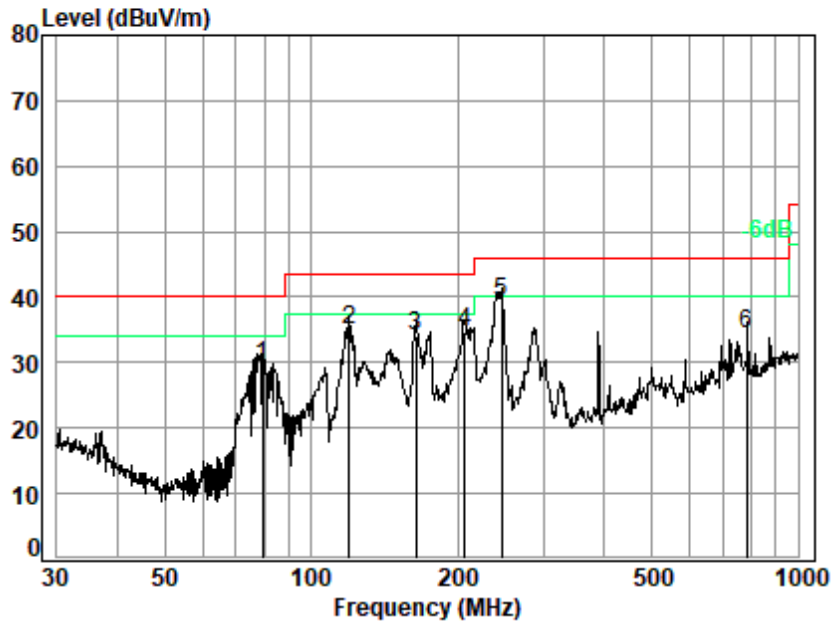
a. The EUT was placed on the top of a rotating table 0.8 meters above the ground for below 1GHz at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. 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. d. 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. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. g. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report. Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor



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Test Mode: 10; Polarity: Horizontal



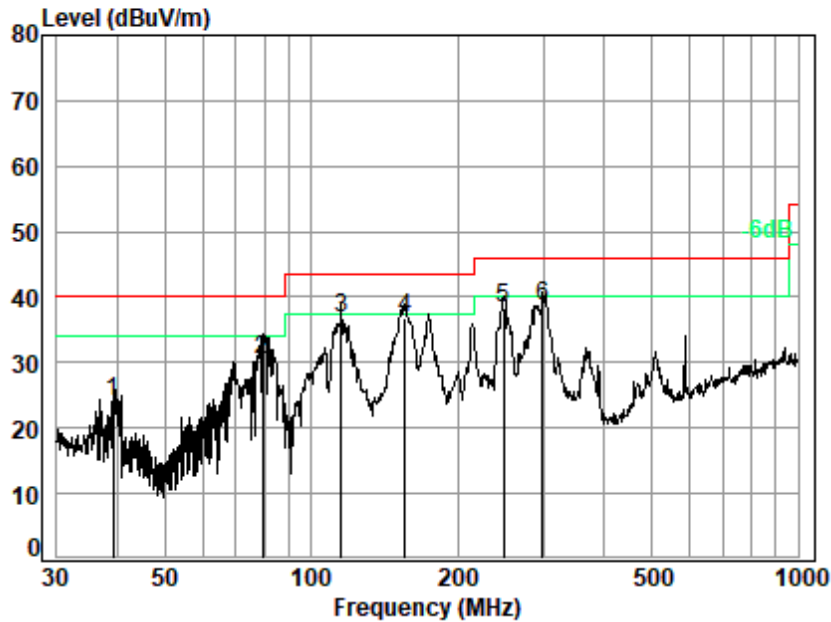
Site : chamber
 Condition: 3m HORIZONTAL
 Job No. : 01169AT
 Test Mode: 10

	Ant Freq	Cable Factor	Preamp Loss	Read Level	Limit Level	Over Limit	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	79.24	10.42	1.05	27.65	45.60	29.42	40.00 -10.58 QP
2	119.44	11.12	1.29	27.51	50.08	34.98	43.50 -8.52 QP
3	163.76	13.28	1.53	27.32	46.57	34.06	43.50 -9.44 QP
4	206.40	14.61	1.76	27.14	45.32	34.55	43.50 -8.95 QP
5 q	245.95	17.13	1.93	26.98	47.22	39.30	46.00 -6.70 QP
6	785.09	27.13	3.78	27.52	30.87	34.26	46.00 -11.74 QP



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Test Mode: 10; Polarity: Vertical



Site : chamber
 Condition: 3m VERTICAL
 Job No. : 01169AT
 Test Mode: 10

	Ant Freq	Cable Factor	Preamp Loss	Read Level	Limit Level	Over Limit	Remark		
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	39.16	16.77	0.74	27.77	34.22	23.96	40.00	-16.04	QP
2	79.24	10.42	1.05	27.65	46.68	30.50	40.00	-9.50	QP
3 q	115.32	11.39	1.27	27.53	51.77	36.90	43.50	-6.60	QP
4	155.91	13.58	1.49	27.36	49.16	36.87	43.50	-6.63	QP
5	248.55	17.20	1.94	26.97	46.13	38.30	46.00	-7.70	QP
6	298.27	17.82	2.16	26.76	45.44	38.66	46.00	-7.34	QP



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8 Test Setup Photo

Refer to Appendix - Test Setup Photo for SZCR2404001169AT

9 EUT Constructional Details (EUT Photos)

Refer to Appendix – External and Internal Photos for SZCR2404001169AT

- End of the Report -

