

TEST REPORT

Application No.: SZCR2308002638AT
Applicant: ZK Technology LLC DBA ZK Teco
Address of Applicant: 200 Centennial Ave, Suite 211 Piscataway New Jersey 08854 United States
Manufacturer: ZK Technology LLC DBA ZK Teco
Address of Manufacturer: 200 Centennial Ave, Suite 211 Piscataway New Jersey 08854 United States
Equipment Under Test (EUT):
EUT Name: Data Collection Terminal
Model No.: Please refer to section 2 ♣
 ♣ Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
Trade Mark: ZKTeco, 
Standard(s) : 47 CFR Part 15, Subpart C 15.225
Date of Receipt: 2023-08-16
Date of Test: 2023-08-26 to 2023-09-22
Date of Issue: 2023-10-09

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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SZEMC-TRF-01 Rev. A/0 Aug01,2022

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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2023-10-09		Original

Authorized for issue by:				
		Darren Yuan		
		Darren Yuan/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
Conducted Emissions at Mains Terminals (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.225	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
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
Radiated Emissions (9kHz-30MHz)		ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15, Subpart C 15.225(d) & 15.209	Pass
Radiated Emissions (30MHz-1GHz)		ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15, Subpart C 15.225(d) & 15.209	Pass
Frequency tolerance		ANSI C63.10 (2013) Section 6.8	47 CFR Part 15, Subpart C 15.225(e)	Pass

Declaration of EUT Family Grouping:

Model No.: ULTIMA 5, ULTIMA-5, ULTIMA-5-G2, UTLIMA-50-G2, ULTIMA-51-G2, ULTIMA-5-BAR, ULTIMA-5-MAG, ULTIMA-5-SILKID, ULTIMA-5-LUM, ULTIMA-5-PRO, ULTIMA-5-PLUS, ULTIMA-5-FAM33, CRONUS-5-G2, CRONUS-5-BAR, CRONUS-5-MAG, CRONUS-5-SILKID, CRONUS-5-LUM, CRONUS-5-PRO, CRONUS-5-PLUS, ULTIMA-5-5-TOUCHLESS, ULTIMA-5-FT(face with thermal), ULTIMA-5-T (thermal), ULTIMA-5-P (for printer), ULT-5-MAG, ULT-5-BAR, ULT-SILKID, ULT-5-FACE, ULT-5-FT, ULT-5-SLKID-MTPRO, ULT-5-Face-MTPRO, ULT-5-FT-MTPRO, ULT-5-PRO, WTPURULT200-G2, WTPURULT5-G2, WTPURULT50-G2, WTPURULT51-G2, TCPTC5-G2, TCPTC50-G2, TCPTC51-G2, ORION5-G2, ORION50-G2, ORION51-G2, OEMTC5-G2, OEMTC50-G2, OEMTC51-G2, ULTIMA-50, ULTIMA-51, ULTIMA 5 MTR30P

Only the model ULTIMA 5 was tested, since according to the declaration from the applicant, the electrical circuit design, PCB layout, components used and internal wiring and functions were identical for the above models, with only difference on model No..



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4 General Information

4.1 Details of E.U.T.

Power supply:	Powered by adapter Adapter information Model: ADS-26FSG-12 12018EPG Input: 100-240V AC, 50/60Hz, Max 0.7A Output: 12.0V DC, 1.5A 18.0W
Cable(s):	DC Cable: 150cm unshielded
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
Conducted Emissions at Mains Terminals (150kHz-30MHz)	$\pm 3.1\text{dB}$
20dB Bandwidth	$\pm 3\%$
Emission Mask	$\pm 4.5\text{dB}$ (Below 1GHz)
Radiated Emissions (9kHz-30MHz)	$\pm 3.6\text{dB}$
Radiated Emissions (30MHz-1GHz)	$\pm 6.0\text{dB}$ for 3m; $\pm 5.0\text{dB}$ for 10m
Frequency tolerance	$\pm 3\%$

Remark:

The U_{lab} (lab Uncertainty) is less than $U_{\text{CISPR/ETSI}}$ (CISPR/ETSI Uncertainty), so the test results
 – compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
 – non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

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4.4 Test Location

All tests were performed at:

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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

Conducted Emissions at Mains Terminals (150kHz-30MHz)					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2022-05-14	2025-05-13
EMI Test Receiver	Rohde&Schwarz	ESCI	SEM004-02	2023-03-20	2024-03-19
Measurement Software	AUDIX	e3 V8.2014-6-27a	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM024-01	2023-07-07	2024-07-06
LISN	Rohde&Schwarz	ENV216	SEM007-01	2022-09-20	2023-09-19
LISN	ETS-LINDGREN	3816/2	SEM007-02	2023-03-20	2024-03-19

20dB Bandwidth					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
DC Power Supply	Zhao Xin	PS-305D	SEM011-13	2022-09-21	2023-09-20
Spectrum Analyzer	Rohde & Schwarz	FSP30	SEM004-06	2022-09-20	2023-09-19
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	2023-03-31	2024-03-30

Emission Mask					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2021-03-27	2024-03-26
MXE EMI receiver	KEYSIGHT	N9038A	SEM004-16	2022-10-20	2023-10-19
Trilog-Broadband Antenna	Schwarzbeck	VULB9168	SEM003-18	2021-10-28	2023-10-27
Pre-amplifier	Sonoma Instrument Co	310N	SEM005-04	2023-03-31	2024-03-30
Loop Antenna	ETS-Lindgren	6502	SEM003-08	2021-11-30	2023-11-29
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



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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	2021-03-27	2024-03-26
MXE EMI receiver	KEYSIGHT	N9038A	SEM004-16	2022-10-20	2023-10-19
Trilog-Broadband Antenna	Schwarzbeck	VULB9168	SEM003-18	2021-10-28	2023-10-27
Pre-amplifier	Sonoma Instrument Co	310N	SEM005-04	2023-03-31	2024-03-30
Loop Antenna	ETS-Lindgren	6502	SEM003-08	2021-11-30	2023-11-29
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	2022-10-20	2023-10-19
BiConiLog Antenna	ETS-LINDGREN	3142C	SEM003-01	2022-09-20	2023-09-19
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

Frequency tolerance					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
DC Power Supply	Zhao Xin	PS-305D	SEM011-13	2022-09-21	2023-09-20
Spectrum Analyzer	Rohde & Schwarz	FSP30	SEM004-06	2022-09-20	2023-09-19
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	2023-03-31	2024-03-30
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2023-03-21	2024-03-20



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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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Member of the SGS Group (SGS SA)

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

Standard 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 Conducted Emissions at Mains Terminals (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207

Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

7.1.1 E.U.T. Operation

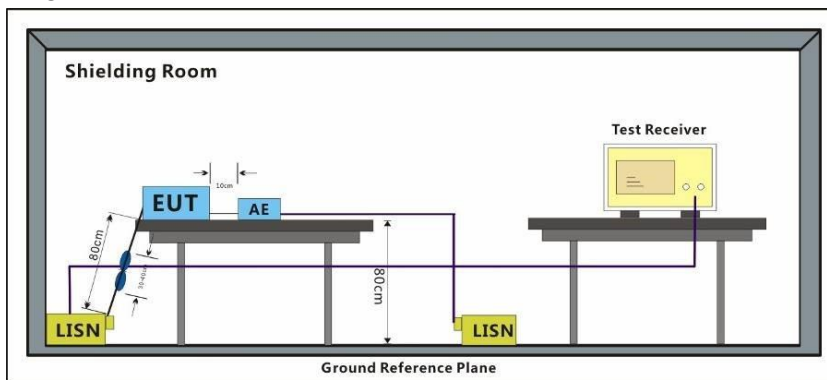
Operating Environment:

Temperature: 23. °C Humidity: 47.3 % RH Atmospheric Pressure: 1000 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	08	TX mode(13.56MHz)_Keep the EUT in continuously transmitting mode.

7.1.3 Test Setup Diagram



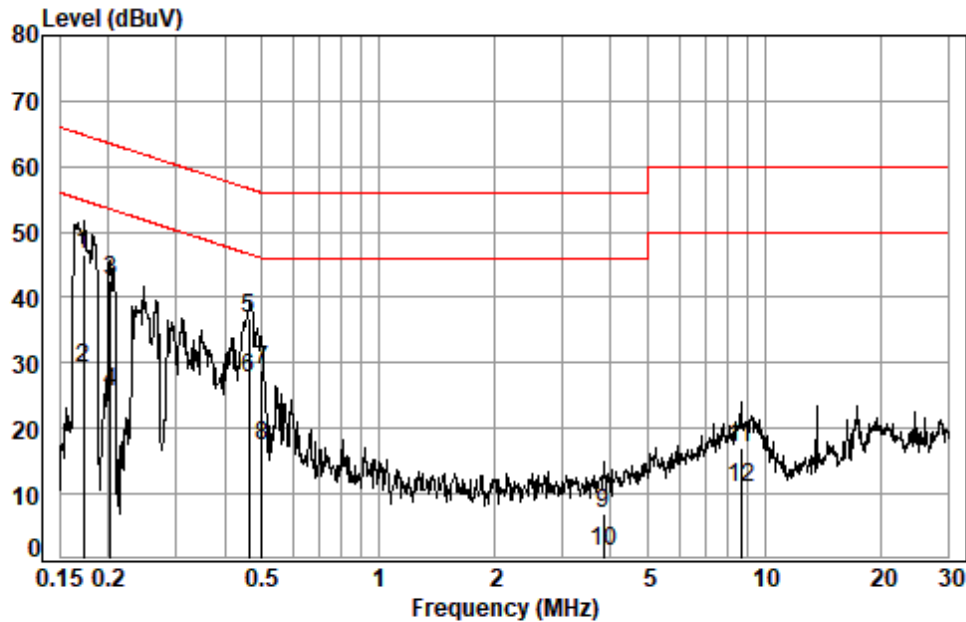
7.1.4 Measurement Procedure and Data

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50μH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Remark: Level=Read Level+ Cable Loss+ LISN Factor



Test Mode: 08; Line: Live line

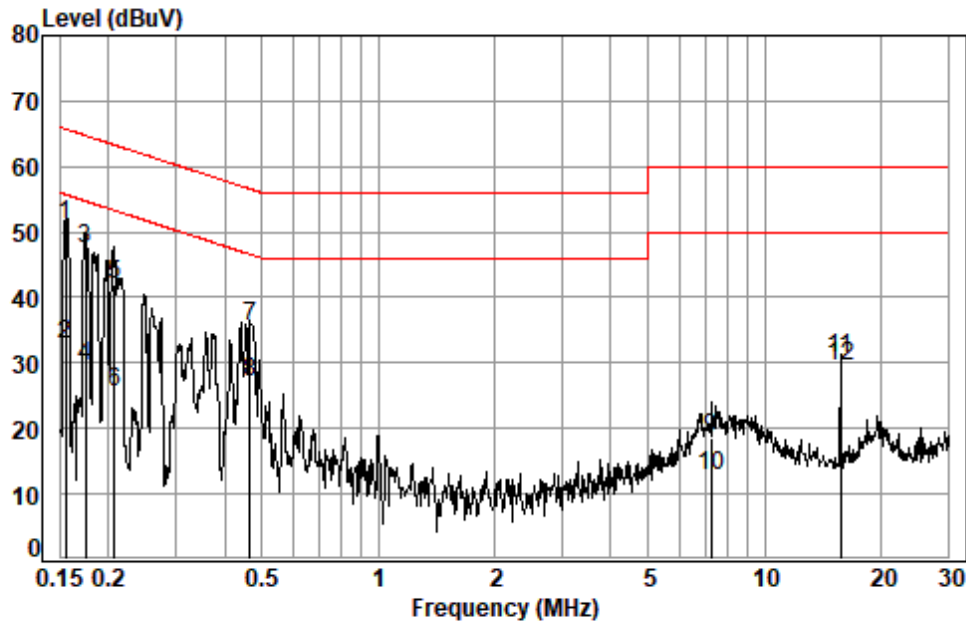


Site : Shielding Room
Condition: Line
Job No. : 02638AT
Test mode: 08

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1 *	0.1722	0.02	9.62	37.03	46.67	64.86	-18.19	QP
2	0.1722	0.02	9.62	19.62	29.26	54.86	-25.60	Average
3	0.2029	0.02	9.62	32.95	42.59	63.49	-20.90	QP
4	0.2029	0.02	9.62	16.03	25.67	53.49	-27.82	Average
5	0.4612	0.04	9.62	27.19	36.85	56.67	-19.82	QP
6 *	0.4612	0.04	9.62	17.95	27.61	46.67	-19.06	Average
7	0.4994	0.04	9.62	19.30	28.96	56.01	-27.05	QP
8	0.4994	0.04	9.62	7.54	17.20	46.01	-28.81	Average
9	3.8196	0.08	9.66	-2.63	7.11	56.00	-48.89	QP
10	3.8196	0.08	9.66	-8.38	1.36	46.00	-44.64	Average
11	8.6832	0.15	9.73	7.19	17.07	60.00	-42.93	QP
12	8.6832	0.15	9.73	1.03	10.91	50.00	-39.09	Average



Test Mode: 08; Line: Neutral Line



Site : Shielding Room
Condition: Neutral
Job No. : 02638AT
Test mode: 08

		Cable	LISN	Read	Limit	Over	
	Freq	Loss	Factor	Level	Level	Line	Limit Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB
1 *	0.1548	0.02	9.62	41.54	51.18	65.74	-14.56 QP
2	0.1548	0.02	9.62	23.11	32.75	55.74	-22.99 Average
3	0.1749	0.02	9.62	37.94	47.58	64.72	-17.14 QP
4	0.1749	0.02	9.62	19.85	29.49	54.72	-25.23 Average
5	0.2072	0.02	9.62	32.49	42.13	63.32	-21.19 QP
6	0.2072	0.02	9.62	16.04	25.68	53.32	-27.64 Average
7	0.4661	0.04	9.62	25.86	35.52	56.58	-21.06 QP
8 *	0.4661	0.04	9.62	17.54	27.20	46.58	-19.38 Average
9	7.2903	0.13	9.73	8.61	18.47	60.00	-41.53 QP
10	7.2903	0.13	9.73	2.97	12.83	50.00	-37.17 Average
11	15.7179	0.24	9.96	20.43	30.63	60.00	-29.37 QP
12	15.7179	0.24	9.96	19.43	29.63	50.00	-20.37 Average



7.2 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.215

Test Method: ANSI C63.10 (2013) Section 6.9

7.2.1 E.U.T. Operation

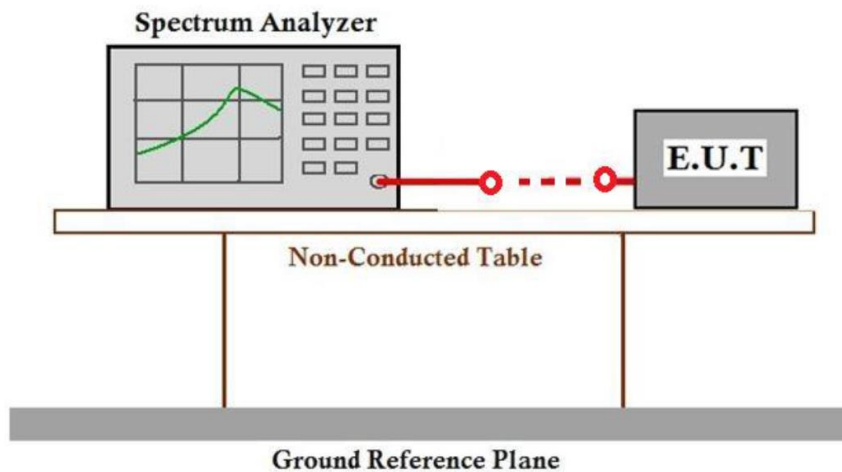
Operating Environment:

Temperature: 20.2 °C Humidity: 45.2 % RH Atmospheric Pressure: 1000 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	08	TX mode(13.56MHz)_Keep the EUT in continuously transmitting mode.

7.2.3 Test Setup Diagram



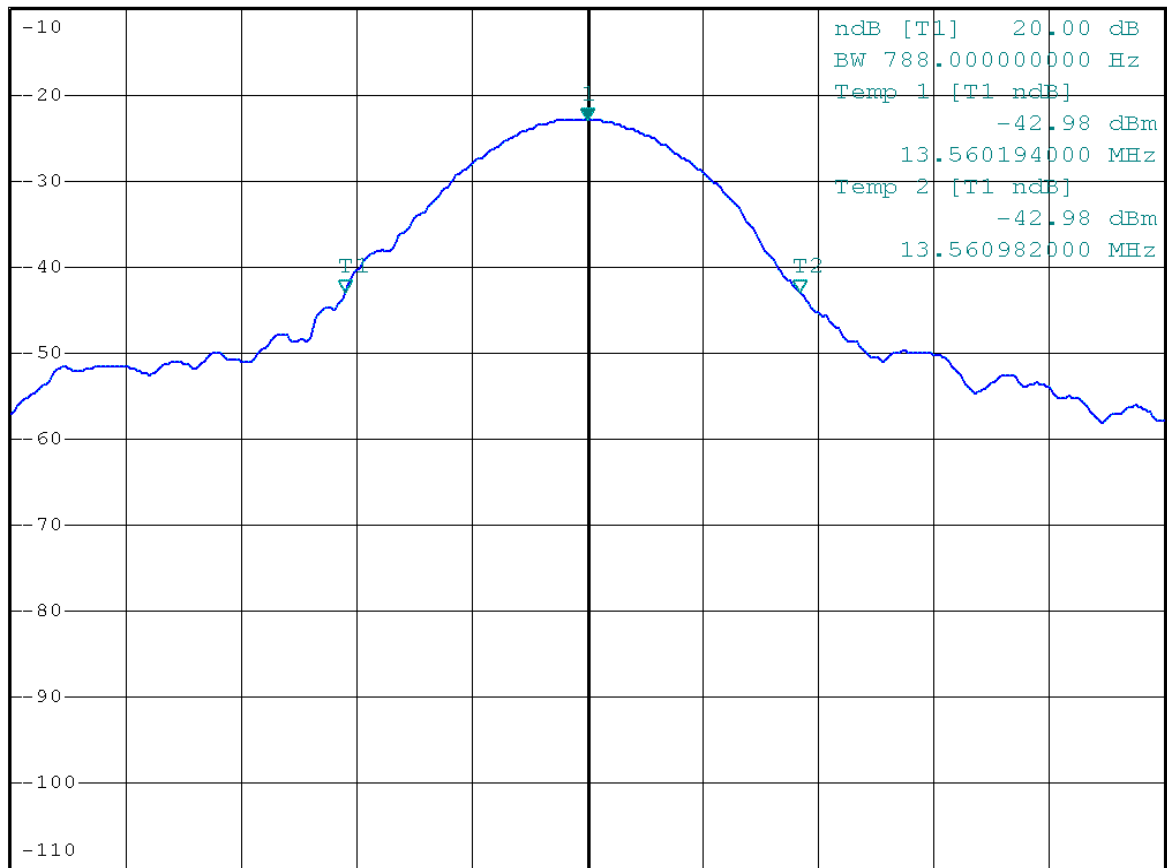
7.2.4 Measurement Procedure and Data

Test Frequency(MHz)	20dB bandwidth(kHz)	Limit(kHz)	Results
13.56	0.788	N/A	Pass



*RBW 300 Hz Marker 1 [T1]
 *VBW 1 kHz -22.93 dBm
 Ref -10 dBm Att 10 dB SWT 35 ms 13.560614000 MHz

1 PK
MAXH



Center 13.560614 MHz

200 Hz/

Span 2 kHz



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7.3 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 dBμV/m
 FS_{max} is the measured field strength, expressed in dBμV/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 84dBuV/m at 30 meters.

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 23.6 °C Humidity: 51.5 % RH Atmospheric Pressure: 1000 mbar

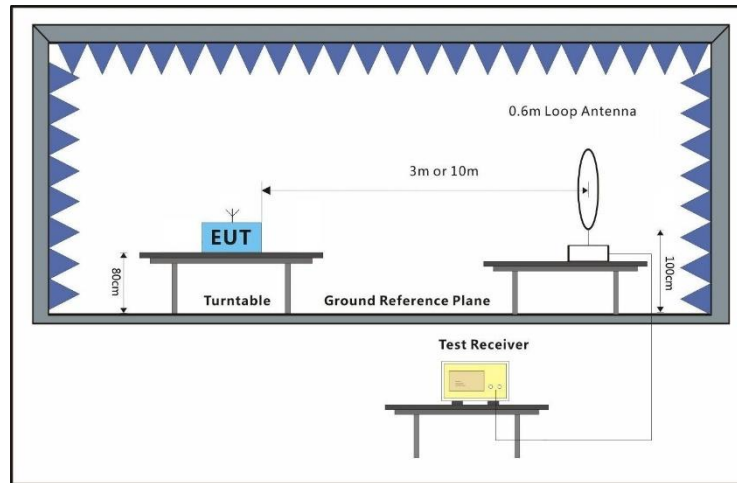
7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	08	TX mode(13.56MHz)_Keep the EUT in continuously transmitting mode.



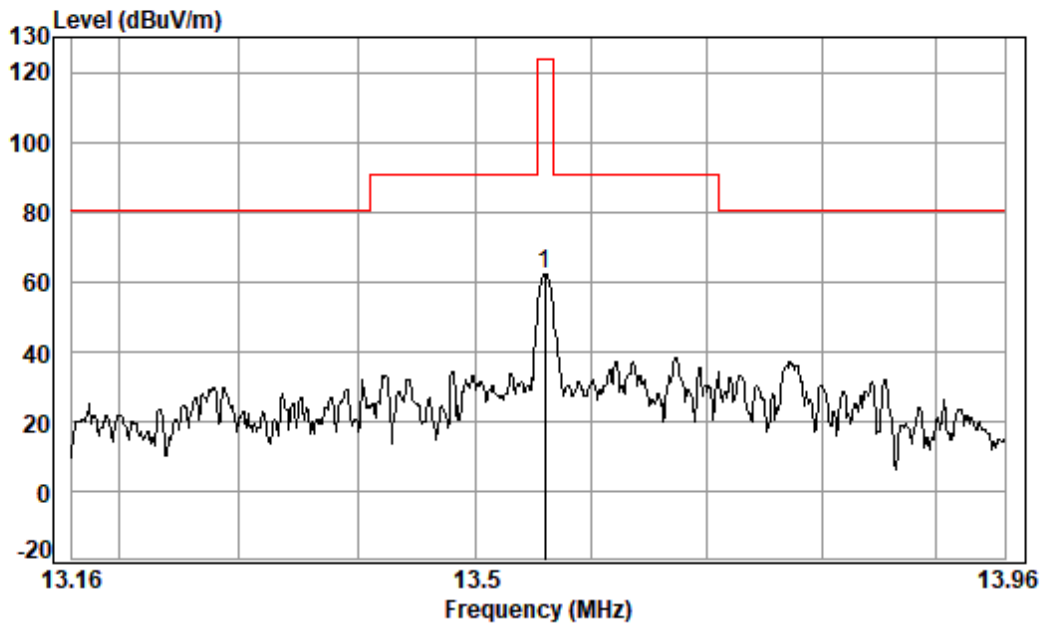
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7.3.3 Test Setup Diagram



7.3.4 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. : 02638AT

Test Mode: 08

		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	84.83	8.65	1.13	32.50	62.11	124.00	-61.89	QP



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&6.5

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 dBμV/m
 FS_{max} is the measured field strength, expressed in dBμV/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

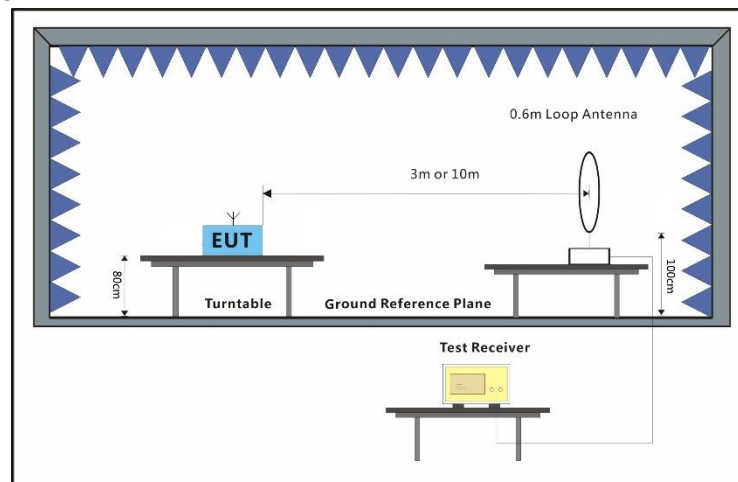
Operating Environment:

Temperature: 24.0 °C

Humidity: 62.0 % RH

Atmospheric Pressure: 1005 mbar

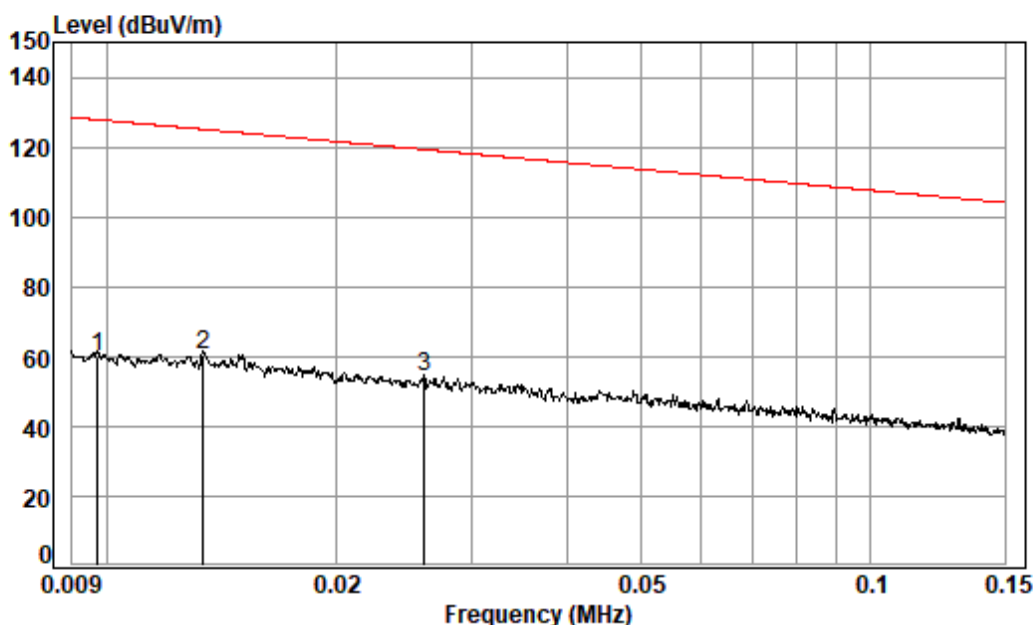
7.4.2 Test Setup Diagram



7.4.3 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.





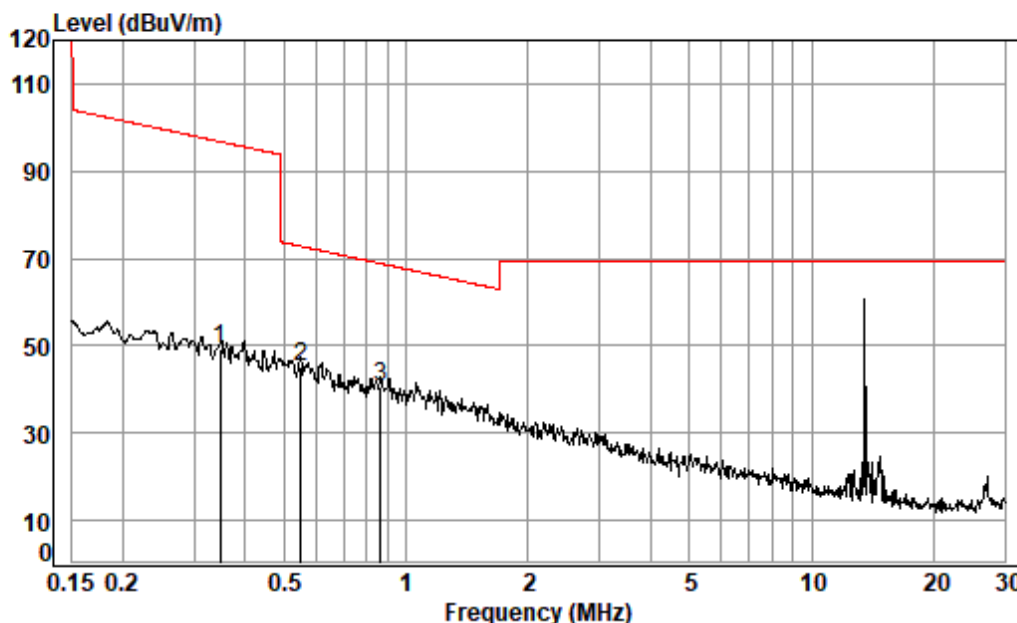
Condition: 3m

Job No. : 02638AT

Test Mode: 08

	Freq	Read Level	Ant Factor	Cable Loss	Preamplifier Factor	Level	Limit	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	0.010	72.49	18.46	0.08	31.35	59.68	127.82	-68.14	Average
2 pp	0.013	75.33	16.70	0.08	31.60	60.51	125.06	-64.55	Average
3	0.026	73.78	12.69	0.10	32.40	54.17	119.27	-65.10	Average





Condition: 3m

Job No. : 02638AT

Test Mode: 08

		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	0.348	49.06	0.00	0.00	0.00	49.06	96.76 -47.70 Average
2	pp	0.549	45.32	0.00	0.00	0.00	45.32	72.80 -27.48 QP
3		0.866	40.68	0.00	0.00	0.00	40.68	68.82 -28.14 QP



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SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR230800263804

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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 6.4&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: 24.0 °C

Humidity: 62.0 % RH

Atmospheric Pressure: 1005 mbar

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	08	TX mode(13.56MHz)_Keep the EUT in continuously transmitting mode.



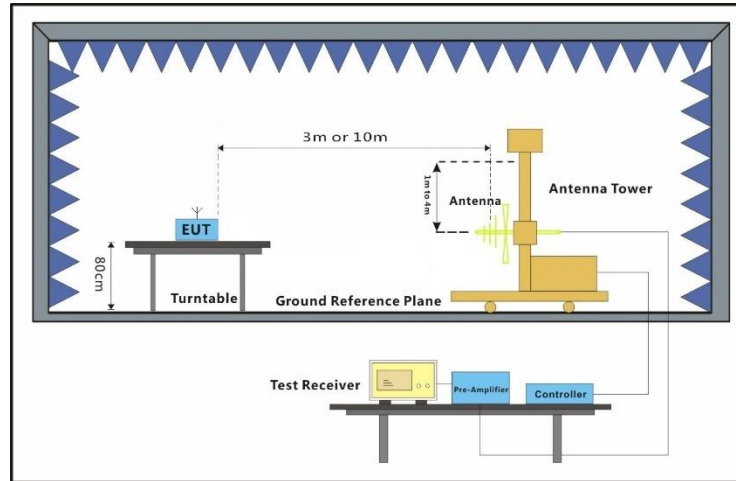
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7.5.3 Test Setup Diagram

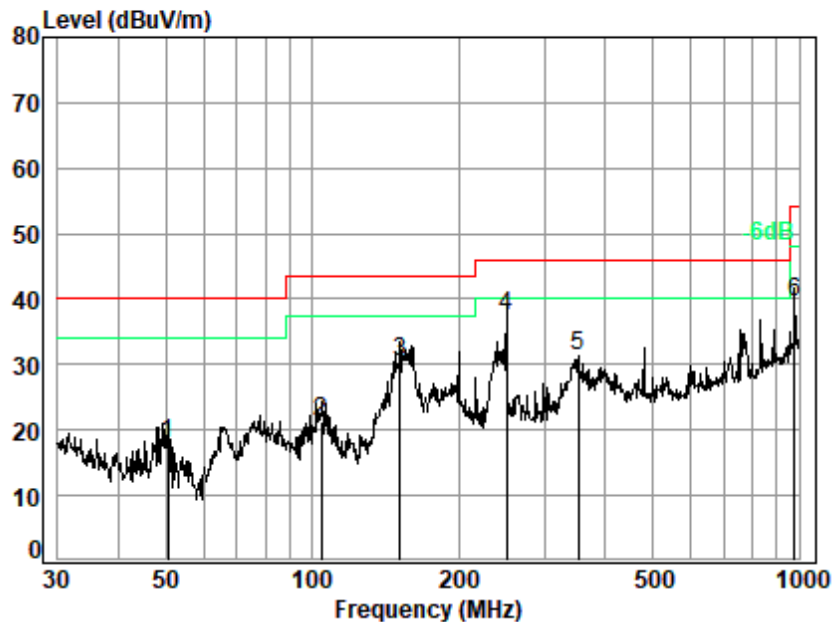


7.5.4 Measurement Procedure and Data

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



Test Mode: 08; Polarity: Horizontal



Site : chamber
Condition: 3m HORIZONTAL
Job No. : 02638AT
Test Mode: 08

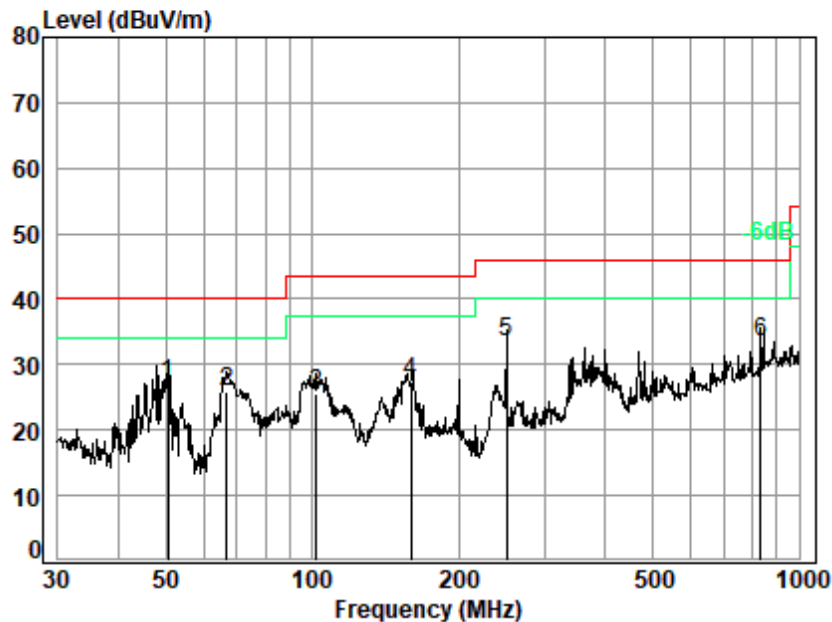
	Ant Freq	Cable Factor	Preamp Loss	Read Factor	Level dBuV	Limit dBuV/m	Over Line	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dB	
1	50.41	12.49	0.83	27.75	32.39	17.96	40.00	QP
2	104.54	12.94	1.21	27.59	34.82	21.38	43.50	QP
3	151.60	13.34	1.47	27.42	43.03	30.42	43.50	QP
4 q	250.30	17.86	1.95	27.07	44.60	37.34	46.00	QP
5	351.71	20.38	2.37	27.12	35.74	31.37	46.00	QP
6	979.18	28.42	4.30	26.75	33.72	39.69	54.00	QP



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Test Mode: 08; Polarity: Vertical



Site : chamber
Condition: 3m VERTICAL
Job No. : 02638AT
Test Mode: 08

	Ant Freq	Cable Factor	Preamp Loss	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	50.41	12.49	0.83	27.75	41.51	27.08	40.00	-12.92 QP
2	66.73	10.51	0.97	27.70	42.06	25.84	40.00	-14.16 QP
3	102.00	12.99	1.20	27.60	38.94	25.53	43.50	-17.97 QP
4	159.78	13.73	1.51	27.39	39.48	27.33	43.50	-16.17 QP
5	250.30	17.86	1.95	27.07	40.61	33.35	46.00	-12.65 QP
6 q	833.32	27.37	3.92	27.45	29.63	33.47	46.00	-12.53 QP



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7.6 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%

7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 20.2 °C

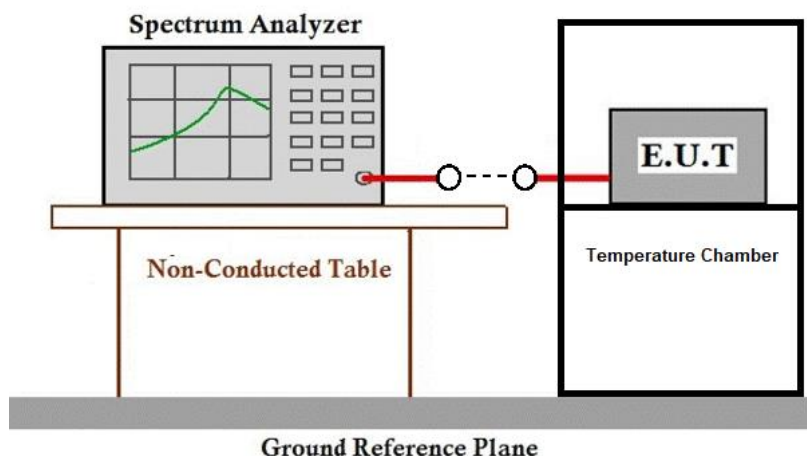
Humidity: 45.2 % RH

Atmospheric Pressure: 1000 mbar

7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	08	TX mode(13.56MHz)_Keep the EUT in continuously transmitting mode.

7.6.3 Test Setup Diagram



7.6.4 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.

Declared Frequency (MHz)		13.56MHz			
Temperature (°C)	Voltage (VAC)	Measurement Frequency(MHz)	Frequency Tolerance (%)	Limit (%)	Result
50	120	13.560771	0.0056858	±0.01	Pass
40		13.560665	0.0049041		Pass
30		13.560634	0.0046755		Pass
20		13.560614	0.0045280		Pass
10		13.560611	0.0045059		Pass
0		13.560612	0.0045133		Pass
-10		13.560599	0.0044174		Pass
-20		13.560587	0.0043289		Pass
20	138	13.560577	0.0042552		Pass
	102	13.560562	0.0041445		Pass



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8 Test Setup Photo

Refer to Setup Photo for SZCR2308002638AT

9 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for SZCR2308002638AT

- End of the Report -

