

TEST REPORT

Application No.: SZCR2305001701AT
Applicant: Annex Products Pty Ltd
Address of Applicant: Level 3 Suite 6A, 299 Toorak Road, South Yarra, VIC 3141 Australia
Manufacturer: Annex Products Pty Ltd
Address of Manufacturer: Level 3 Suite 6A, 299 Toorak Road, South Yarra, VIC 3141 Australia
Factory: Shenzhen Huagon Technology Co., Ltd
Address of Factory: 401-403, Building B, Weihuada Industrial Park, No. 5, Lirong Road, Xinshi community, Dalang street, Longhua District, Shenzhen

Equipment Under Test (EUT):

EUT Name: 12V-24V Waterproof Wireless Charger
Model No.: QL-5764
Trade Mark: QUAD LOCK
FCC ID: 2AOU9-HWCH
Standard(s) : 47 CFR Part 15, Subpart C
Date of Receipt: 2023-05-30
Date of Test: 2023-06-01 to 2023-06-08
Date of Issue: 2023-06-29

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

Kenx. Xu

Kenx Xu
EMC Laboratory Manager



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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		2023-06-29		Original

Authorized for issue by:				
		Leo Li		
		Leo Li/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	N/A	47 CFR Part 15, Subpart C 15.203	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
20dB Bandwidth	47 CFR Part 15, Subpart C	ANSI C63.10 (2013) Section 6.9.2	47 CFR Part 15, Subpart C 15.215	Pass
Restricted Bands		ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205	Pass
Radiated Emissions (9kHz-30MHz)		ANSI C63.10 (2013) Section 6.4	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Emissions (30MHz-1GHz)		ANSI C63.10 (2013) Section 6.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass



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9 EUT Constructional Details (EUT Photos).....23



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4 General Information

4.1 Details of E.U.T.

Power supply:	Input: DC 12-24V 2A Max Output: 5W/7.5W/10W/15W
Cable(s):	DC cable: 150cm unshielded
Operation frequency:	120.0kHz to 126.4kHz
Modulation type:	Load modulation
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.
DC power supply	ZHAOXIN	PS-3005D	REF. No.SEA27B01
E-loading	N/A	N/A	REF. No.SEA42A00

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
20dB Bandwidth	$\pm 0.3\%$
Restricted Bands	$\pm 0.3\%$
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

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. 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

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	2022-09-22	2023-09-21
Measurement Software	TST PASS	TST PASS V2.0	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-01	2022-07-08	2023-07-07
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2023-03-31	2024-03-30

Restricted Bands					
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	2022-09-22	2023-09-21
Measurement Software	TST PASS	TST PASS V2.0	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-01	2022-07-08	2023-07-07
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2023-03-31	2024-03-30

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	2022-07-08	2023-07-07



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Radiated Emissions (30MHz-1GHz)					
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	2022-07-08	2023-07-07

General used equipment					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2022-09-04	2023-09-03
Humidity/ Temperature Indicator	Anymetre	TH101B	SEM002-09	2022-09-04	2023-09-03
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 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 antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an 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.

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 6.9.2

Limit:

For report reference only

7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 26.6 °C

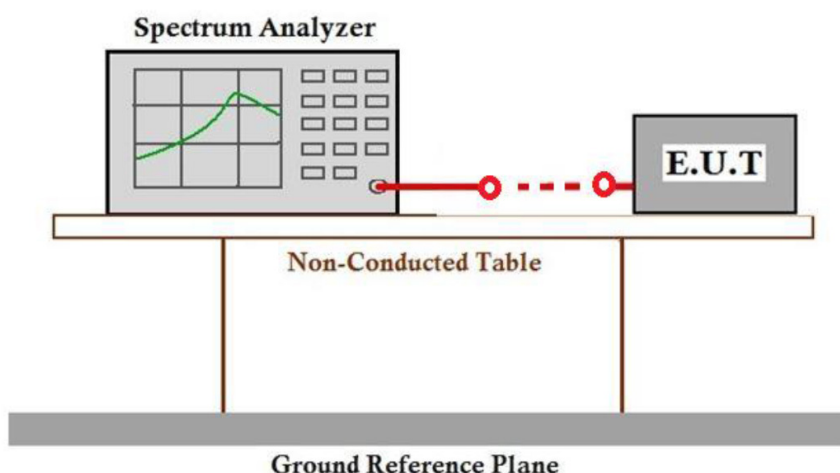
Humidity: 48.8 % RH

Atmospheric Pressure: 1005 mbar

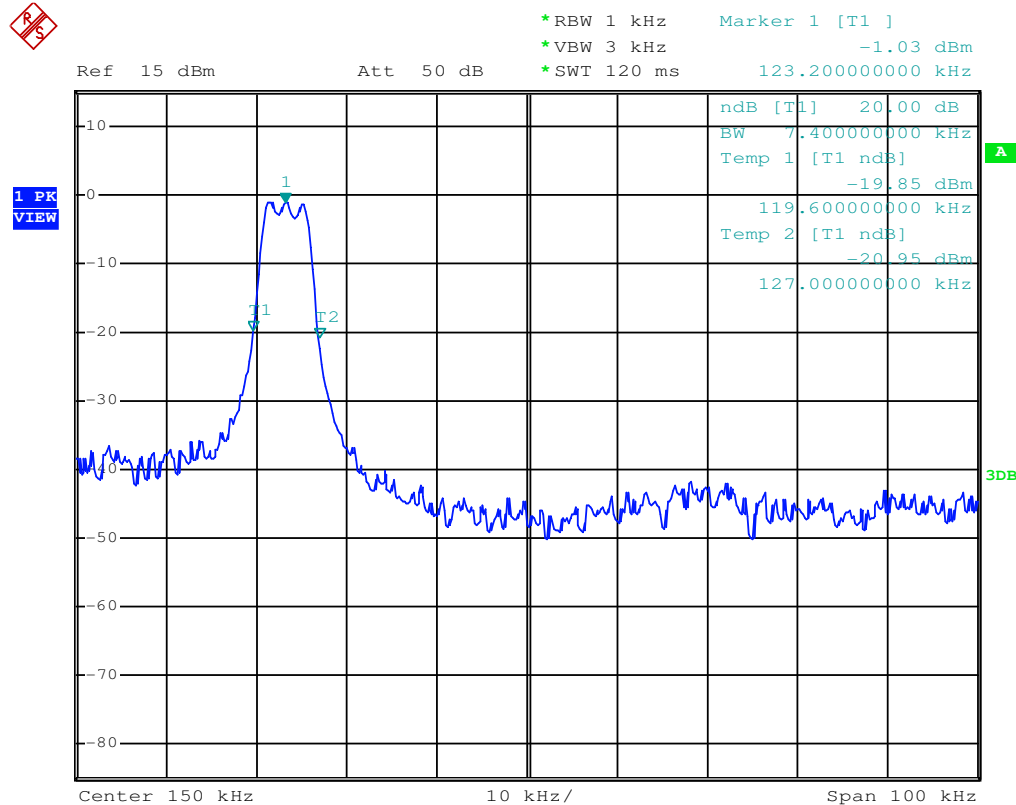
7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Pre-scan	00	Charge mode_Keep the EUT charging(5W)(DC 12V supply)
Pre-scan	01	Charge mode_Keep the EUT charging(7.5W) (DC 12V supply)
Pre-scan	02	Charge mode_Keep the EUT charging(10W) (DC 12V supply)
Final test	03	Charge mode_Keep the EUT charging(15W) (DC 12V supply)
Pre-scan	04	Charge mode_Keep the EUT charging(5W)(DC 24V supply)
Pre-scan	05	Charge mode_Keep the EUT charging(7.5W) (DC 24V supply)
Pre-scan	06	Charge mode_Keep the EUT charging(10W) (DC 24V supply)
Pre-scan	07	Charge mode_Keep the EUT charging(15W) (DC 24V supply)

7.1.3 Test Setup Diagram



7.1.4 Measurement Procedure and Data



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7.2 Restricted Bands

Test Requirement 47 CFR Part 15, Subpart C 15.205
Test Method: ANSI C63.10 (2013) Section 6.10.5

Limit:

The fundamental wave could not fall in the restricted band 90KHz-110KHz

7.2.1 E.U.T. Operation

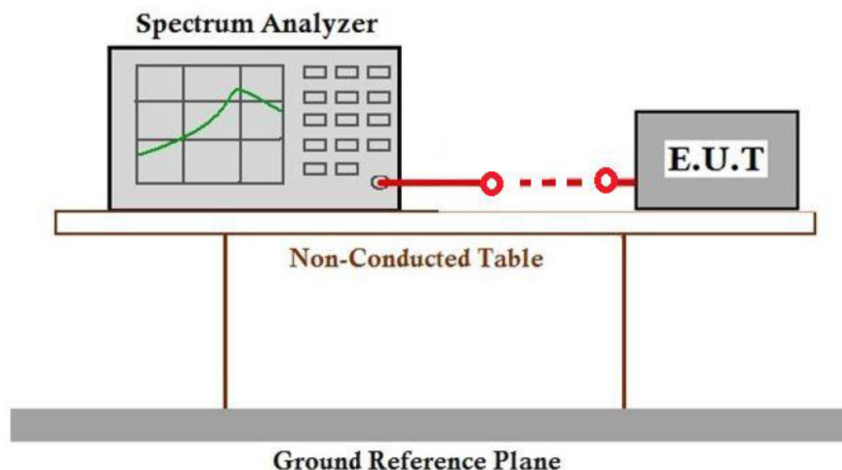
Operating Environment:

Temperature: 26.6 °C Humidity: 48.8 % RH Atmospheric Pressure: 1005 mbar

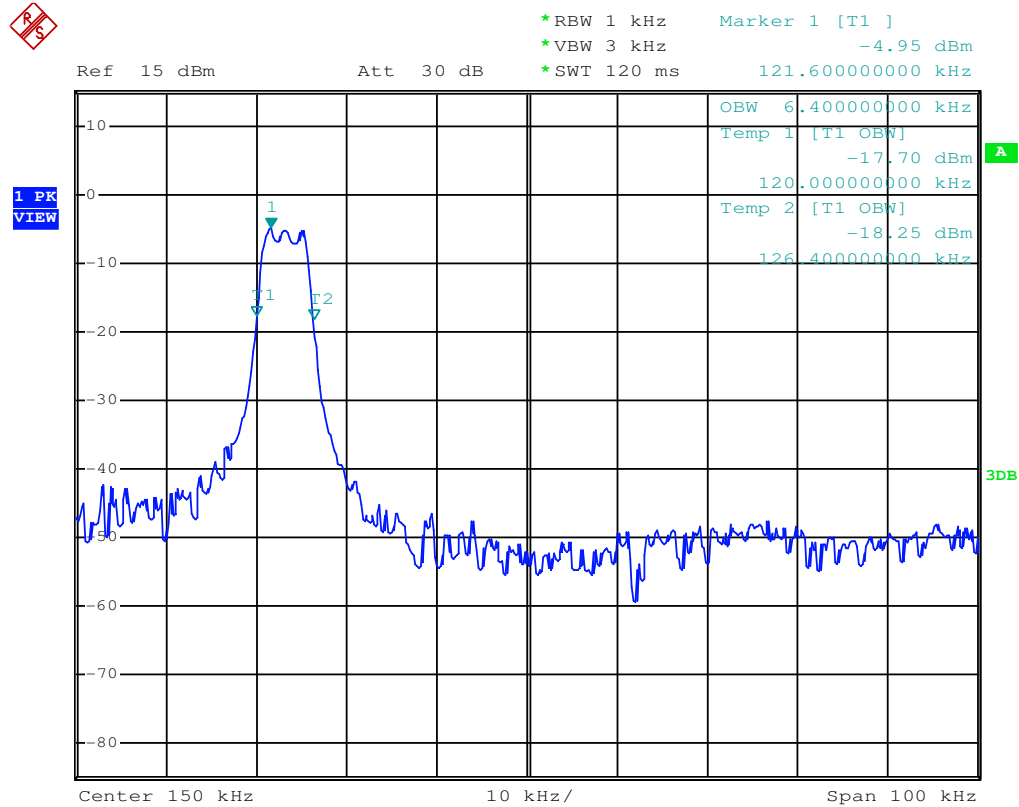
7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Pre-scan	00	Charge mode_Keep the EUT charging(5W)(DC 12V supply)
Pre-scan	01	Charge mode_Keep the EUT charging(7.5W) (DC 12V supply)
Pre-scan	02	Charge mode_Keep the EUT charging(10W) (DC 12V supply)
Final test	03	Charge mode_Keep the EUT charging(15W) (DC 12V supply)
Pre-scan	04	Charge mode_Keep the EUT charging(5W)(DC 24V supply)
Pre-scan	05	Charge mode_Keep the EUT charging(7.5W) (DC 24V supply)
Pre-scan	06	Charge mode_Keep the EUT charging(10W) (DC 24V supply)
Pre-scan	07	Charge mode_Keep the EUT charging(15W) (DC 24V supply)

7.2.3 Test Setup Diagram



7.2.4 Measurement Procedure and Data



7.3 Radiated Emissions (9kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

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

Measurement Distance: 10m

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz. 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.		

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.

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 23.2 °C

Humidity: 50.5 % RH

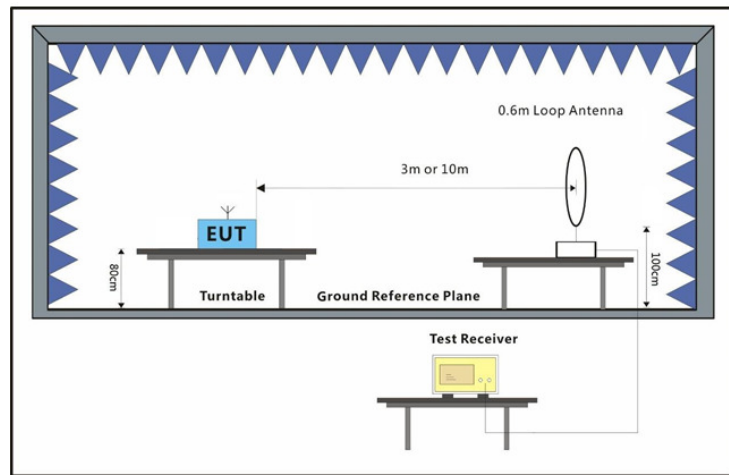
Atmospheric Pressure: 1010 mbar



7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Pre-scan	00	Charge mode_Keep the EUT charging(5W)(DC 12V supply)
Pre-scan	01	Charge mode_Keep the EUT charging(7.5W) (DC 12V supply)
Pre-scan	02	Charge mode_Keep the EUT charging(10W) (DC 12V supply)
Final test	03	Charge mode_Keep the EUT charging(15W) (DC 12V supply)
Pre-scan	04	Charge mode_Keep the EUT charging(5W)(DC 24V supply)
Pre-scan	05	Charge mode_Keep the EUT charging(7.5W) (DC 24V supply)
Pre-scan	06	Charge mode_Keep the EUT charging(10W) (DC 24V supply)
Pre-scan	07	Charge mode_Keep the EUT charging(15W) (DC 24V supply)

7.3.3 Test Setup Diagram



7.3.4 Measurement Procedure and Data

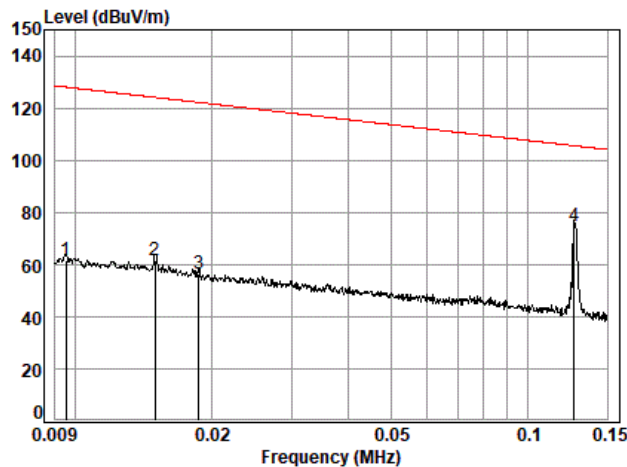
- All radiated emission measurements in terms of magnetic field strength shall be performed with a shielded loop antenna.
- For all radiated emission measurements in terms of magnetic field strength, the loop antenna were placed such that:
 - its centre shall be at 1.3 m height above the ground plane;
 - the projection of its centre onto the ground plane shall be at the specified measurement distance from the projection on the ground plane of the closest point on the boundary of the equipment under test (EUT); and
 - measurements shall be performed with the loop antenna placed vertically, in turn, in two polarizations (the measurement axis specified below is the line segment connecting the projections on the ground plane of the centre of the loop antenna and the centre of the EUT arrangement):
 - coaxial (loop plane perpendicular to the ground plane and to the measurement axis); and
 - coplanar (loop plane perpendicular to the ground plane and coplanar with the measurement axis).

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Test Site: 10M-chamber

Job No. : 01701AT

Test mode: 03

Remark1 :

Remark2 :

Marker	Freq. MHz	AntFac dB/m	CabLos dB	Reading dBuV	Measured dBuV/m	Limit dBuV/m	Over dBuV	Remark
1	0.009	0.00	0.08	110.42	61.69	128.06	-66.37	Average
2	0.015	0.00	0.09	110.49	61.70	124.10	-62.40	Average
3	0.019	0.00	0.09	105.04	56.20	122.17	-65.97	Average
4	0.127	0.00	0.16	124.68	74.86	105.55	-30.69	Average



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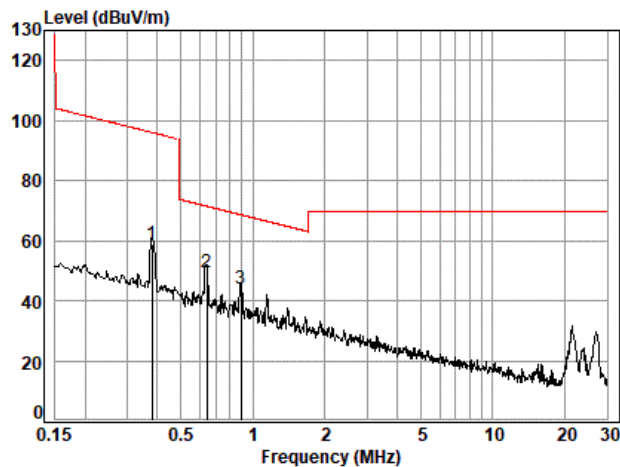
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Test Site: 10M-chamber

Job No. : 01701AT

Test mode: 03

Remark1 :

Remark2 :

Marker	Freq. MHz	AntFac dB/m	CabLos dB	Reading dBuV	Measured dBuV/m	Limit dBuV/m	Over dBuV	Remark
1	0.381	10.31	0.20	80.74	58.75	95.98	-37.23	Average
2	0.644	10.29	0.00	71.88	49.67	71.43	-21.76	QP
3	0.894	10.28	0.00	66.03	43.81	68.57	-24.76	QP



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7.4 Radiated Emissions (30MHz-1GHz)

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

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

Measurement Distance: 10m

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.		

7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 23.2 °C

Humidity: 50.5 % RH

Atmospheric Pressure: 1010 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Pre-scan	00	Charge mode_Keep the EUT charging(5W)(DC 12V supply)
Pre-scan	01	Charge mode_Keep the EUT charging(7.5W) (DC 12V supply)
Pre-scan	02	Charge mode_Keep the EUT charging(10W) (DC 12V supply)
Final test	03	Charge mode_Keep the EUT charging(15W) (DC 12V supply)
Pre-scan	04	Charge mode_Keep the EUT charging(5W)(DC 24V supply)
Pre-scan	05	Charge mode_Keep the EUT charging(7.5W) (DC 24V supply)
Pre-scan	06	Charge mode_Keep the EUT charging(10W) (DC 24V supply)
Pre-scan	07	Charge mode_Keep the EUT charging(15W) (DC 24V supply)



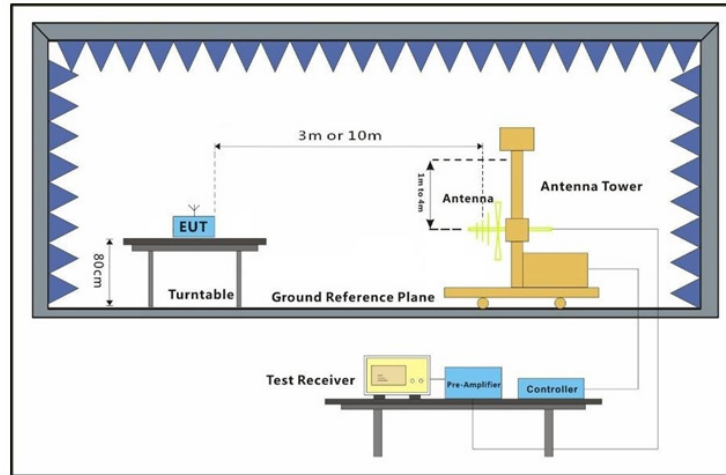
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7.4.3 Test Setup Diagram



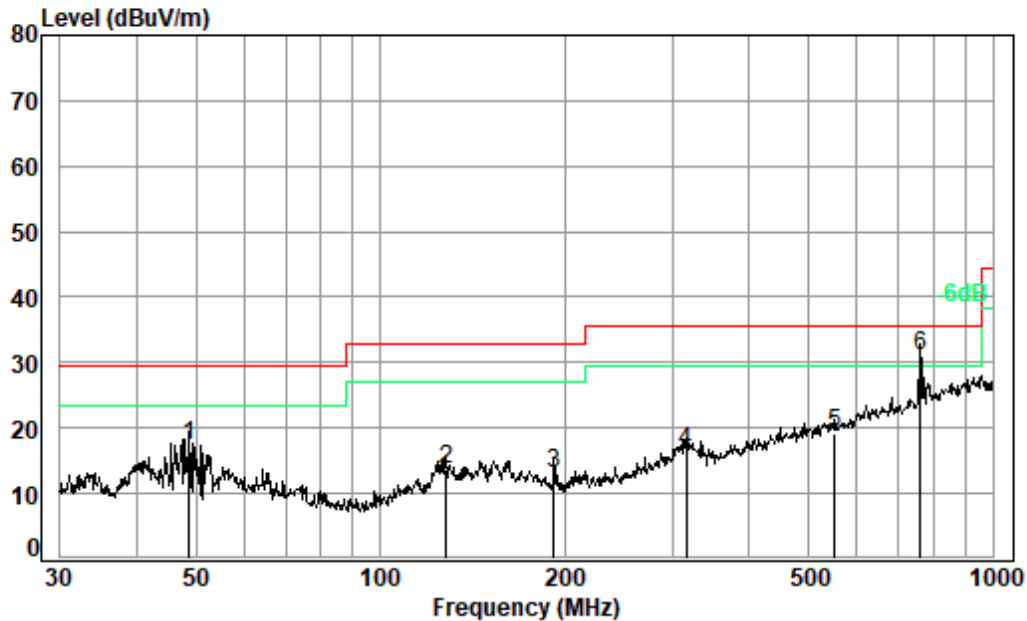
7.4.4 Measurement Procedure and Data

- The EUT was placed on the top of a rotating table 0.8 meters above the ground for below 1GHz at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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.
- Test the EUT in the lowest channel, the middle channel, the Highest channel
- 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.
- Repeat above procedures until all frequencies measured was complete.

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



Test Mode: 03; Polarity: Horizontal



Condition: 10m HORIZONTAL

Job No. : 01701AT

Test Mode: 03

	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	48.843	32.04	17.20	0.61	32.50	17.35	29.50	-12.15	QP
2	128.113	29.54	15.55	0.93	32.40	13.62	33.00	-19.38	QP
3	191.745	29.07	15.26	1.16	32.40	13.09	33.00	-19.91	QP
4	315.481	29.26	18.05	1.46	32.30	16.47	35.60	-19.13	QP
5	552.883	26.78	22.83	1.95	32.35	19.21	35.60	-16.39	QP
6 pp	760.704	34.96	25.83	2.28	32.12	30.95	35.60	-4.65	QP



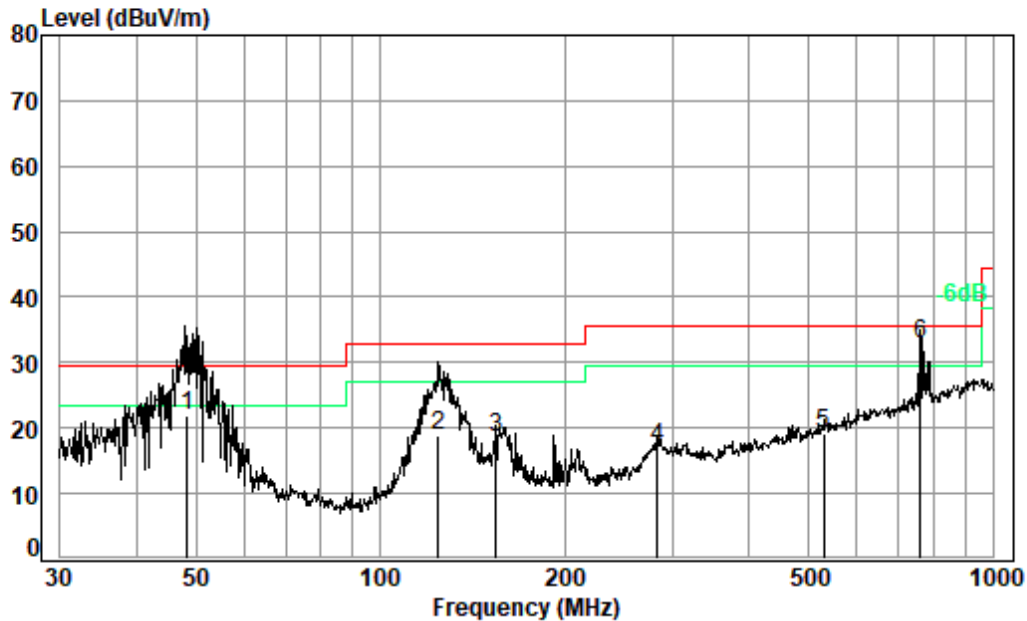
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Test Mode: 03; Polarity: Vertical



Condition: 10m VERTICAL

Job No. : 01701AT

Test Mode: 03

	Freq	Read Level	Ant Factor	Cable Loss	Preamplifier Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	48.332	36.73	17.21	0.61	32.50	22.05	29.50	-7.45	QP
2	124.133	35.15	15.30	0.92	32.40	18.97	33.00	-14.03	QP
3	154.279	32.01	17.84	1.03	32.40	18.48	33.00	-14.52	QP
4	282.985	30.50	17.34	1.40	32.32	16.92	35.60	-18.68	QP
5	530.101	27.07	22.49	1.91	32.33	19.14	35.60	-16.46	QP
6 pp	760.704	36.87	25.83	2.28	32.12	32.86	35.60	-2.74	QP



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8 Test Setup Photo

Refer to Appendix - Test Setup Photo for SZCR2305001701AT

9 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for SZCR2305001701AT

- End of the Report -

