

Radio Test Report

Report No.: STS2307145W01

Issued for

Litum bilgi teknolojileri san. Ve dis tic. A.S

Şevket Özçelik sok. No29 Alsancak izmir 35000 Turkey

Product Name: LITUM TAG CHARGER STATION

Brand Name: Litum

Model Name: 900

Series Model(s): N/A

FCC ID: 2AW7W-900

Test Standards: FCC Part 15 Subpart C

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TEST REPORT

Applicant's Name: Litum bilgi teknolojileri san. Ve dis tic. A.S
Address.....: Şevket Özçelik sok. No29 Alsancak izmir 35000 Turkey
Manufacturer's Name: Litum bilgi teknolojileri san. Ve dis tic. A.S
Address.....: Şevket Özçelik sok. No29 Alsancak izmir 35000 Turkey

Product Description

Product Name: LITUM TAG CHARGER STATION
Brand Name: Litum
Model Name: 900
Series Model(s): N/A

Test Standards.....: FCC Part 15 Subpart C

Test Procedure: ANSI C63.10-2013

This device described above has been tested by STS, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test.....:

Date of receipt of test item: 31 July 2023
Date (s) of performance of tests : 31 July 2023 ~ 18 Aug. 2023
Date of Issue: 18 Aug. 2023
Test Result: **Pass**

Testing Engineer :

Aaron Bu

(Aaron Bu)

Technical Manager :

Sean She

(Sean she)

Authorized Signatory :

Chris Chen

(Chris Chen)



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Revision History

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	18 Aug. 2023	STS2307145W01	ALL	Initial Issue

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.209(a)	Radiated emission, Spurious Emission	PASS	
2.1049	20 dB Bandwidth	PASS	
15.203	Antenna Requirement	PASS	

1.1 TEST FACTORY

SHENZHEN STS TEST SERVICES CO., LTD

Add. :101, Building B, Zhuoke Science Park, No.190 Chongqing Road, ZhanChengShequ, Fuhai Sub-District, Bao'an District, Shenzhen, Guang Dong, China

FCC test Firm Registration Number: 625569

IC test Firm Registration Number: 12108A

A2LA Certificate No.: 4338.01

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately **95 %**.

No.	Item	Uncertainty
1	RF output power, conducted	$\pm 1.197\text{dB}$
2	Unwanted Emissions, conducted	$\pm 2.896\text{dB}$
3	All emissions, radiated 9K-30MHz	$\pm 3.84\text{dB}$
4	All emissions, radiated 30M-1GHz	$\pm 3.94\text{dB}$
5	All emissions, radiated 1G-6GHz	$\pm 4.59\text{dB}$
6	All emissions, radiated >6G	$\pm 5.22\text{dB}$
7	Conducted Emission (9KHz-150KHz)	$\pm 2.14\text{dB}$
8	Conducted Emission (150KHz-30MHz)	$\pm 2.54\text{dB}$
9	Occupied Channel Bandwidth	$\pm 3.5\%$
10	Dwell time	$\pm 3.2\%$

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	LITUM TAG CHARGER STATION
Brand	Litum
Model Number	900
Series Model(s)	N/A
Model Difference	N/A
Channel List	Please refer to the Note 2.
Antenna Type	Please refer to the Note 3.
Equipemnt Category	Non-ISM frequency
Operating frequency	110.5K-205K
Modulation Type	ASK
Rating	Input: 100-120V AC , 50-60Hz, 77W 220-240V AC, 50-60Hz, 77W Output: DC 9V,72W
Adapter	Input: 115/230V Output:12V
Hardware version number	01
Software version number	01
Connecting I/O Port(s)	Please refer to the Note 1.

Note:

- For a more detailed features description, please refer to the manufacturer's specifications or the User Manual.
- Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	NOTE
1	Litum	900	Coil	N/A	Antenna

2.2 DESCRIPTION OF THE TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Test Mode	Description
Mode 1	Charging+TX Mode+FULL-Coil (Coil1~Coil 16)
Mode 2	Charging+TX Mode+HALF-Coil (Coil1~Coil 8 and Coil 9~Coil 16)
Mode 3	Charging+TX Mode+NULL-Coil (No Coil)
Mode 4	Charging+TX Mode+Single-Coil (Each coil)

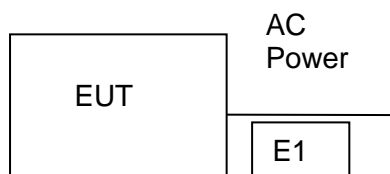


Note: All mode has been tested, the worst case is Mode 1, this report only shown the worst case.

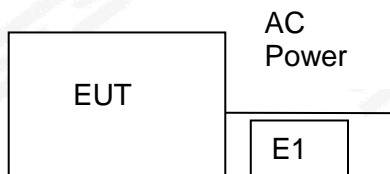
2.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters

Radiated Emission Test



Conducted Emission Test



2.4 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
E1	aDAPTER	Litum	900	N/A	N/A

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
Load	Badge Tag	Litum	900	N/A	N/A

Note:

- (1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (2) “YES” is means “with core”; “NO” is means “without core”.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2022.09.29	2023.09.28
Signal Analyzer	R&S	FSV 40-N	101823	2022.09.29	2023.09.28
Active loop Antenna	ZHINAN	ZN30900C	16035	2023.02.28	2024.02.27
Bilog Antenna	TESEQ	CBL6111D	34678	2022.09.30	2024.09.29
Pre-Amplifier (0.1M-3GHz)	EM	EM330	060665	2023.02.28	2024.02.27
Temperature & Humidity	HH660	Mieo	N/A	2022.09.30	2023.09.29
Test SW	BALUN	BL410-E/18.905			

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2022.09.29	2023.09.28
LISN	R&S	ENV216	101242	2022.09.28	2023.09.27
LISN	EMCO	3810/2NM	23625	2022.09.28	2023.09.27
Temperature & Humidity	HH660	Mieo	N/A	2022.09.30	2023.09.29
Test SW	FARAD	EZ-EMC(Ver.STSLAB-03A1 CE)			

3. CONDUCTED EMISSION TEST RESULT (SECTION 15.207)

3.1 POWER LINE CONDUCTED EMISSION LIMITS

The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table.

FREQUENCY (MHz)	Class B (dBuV)	
	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of "*" marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

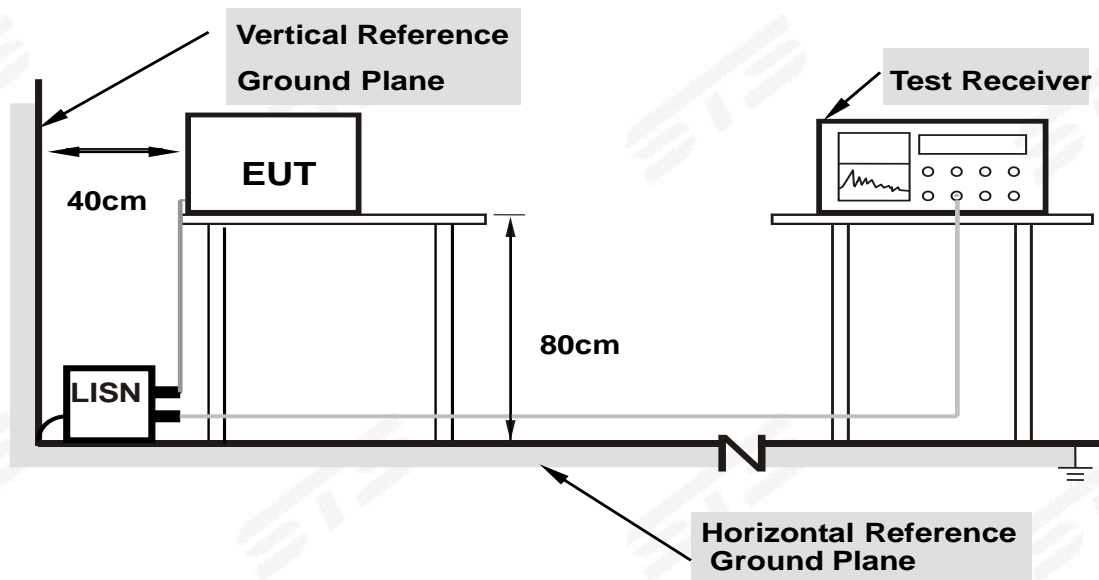
The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.2 TEST PROCEDURE

- The EUT is 0.8 m from the horizontal ground plane and 0.4 m from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments are powered from additional LISN(s). The LISN provides 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN is at least 80 cm from the nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.3 TEST SETUP



Note: 1. Support units were connected to second LISN.

2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes support units.

3.4 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

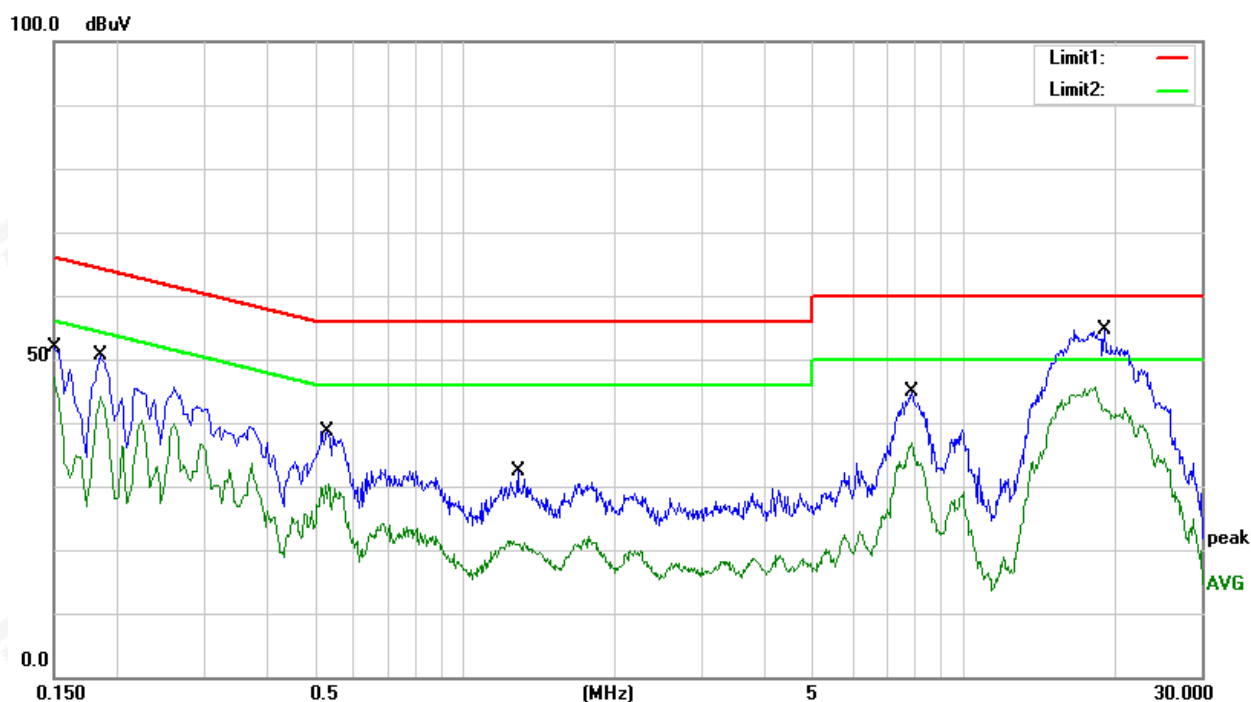
3.5 TEST RESULTS

Temperature:	25.3°C	Relative Humidity:	59%
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	Mode 1		

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV/m)	Margin (dB)	Detector
1	0.1500	31.59	20.29	51.88	66.00	-14.12	QP
2	0.1500	26.78	20.29	47.07	56.00	-8.93	AVG
3	0.1860	30.19	20.37	50.56	64.21	-13.65	QP
4	0.1860	23.82	20.37	44.19	54.21	-10.02	AVG
5	0.5300	18.23	20.47	38.70	56.00	-17.30	QP
6	0.5300	9.86	20.47	30.33	46.00	-15.67	AVG
7	1.2820	11.94	20.33	32.27	56.00	-23.73	QP
8	1.2820	1.16	20.33	21.49	46.00	-24.51	AVG
9	7.8740	24.08	20.68	44.76	60.00	-15.24	QP
10	7.8740	16.10	20.68	36.78	50.00	-13.22	AVG
11	19.1300	31.96	22.68	54.64	60.00	-5.36	QP
12	19.1300	22.90	22.68	45.58	50.00	-4.42	AVG

Remark:

1. All readings are Quasi-Peak and Average values
2. Margin = Result (Result = Reading + Factor) – Limit
3. Factor = LISN factor + Cable loss + Limiter (10dB)



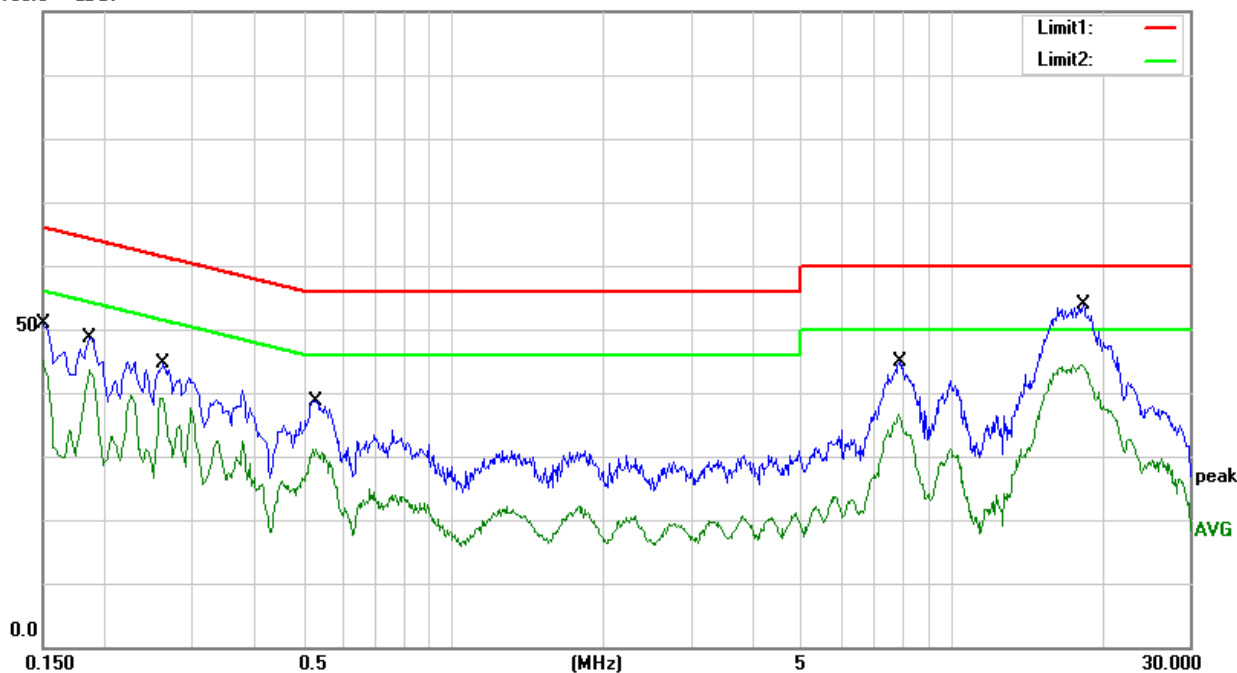
Temperature:	25.8°C	Relative Humidity:	59%
Test Voltage:	AC 120V/60Hz	Phase:	N
Test Mode:	Mode 1		

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV/m)	Margin (dB)	Detector
1	0.1500	30.61	20.29	50.90	66.00	-15.10	QP
2	0.1500	24.79	20.29	45.08	56.00	-10.92	AVG
3	0.1860	28.34	20.37	48.71	64.21	-15.50	QP
4	0.1860	23.31	20.37	43.68	54.21	-10.53	AVG
5	0.2620	23.91	20.64	44.55	61.37	-16.82	QP
6	0.2620	18.54	20.64	39.18	51.37	-12.19	AVG
7	0.5300	18.15	20.47	38.62	56.00	-17.38	QP
8	0.5300	10.75	20.47	31.22	46.00	-14.78	AVG
9	7.8540	24.27	20.68	44.95	60.00	-15.05	QP
10	7.8540	15.83	20.68	36.51	50.00	-13.49	AVG
11	18.3580	31.43	22.47	53.90	60.00	-6.10	QP
12	18.3580	21.98	22.47	44.45	50.00	-5.55	AVG

Remark:

1. All readings are Quasi-Peak and Average values
2. Margin = Result (Result = Reading + Factor) – Limit
3. Factor = LISN factor + Cable loss + Limiter (10dB)

100.0 dBuV



4. RADIATED& FIELD EMISSION TEST RESULT (SECTION 15.209)

4.1 LIMIT

Frequency [MHz]	Field Strength [uV/m]	Measurement Distance [Meters]
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1.705	24000/F (kHz)	30
1.705 ~ 30	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for AV
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for AV
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

§ 15.209(d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

4.2 TEST PROCEDURE

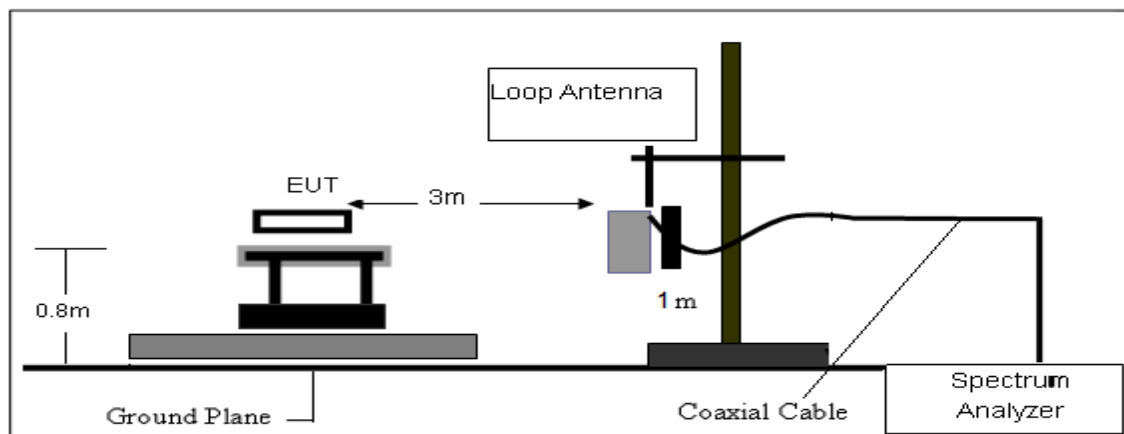
- a. The measuring distance of at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz.
- b. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- d. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

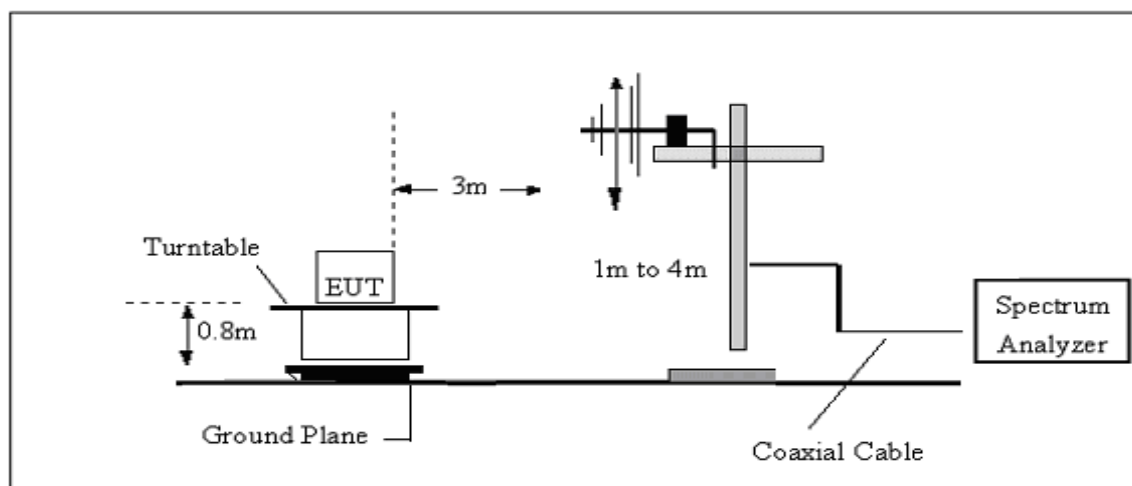
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

4.3 TEST SETUP

(A) Radiated Emission Test-Up Frequency Below 30MHz



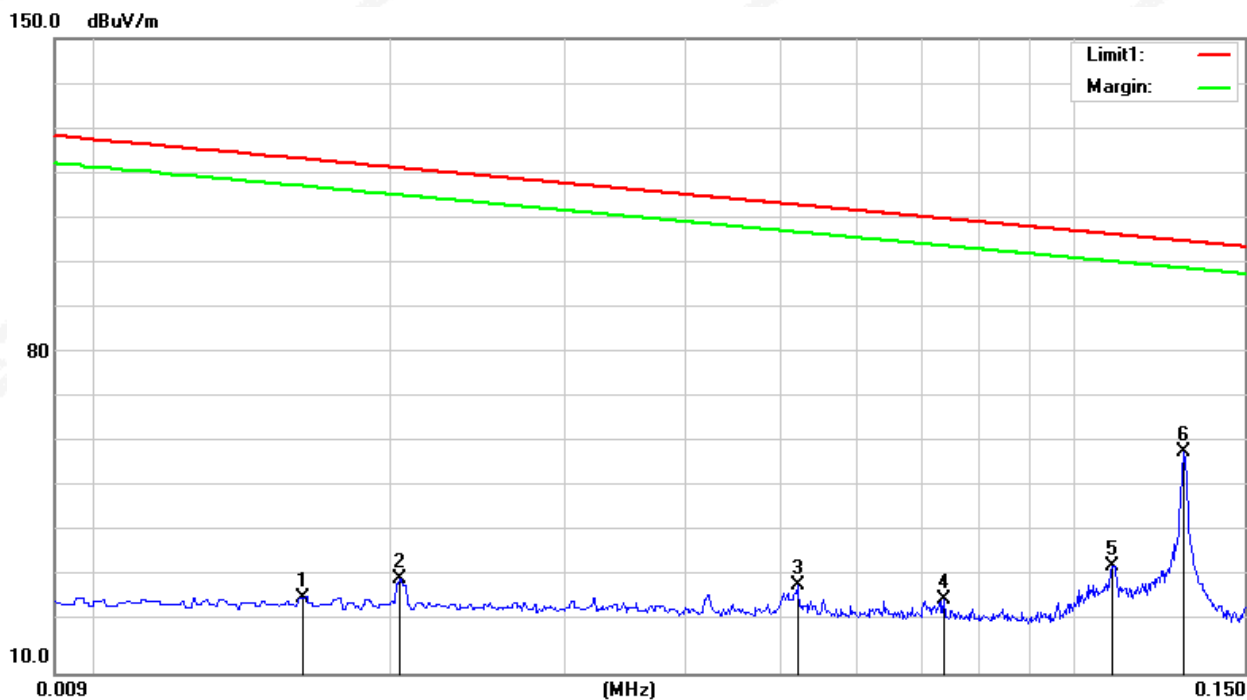
(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



4.4 TEST RESULTS

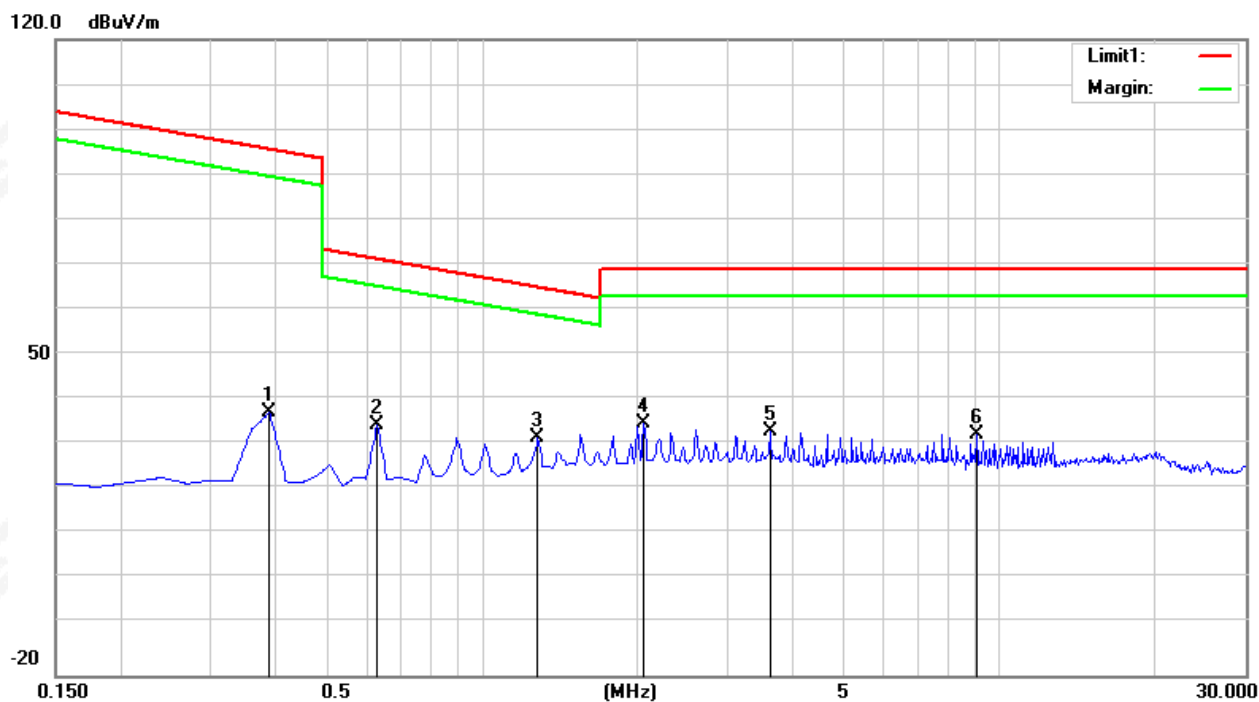
Temperature :	23.1℃	Relative Humidity :	60%
Test Voltage :	AC 120V/60Hz	Test Mode :	TX Mode

4.4.1 Spurious Radiated Emission Below 30 MHz 9KHz-150KHz



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0161	6.87	19.82	26.69	123.47	-96.78	peak
2	0.0204	10.89	20.09	30.98	121.41	-90.43	peak
3	0.0521	9.82	19.44	29.26	113.27	-84.01	peak
4	0.0736	7.28	18.84	26.12	110.27	-84.15	peak
5	0.1100	16.17	17.58	33.75	106.78	-73.03	peak
6	0.1300	41.29	17.54	58.83	105.33	-46.50	peak

150KHz-30MHz



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	0.3888	17.79	20.16	37.95	95.81	-57.86	peak
2	0.6276	15.02	20.25	35.27	71.65	-36.38	peak
3	1.2843	12.11	20.26	32.37	65.43	-33.06	peak
4	2.0604	14.98	20.38	35.36	69.50	-34.14	peak
5	3.6126	13.31	20.28	33.59	69.50	-35.91	peak
6	9.0752	12.87	20.26	33.13	69.50	-36.37	peak

4.4.2 Spurious Radiated Emission below 1 GHz

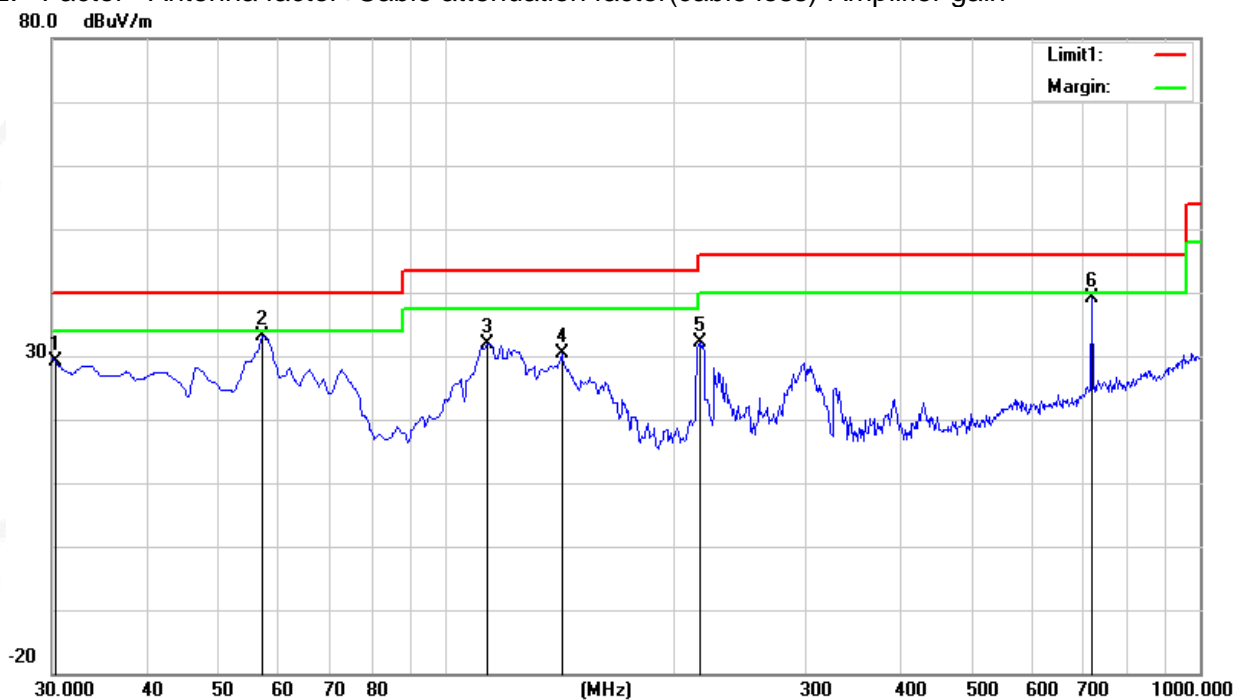
Temperature :	23.1 °C	Relative Humidity :	60%
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 1

The following table shows the highest levels of radiated emissions on polarizations of vertical

Frequency	Reading	Correct	Result	Limit	Margin	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
30.3173	42.15	-13.01	29.14	40.00	-10.86	peak
57.1600	58.58	-25.45	33.13	40.00	-6.87	peak
113.4200	50.60	-18.73	31.87	43.50	-11.63	peak
142.5200	48.66	-18.18	30.48	43.50	-13.02	peak
217.2100	51.99	-19.93	32.06	46.00	-13.94	peak
721.6100	42.14	-3.12	39.02	46.00	-6.98	peak

Remark:

1. Margin = Result (Result = Reading + Factor)–Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain



Temperature :	23.1 °C	Relative Humidity :	60%
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 1

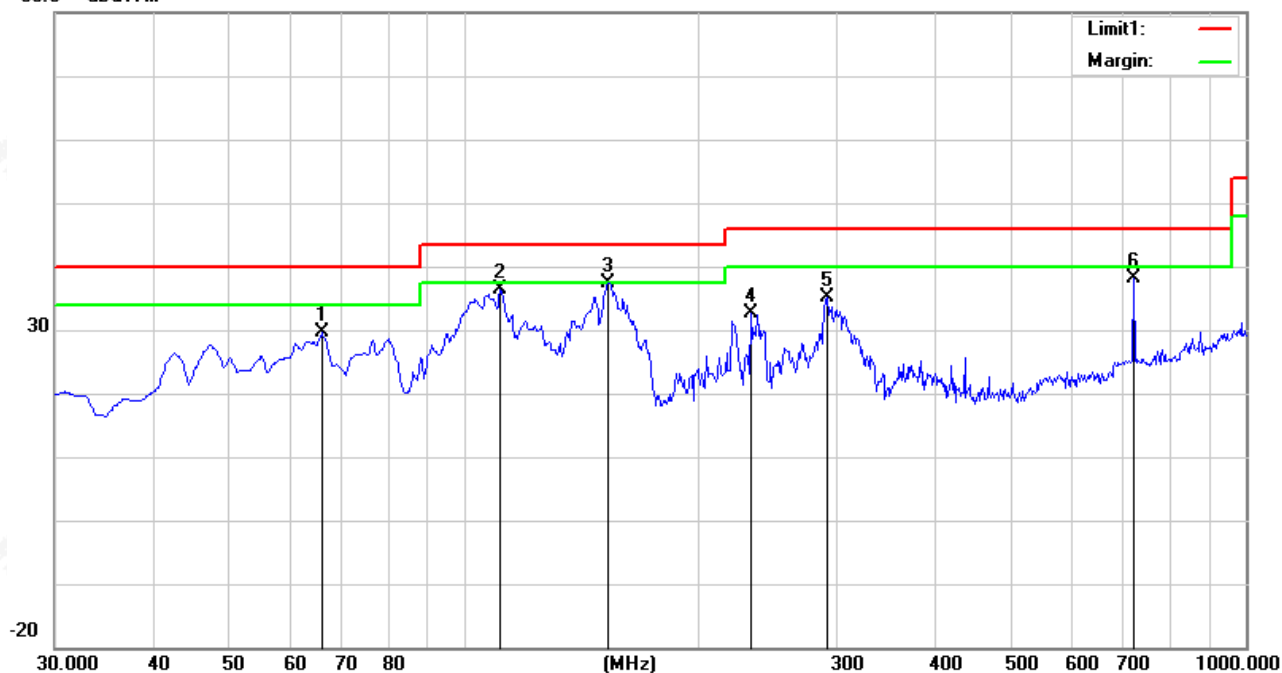
The following table shows the highest levels of radiated emissions on polarizations of horizontal

Frequency	Reading	Correct	Result	Limit	Margin	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
65.8900	55.15	-25.60	29.55	40.00	-10.45	peak
111.4800	55.28	-18.92	36.36	43.50	-7.14	peak
153.1900	56.00	-18.58	37.42	43.50	-6.08	peak
233.7000	51.56	-18.81	32.75	46.00	-13.25	peak
292.8700	50.18	-15.06	35.12	46.00	-10.88	peak
721.6100	41.24	-3.12	38.12	46.00	-7.88	peak

Remark:

1. Margin = Result (Result =Reading + Factor)-Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

80.0 dBuV/m



5. 20 DB BANDWIDTH TEST

5.1 Limit

FCC Part 2.1049, Only applicable to report.

5.2 TEST SETUP

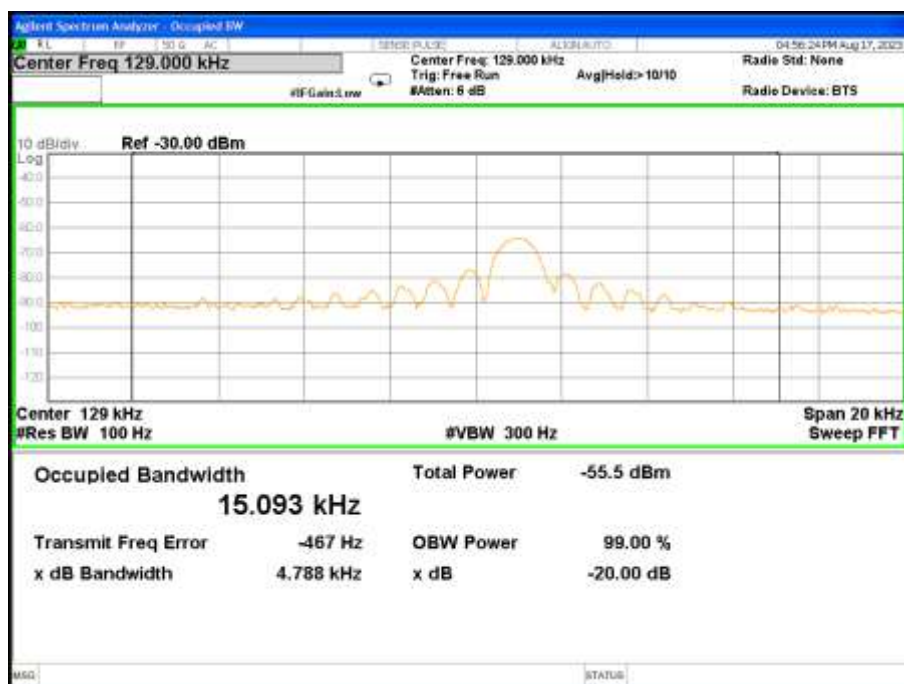
Spectrum Parameter	Setting
Span Frequency	approximately 2 to 3 times the 20 dB bandwidth
RB	greater than 1 % of the 20 dB bandwidth,
VB	equal to the RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

The test program and configuration, Refer to 4.2 and 4.3

5.3 TEST RESULTS

Operating Frequency (kHz)	20 dB Bandwidth (KHz)
129	4.788

CH00





APPENDIX-PHOTOS OF TEST SETUP

Note: See test photos in setup photo document for the actual connections between Product and support equipment.

*****END OF THE REPORT*****