

FCC Test Report

Report No.: ADQW-ESH-P22110744B-1

FCC ID: 2A9QJ-74T0

Product: WIRELESS CHARGER

Test Model: 74T0

Received Date: Nov.13, 2022

Test Date: Nov.13 to Dec.12, 2022

Issued Date: Dec.12, 2022

Applicant: APTIV CONNECTION SYSTEMS INDIA PVT LTD

Address: 7/60-A, 60-B, Arakunnam-Pulickamaly Road, Arakunnam P.O, Ernakulam, Kerala, INDIA, 68231

Manufacturer: APTIV CONNECTION SYSTEMS INDIA PVT LTD

Address: 7/60-A, 60-B, Arakunnam-Pulickamaly Road, Arakunnam P.O, Ernakulam, Kerala, INDIA, 68231

Issued By: BUREAU VERITAS ADT (Shanghai) Corporation

Lab Address: No. 829, Xinzhuang Road, Shanghai, P.R.China (201612)



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification.

Table of Contents

Release Control Record	3
1 Certificate of Conformity	4
2 Summary of Test Results	5
2.1 Test Instruments	6
2.2 Measurement Uncertainty	7
2.3 Modification Record	7
2.4 Support Units	7
3 General Information	8
3.1 General Description of EUT	8
3.1.1 Test Mode Applicability:	9
3.1.2 Test Condition:	10
3.2 Description of Support Units	10
3.3 General Description of Applied Standards	10
4 Test Procedure and Results	11
4.1 AC Power Conducted Emission	11
4.1.1 Limits	11
4.1.2 Test Procedures	11
4.1.3 Deviation from Test Standard	11
4.1.4 Test Setup	12
4.1.5 EUT Operating Conditions	12
4.1.6 Test Results	13
4.2 Radiated Emissions Measurement	14
4.2.1 Test Procedure Reference	15
4.2.2 Test Procedures	15
4.2.3 Deviation from Test Standard	16
4.2.4 Test Setup	16
4.2.5 Test Results	18
4.3 20dB Spectrum Bandwidth Measurement	23
4.3.1 Limit	23
4.3.2 Test Setup	23
4.3.3 Test Procedures	23
4.3.4 Deviation of Test Standard	23
4.3.5 Test Results	24
5 Pictures of Test Arrangements	25



Release Control Record

Issue No.	Description	Date Issued
ADQW-ESH-P22110744B-1	Original release	Dec.12, 2022



1 Certificate of Conformity

Product: WIRELESS CHARGER

Brand: • **APTIV** •

Test Model: 74T0

Applicant: APTIV CONNECTION SYSTEMS INDIA PVT LTD

Test Date: Nov.13 to Dec.12, 2022

Standards: 47 CFR FCC Part 15, Subpart C
ANSI C63.10:2020

The above equipment has been tested by **BUREAU VERITAS ADT (Shanghai) Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by :

, Date:

Dec.12, 2022

Yan ZHOU

Project Engineer

Approved by :

, Date:

Dec.12, 2022

Sean YU

RF Supervisor

2 Summary of Test Results

The EUT has been tested according to the following specifications:

47 CFR FCC Part 15, Subpart C			
Standard Section	Test Type and Limit	Result	REMARK
§15.203	Antenna Requirement	PASS	No antenna connector is used.
§15.207	AC Power Conducted Emission	NA	The EUT is powered by DC source.
§15.209	Radiated Emission	PASS	Meet the requirement of limit.
§15.215 (c)	20dB Bandwidth	PASS	Meet the requirement of limit.

2.1 Test Instruments

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Hybrid Antenna(25MHz-1.5GHz)	Schwarzbeck	VULB9168	E1A1012	Jul.26, 21	Jul.25, 23
Horn Antenna(1GHz -18GHz)	Schwarzbeck	BBHA9120D	E1A1017	Jul.25, 22	Jul.24, 24
Double Ridge Horn Antenna(18G-40G)	COM-POWER	AH-840	E1A1040	Jul.25, 22	Jul.24, 24
Pre-Amplifier(100kHz-1.3GHz)	Agilent	8447D	E1A2001	Mar.03, 22	Mar.02, 23
Pre-Amplifier(0.5GHz-18GHz)	EMCI	EMC184045SE	E1A2009	Aug.04, 22	Aug.03, 23
Pre-Amplifier(18GHz-40GHz)	EMCI	EMC051845SE	E1A2008	Aug.04, 22	Aug.03, 23
EMI test receiver	R&S	ESR7	E1R1005	Mar.03, 22	Mar.02, 23
Spectrum Analyzer	Keysight	N9030B	E1S1003	Sep.14, 22	Sep.13, 23
Spectrum Analyzer	Keysight	N9020A	E1S1004	Mar.03, 22	Mar.02, 23
LISN	R&S	ENV216	E1L1011	Jun.20, 22	Jun.19, 23
RF Control Unit	Toscend	JS0806-2	E1C5003	N/A	N/A
Test Software	ADT	ADT_COND_V7 .3.1	N/A	N/A	N/A
Test Software	Toscend	JS32-RE	N/A	N/A	N/A
Test Software	Toscend	JS1120	N/A	N/A	N/A
Test Software	Toscend	JS1120-3	N/A	N/A	N/A

2.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Measurement	Frequency	Expanded Uncertainty ($k=2$) ($\pm$)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.83 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.36 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.47 dB
	6GHz ~ 18GHz	3.75 dB
	18GHz ~ 40GHz	3.30 dB

2.3 Modification Record

There were no modifications required for compliance.

2.4 Support Units

Description	Manufacturer	Model No.	Serial No.
Dummy Load	N/A	N/A	N/A

3 General Information

3.1 General Description of EUT

Product	WIRELESS CHARGER
Brand	• A P T I V •
Test Model	74T0
Power Rating	12V ---,3A
Modulation Type	FSK, ASK
Modulation Technology	Qi
Operating Frequency	127.7kHz
Antenna Type	Coil Antenna
Antenna Connector	--

Note:

1. For more details, please refer to the User's manual of the EUT.
2. Wireless maximum transmitted power of the EUT is 15W, it also supports power output below 15W such as 5W/7.5W/10W;

3.1.1 Test Mode Applicability:

EUT Configure Mode	Applicable to				Description
	RE (9 kHz~30MHz)	RE (30MHz~1GHz)	PLC	BW	
-	√	√	-	√	-

Where **RE≥1G**: Radiated Emission above 1GHz **RE< 1G**: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission **BW**: 20dB Spectrum Bandwidth

Radiated Emission Test RE (9 kHz~30MHz):

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
-	Charging	127.7 kHz	127.7 kHz	FSK, ASK

Radiated Emission Test RE (30MHz~1GHz):

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
-	Charging	127.7 kHz	127.7 kHz	FSK, ASK

Power Line Conducted Emission Test:

☐ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
-	Charging	127.7 kHz	127.7 kHz	FSK, ASK

3.1.2 Test mode

The EUT was tested under the following modes, the final worst mode were marked in boldface and recorded in this report.

Test Mode	Test setup configuration	Changing current condition
Mode 1	EUT charging to receiver load	Near 100% battery status
Mode 2	EUT charging to receiver load	50% battery status
Mode 3	EUT charging to receiver load	<1% battery status
Mode 4	EUT charging standby mode	

3.1.3 Test Condition:

Applicable to	Normal Environmental Conditions	Normal Input Power
RE (9 kHz~30MHz)	23deg. C, 58%RH	DC 12V
RE (30MHz~1GHz)	23deg. C, 58%RH	DC 12V
PLC	--	--

3.2 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

3.3 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standard:

FCC Part 15, Subpart C (15.207, 15.209)

ANSI C63.10: 2020

All relaxed test items have been performed and recorded as per the above standard.

4 Test Procedure and Results

4.1 AC Power Conducted Emission

4.1.1 Limits

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.1.2 Test Procedures

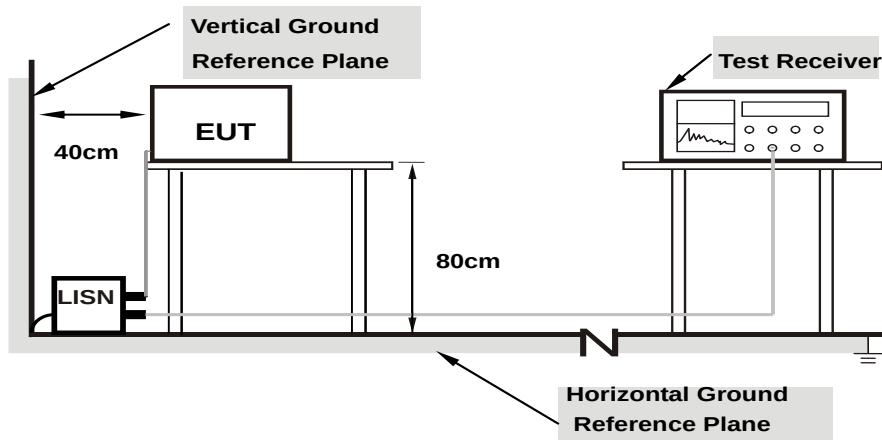
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.1.3 Deviation from Test Standard

No deviation.

4.1.4 Test Setup



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

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.5 EUT Operating Conditions

Same as 4.1.6.

4.1.6 Test Results

Not applicable. The EUT is powered by DC source.

4.2 Radiated Emissions Measurement

For 15.205 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part15, must also comply with the radiated emission limits specified in Section 15.209(a).

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(2)
13.36 - 13.41	--	--	--

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15C 15.209

Frequency [MHz]	Field Strength [uV/m]	Measured 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

4.2.1 Test Procedure Reference

ANSI C63.10 Section 6.3 (General Requirements)

4.2.2 Test Procedures

For Radiated emission below 30MHz

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degree to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- Both X and Y axes of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and the rotate table was turned from 0 degree to 360 degree to find the maximum reading.
- The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

For Radiated emission above 30MHz

- The EUT was placed on the top of a rotating table 0.8 meters (for below 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna 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.

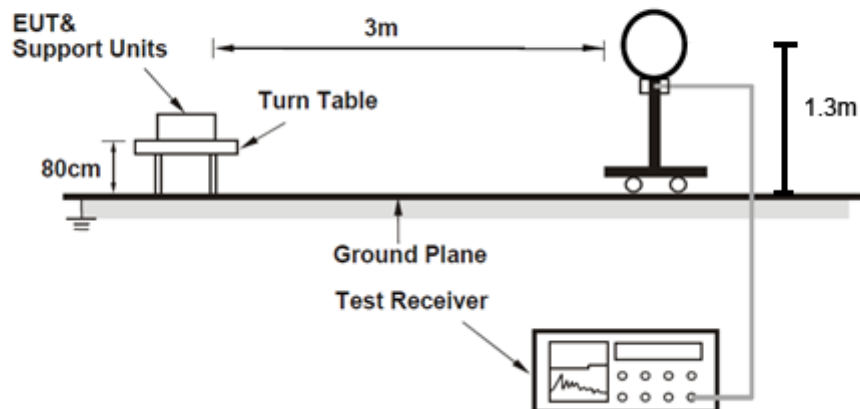
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

4.2.3 Deviation from Test Standard

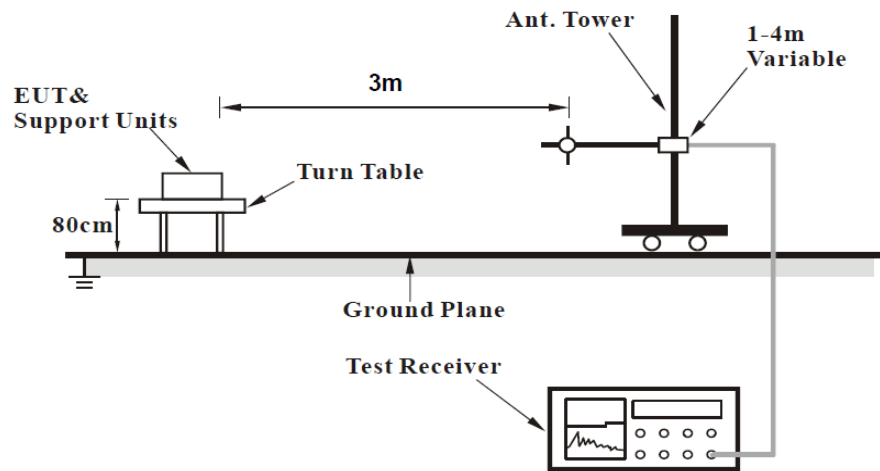
No deviation.

4.2.4 Test Setup

For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz

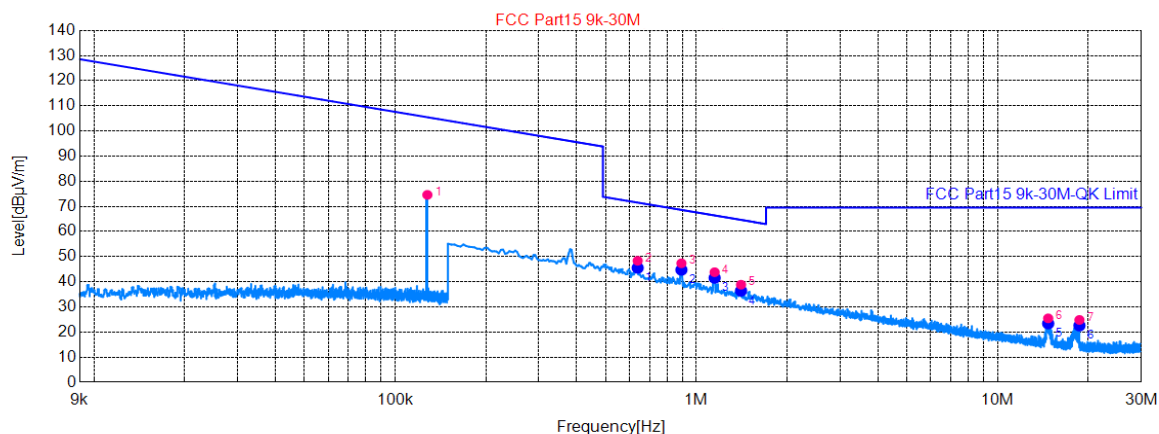


For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.5 Test Results

Radiated Emissions Range 9kHz~30MHz

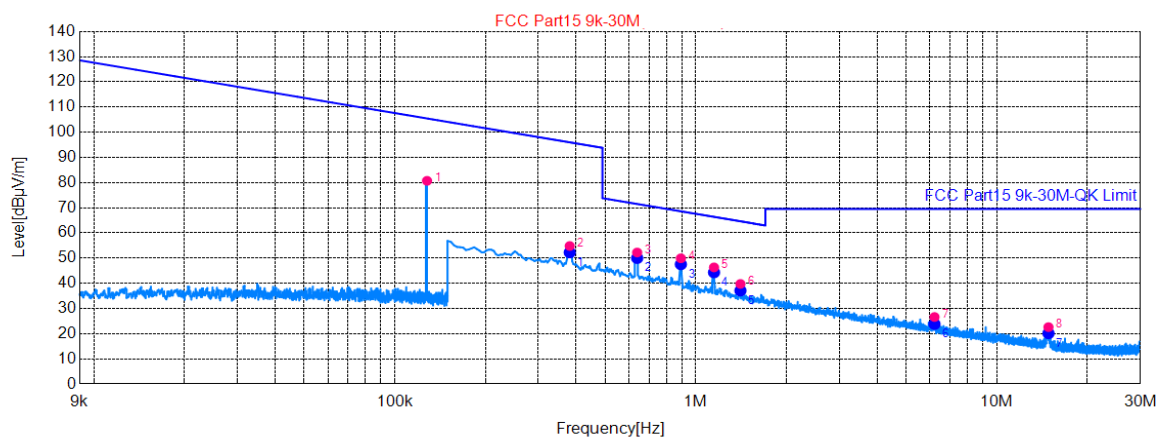
Channel	127.7kHz	Detector Function	Quasi-Peak (QP)
Frequency Range	9KHz ~ 30MHz	Antenna Polarity	Parallel
Mode	Operating		



Final Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Value [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height[c m]	Angle [°]
1	0.6388	37.65	10.71	48.36	71.50	23.14	100	272
2	0.8925	36.65	10.71	47.36	68.59	21.23	100	289
3	1.1500	33.09	10.72	43.81	66.39	22.58	100	134
4	1.4074	28.09	10.75	38.84	64.64	25.80	100	255
5	14.720	16.62	8.84	25.46	69.54	44.08	100	249
6	18.701	16.66	8.17	24.83	69.54	44.71	100	306

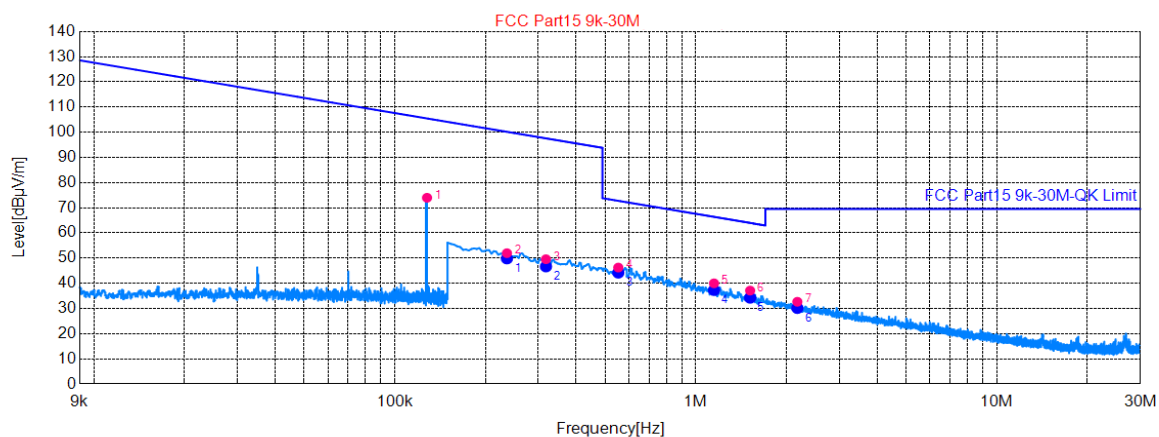
Channel	127.7kHz	Detector Function	Quasi-Peak (QP)
Frequency Range	9KHz ~ 30MHz	Antenna Polarity	Perpendicular
Mode	Operating		



Final Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Value [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height[cm]	Angle [°]
1	0.3813	44.12	10.71	54.83	95.98	41.15	100	134
2	0.6388	41.52	10.71	52.23	71.50	19.27	100	134
3	0.8925	39.22	10.71	49.93	68.59	18.66	100	349
4	1.1500	35.62	10.72	46.34	66.39	20.05	100	360
5	1.4074	29.01	10.75	39.76	64.64	24.88	100	352
6	6.2133	16.46	10.17	26.63	69.54	42.91	100	212

Channel	127.7kHz	Detector Function	Quasi-Peak (QP)
Frequency Range	9KHz ~ 30MHz	Antenna Polarity	Ground-parallel
Mode	Operating		



Final Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Value [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height[cm]	Angle [°]
1	0.2358	41.27	10.71	51.98	100.15	48.17	100	226
2	0.3179	38.86	10.71	49.57	97.56	47.99	100	226
3	0.5530	35.56	10.71	46.27	72.75	26.48	100	226
4	1.1500	29.27	10.72	39.99	66.39	26.40	100	226
5	1.5156	26.36	10.76	37.12	63.99	26.87	100	137
6	2.1761	21.87	10.79	32.66	69.54	36.88	100	226

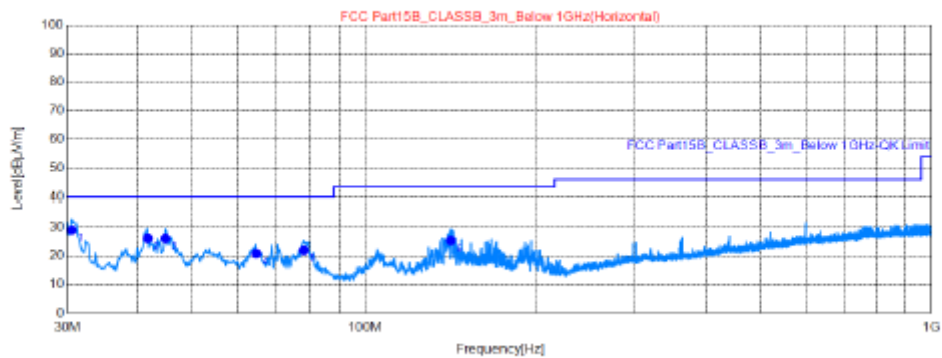
Radiated Emissions Range 30MHz~1GHz

Below is the worst test data

Channel	127.7kHz	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz~1GHz	Antenna Polarity	Horizontal
Mode	Operating		

Test Plot:

Test Graph



Final Data List

NO.	Freq. [MHz]	QP Reading [dBµV/m]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	30.58	40.69	-11.68	29.01	40.00	10.99	200	22	Horizontal
2	41.64	36.48	-10.37	26.11	40.00	13.89	200	6	Horizontal
3	44.74	36.42	-10.34	26.08	40.00	13.92	200	38	Horizontal
4	64.72	32.49	-11.67	20.82	40.00	19.18	200	221	Horizontal
5	77.91	36.33	-14.37	21.96	40.00	18.04	100	324	Horizontal
6	141.7	35.35	-9.98	25.37	43.50	18.13	200	310	Horizontal

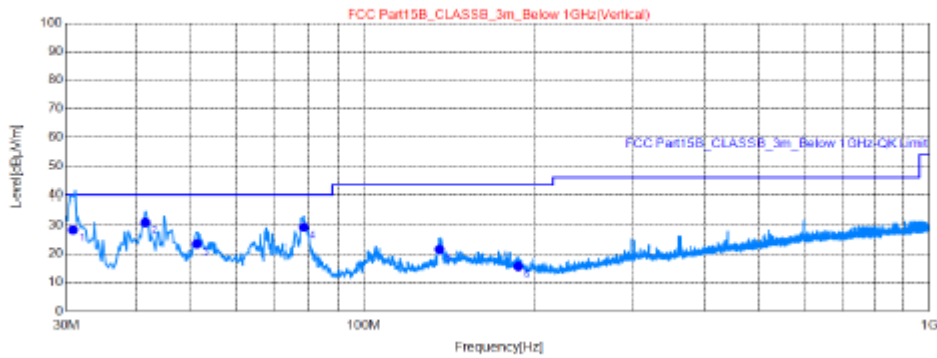
REMARKS:

- Emission Level(dBuV/m) = Spectrum reading (dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Limit value – Emission Level

Channel	127.7kHz	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz	Antenna Polarity	Vertical

Test Plot:

Test Graph



Final Data List

NO.	Freq. [MHz]	QP Reading [dB μ V/m]	Factor [dB]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	30.88	40.07	-11.65	28.42	40.00	11.58	117.2	99.5	Vertical
2	41.44	41.41	-10.38	31.03	40.00	8.97	100	108	Vertical
3	51.14	33.92	-10.41	23.51	40.00	16.49	200	317	Vertical
4	78.30	43.79	-14.46	29.33	40.00	10.67	200	78	Vertical
5	136.1	32.06	-10.44	21.62	43.50	21.88	100	295	Vertical
6	187.5	27.12	-11.53	15.59	43.50	27.91	200	208	Vertical

REMARKS:

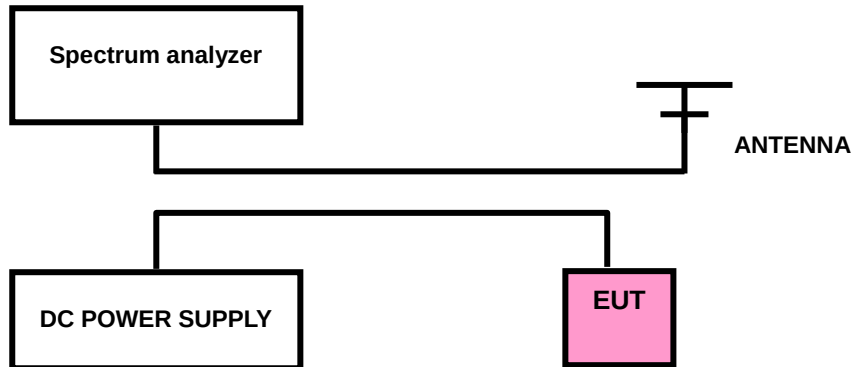
- Emission Level(dBuV/m) = Original Spectrum reading (dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Limit value – Emission Level

4.3 20dB Spectrum Bandwidth Measurement

4.3.1 Limit

Reporting only

4.3.2 Test Setup



4.3.3 Test Procedures

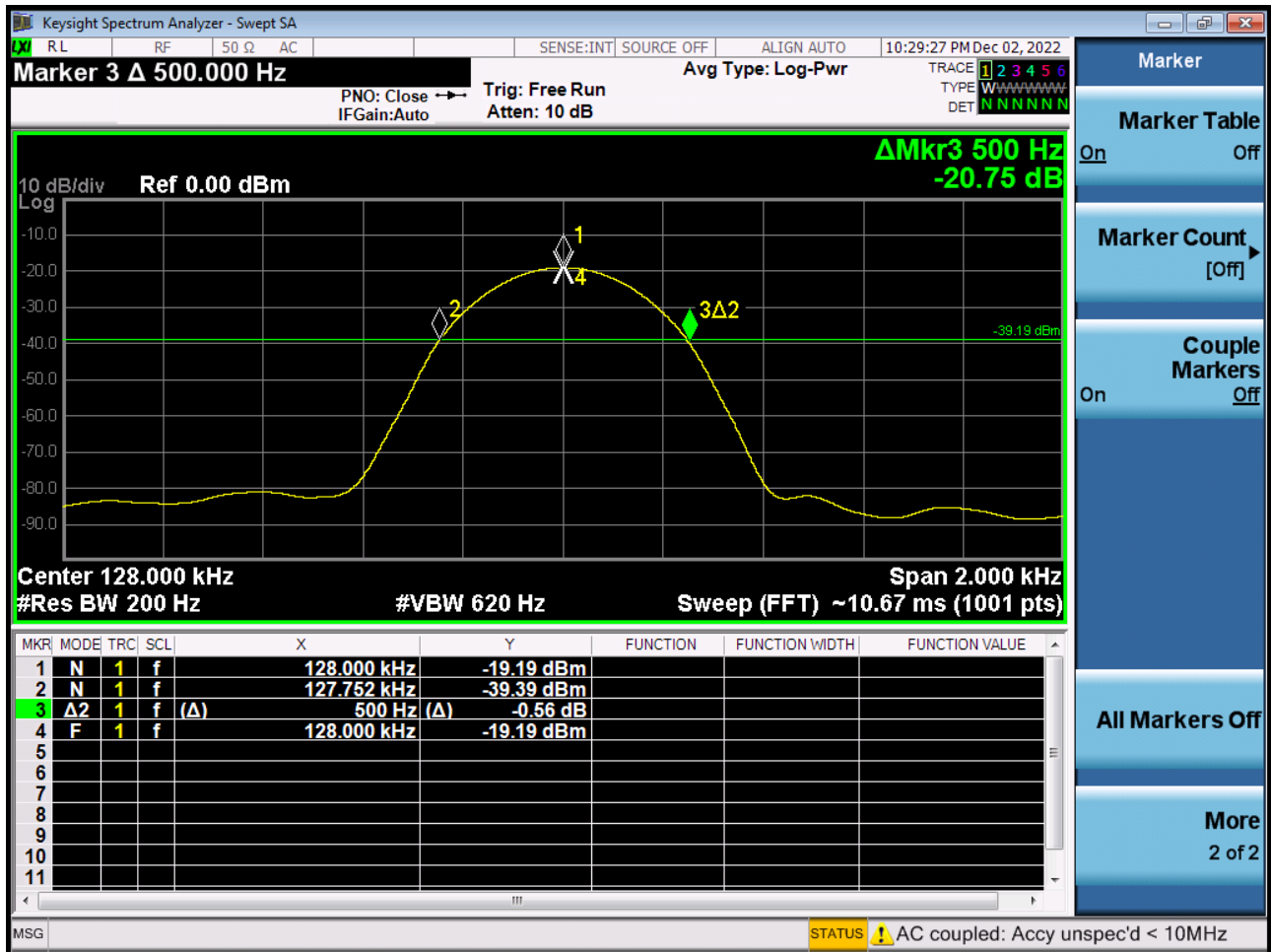
1. The resolution bandwidth of 200 Hz and the video bandwidth of 620 Hz were used.
2. EUT in peak Max hold mode.
3. Measured the spectrum width with power higher than 20dB below carrier.
4. Measured the 99% OBW.

4.3.4 Deviation of Test Standard

No deviation.

4.3.5 Test Results

TEST MODE	CHANNEL FREQUENCY (KHz)	20dB BANDWIDTH (Hz)
Wireless Charging	128.00	500



5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

--- END ---