



FCC RADIO TEST REPORT

FCC ID: 2AOKB-R5113

Product : Roav Smart Car Charger F0

Trade Name : Roav

Model Name : R5113

Serial Model : N/A

Report No. : SER180402009003E

Prepared for

Anker Innovations Limited
Room 1318-19, Hollywood Plaza, 610 Nathan Road, Mongkok,
Kowloon, Hong Kong

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name : Anker Innovations Limited
Address : Room 1318-19, Hollywood Plaza, 610 Nathan Road, Mongkok, Kowloon, Hong Kong
Manufacture's Name..... : Anker Innovations Limited
Address : Room 1318-19, Hollywood Plaza, 610 Nathan Road, Mongkok, Kowloon, Hong Kong

Product description

Product name : Roav Smart Car Charger F0
Model and/or type reference : R5113
Serial Model : N/A
Rating(s) : Input: DC12-24V, 2.5A Max
Output: DC 5V, 4.8A(2.4A Max Per Port)

Standards : FCC 47 CFR Part 15, Subpart C §15.239

Test procedure..... ANSI C63.10-2013

This device described above has been tested by NTEK, and 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 (s) of performance of tests: 03 May. 2018 ~ 21 May. 2018

Date of Issue.....: 21 May. 2018

Test Result.....: **Pass**

Testing Engineer : Allen Liu
(Allen Liu)

Technical Manager : Jason Chen
(Jason Chen)

Authorized Signatory : Sam. Chen
(Sam Chen)

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15, Subpart C (15.239)			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	N/A	
15.203	Antenna Requirement	Pass	
15.239	Radiated Spurious Emission	Pass	
15.239	Occupied Bandwidth	Pass	
15.205 15.239	Spurious Emission in Restricted Band	Pass	

1.1 TEST FACILITY

NTEK Testing Technology Co., Ltd

Add. : 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen P.R. China.

FCC FRN Registration No.: 463705; IC Registration No.:9270A-1

CNAS Registration No.:L5516

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded 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	Conducted Emission Test	$\pm 1.38\text{dB}$
2	RF power,conducted	$\pm 0.16\text{dB}$
3	Spurious emissions,conducted	$\pm 0.21\text{dB}$
4	All emissions,radiated(<1G)	$\pm 4.68\text{dB}$
5	All emissions,radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Roav Smart Car Charger F0	
Trade Name	Roav	
Model Name	R5113	
Serial Model	N/A	
Model Difference	N/A	
Product Description	The EUT is a Roav Smart Car Charger F0	
	Product Type	Low Power Communication Device Transmitter
	Operation Frequency:	88.1-107.9MHz
	Modulation Type:	FM
	Number Of Channel	199CH.
	Antenna Designation:	Spring antenna
	Antenna Gain(Peak)	1.2 dBi
Power supply	Field Strength:	45.7 dBuV/m
	☒ DC supply: Input: DC12-24V, 2.5A Max Output: DC 5V, 4.8A(2.4A Max Per Port)	
	☐ Adapter supply:	
Battery	N/A	
Hard Ware Version	CGBT1297_2815(HY-F0)_MAIN_V1.2	
Soft Ware Version	CGBT1297_2815_[CH]_[LX-G]_[CGF]_SDK3.0.1V0.2.3	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.2 DESCRIPTION OF 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.

Carrier Frequency and Channel list:

Channel	Frequency(MHz)
0	88.1
1	88.2
...	...
99	98.1
100	98.2
...	...
197	107.8
198	107.9

Note: $f_c = 88.1\text{MHz} + k \times 0.1\text{MHz}$ $k = 0$ to 198

Pretest Mode	Description
Mode 1	88.1MHz
Mode 2	98.1MHz
Mode 3	107.9MHz

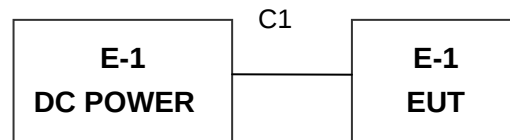
For Conducted Emission	
Final Test Mode	Description
N/A	N/A

For Radiated Emission	
Final Test Mode	Description
Mode 1	88.1MHz
Mode 2	98.1MHz
Mode 3	107.9MHz

Note:

- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) During testing, the EUT was actively playing music set to its maximum audio volume in order to generate the worst case emissions (e.g. to generate the maximum bandwidth during bandwidth test). No test tones were used for testing. The tuning range of the EUT was manually verified and the conclusion is that it only works at selected channels within 88.1-107.9MHz, not below and not above this range.

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

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.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Roav Smart Car Charger F0	Roav	R5113	N/A	EUT
E-2	DC POWER	N/A	N/A	N/A	Peripherals

Item	Shielded Type	Ferrite Core	Length	Note
C-1	DC Cable	NO	NO	1.2m

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation& Conducted Test equipment

	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	N9020A	MY49100060	2017.10.26	2018.10.25	1 year
2	Test Receiver	R&S	ESPI	101318	2017.06.06	2018.06.05	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2018.04.08	2019.04.07	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200983705	2017.06.06	2018.06.05	1 year
5	Horn Antenna	EM	EM-AH-10180	2011071402	2018.04.08	2019.04.07	1 year
6	Amplifier	EMC	EMC051835SE	980246	2017.08.09	2018.08.08	1 year
7	Test Cable (9KHz-30MHz)	N/A	R-01	N/A	2017.04.21	2020.04.20	3 year
8	Test Cable (30MHz-1GHz)	N/A	R-02	N/A	2017.04.21	2020.04.20	3 year
9	temporary antenna connector (Note)	NTS	R001	N/A	N/A	N/A	N/A

3. ANTENNA REQUIREMENT

3.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: 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.

3.2 EUT ANTENNA

The EUT antenna is permanent attached spring antenna. It comply with the standard requirement.

3.3 CONDUCTED EMISSION MEASUREMENT

3.3.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

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

Note: 1. *Decreases with the logarithm of the frequency
2. The lower limit shall apply at the transition frequencies
3. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

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

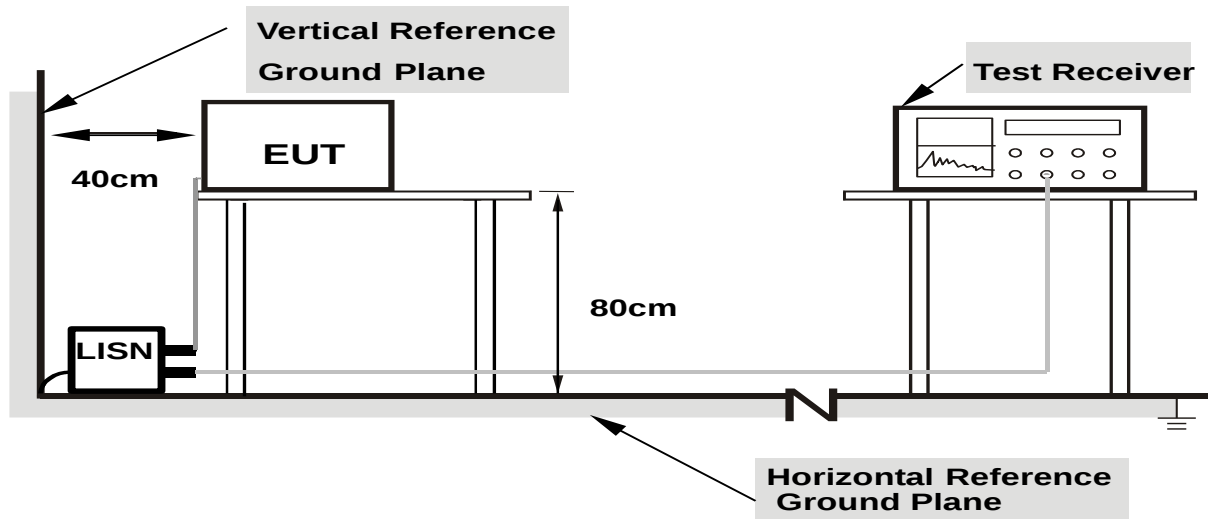
3.3.2 TEST PROCEDURE

- The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 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 at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.3.3 DEVIATION FROM TEST STANDARD

No deviation

3.3.4 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 from other units and other metal planes

3.2.5 TEST RESULT

EUT :	Roav Smart Car Charger F0	Model Name. :	R5113
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N/A
Test Voltage :	N/A	Test Mode :	N/A

Note: Not applicable

3.4 RADIATED EMISSION MEASUREMENT

3.4.1 Radiated Emission Limits (FCC 15.209)

Frequencies (MHz)	Field Strength (micorvolts/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
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission level (dBuV/m)=20log Emission level (uV/m).

LIMITS OF RADIATED EMISSION MEASUREMENT (FCC 15.239)

Frequency of Emission (MHz)	Field Strength of fundamental (dBμV/m)	
88-108	Peak	QP
	68	68

Notes:

- (1) Fcc part15.239 (b) The field strength of any emissions within the permitted 200 kHz band shall not exceed 250 microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emissions apply.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1MHz / 1MHz for Peak

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.4.2 TEST PROCEDURE

- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m.
- d. 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.
- e. 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.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

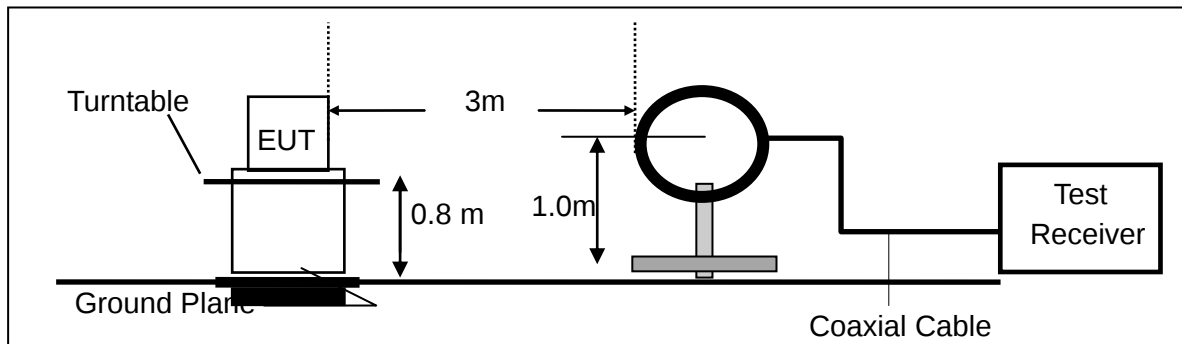
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.4.3 DEVIATION FROM TEST STANDARD

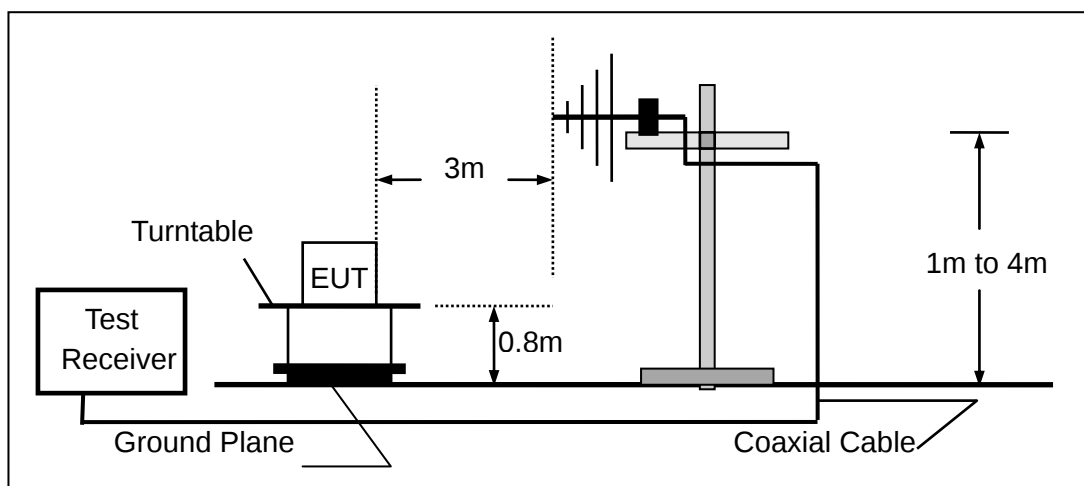
No deviation

3.4.4 TEST SETUP

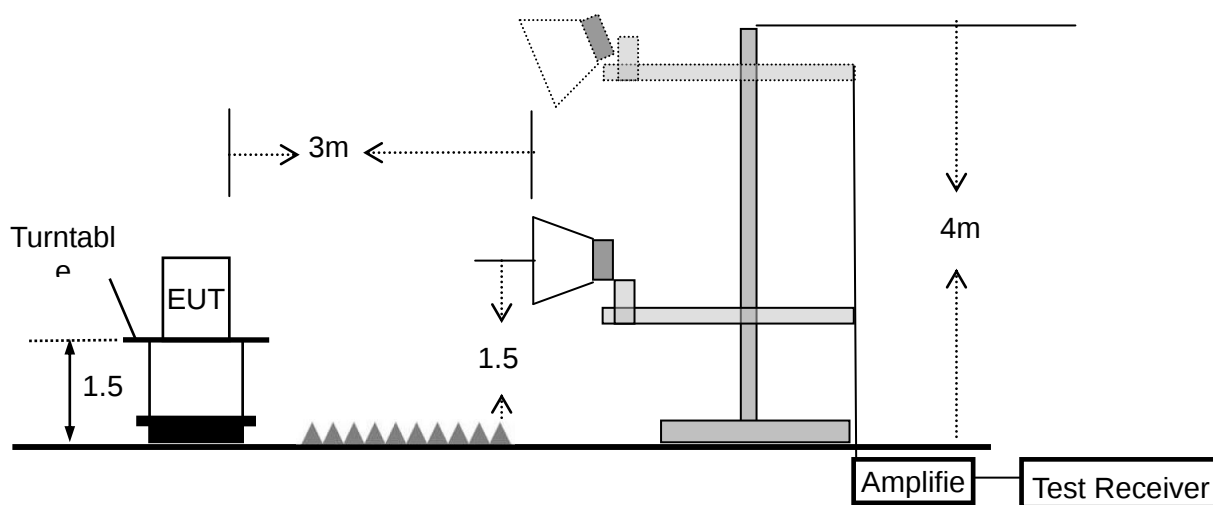
(a) For radiated emissions below 30MHz



(b) For radiated emissions from 30MHz to 1000MHz



(c) For radiated emissions above 1000MHz



3.4.5 TEST RESULTS (BLOW 30MHz)

EUT :	Roav Smart Car Charger F0	Model Name. :	R5113
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 12.0V
Test Mode :	TX	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $20 \log (\text{specific distance/test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

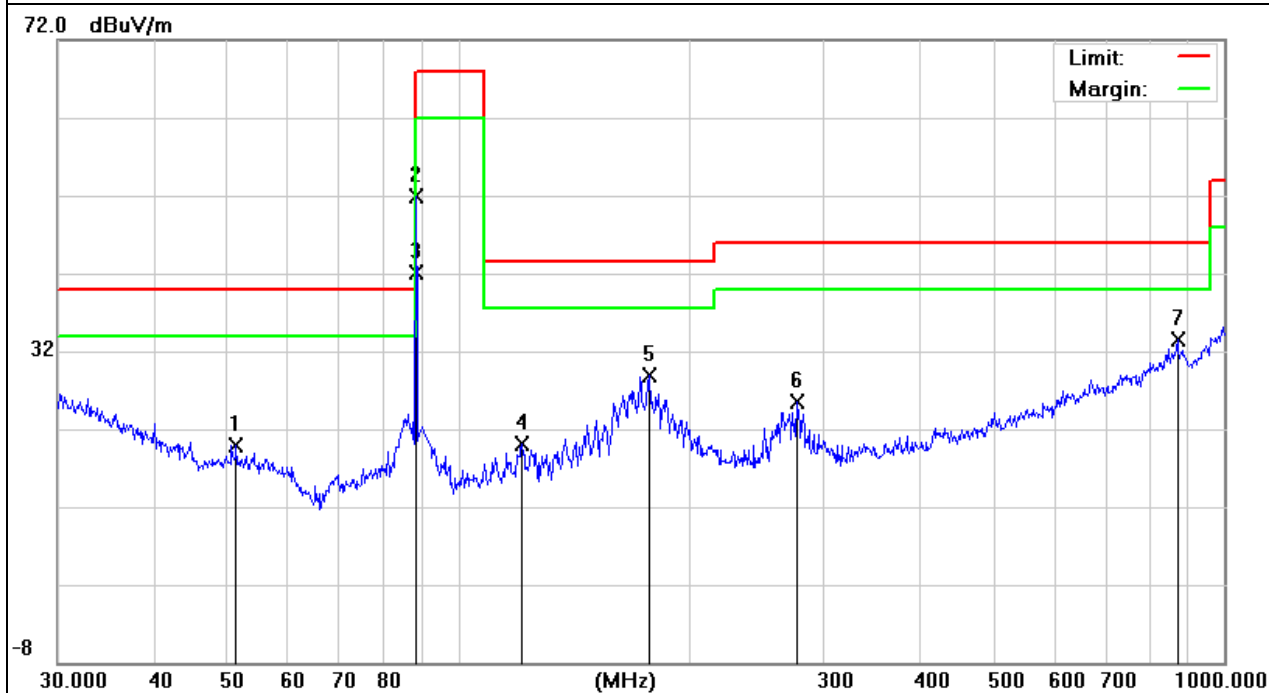
3.4.6 TEST RESULTS (BETWEEN 30 – 1000 MHZ)

EUT :	Roav Smart Car Charger F0	Model Name :	R5113
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 12.0V
Test Mode :	88.1MHz	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
51.3004	6.70	13.29	19.99	40.00	-20.01	QP
88.1000	40.17	11.76	51.93	68.00	-16.07	peak
88.1000	30.26	11.76	42.02	68.00	-25.98	QP
121.1230	9.44	10.61	20.05	43.50	-23.45	QP
177.5092	16.19	12.69	28.88	43.50	-14.62	QP
277.0935	11.42	14.03	25.45	46.00	-20.55	QP
869.1301	7.51	25.93	33.44	46.00	-12.56	QP

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

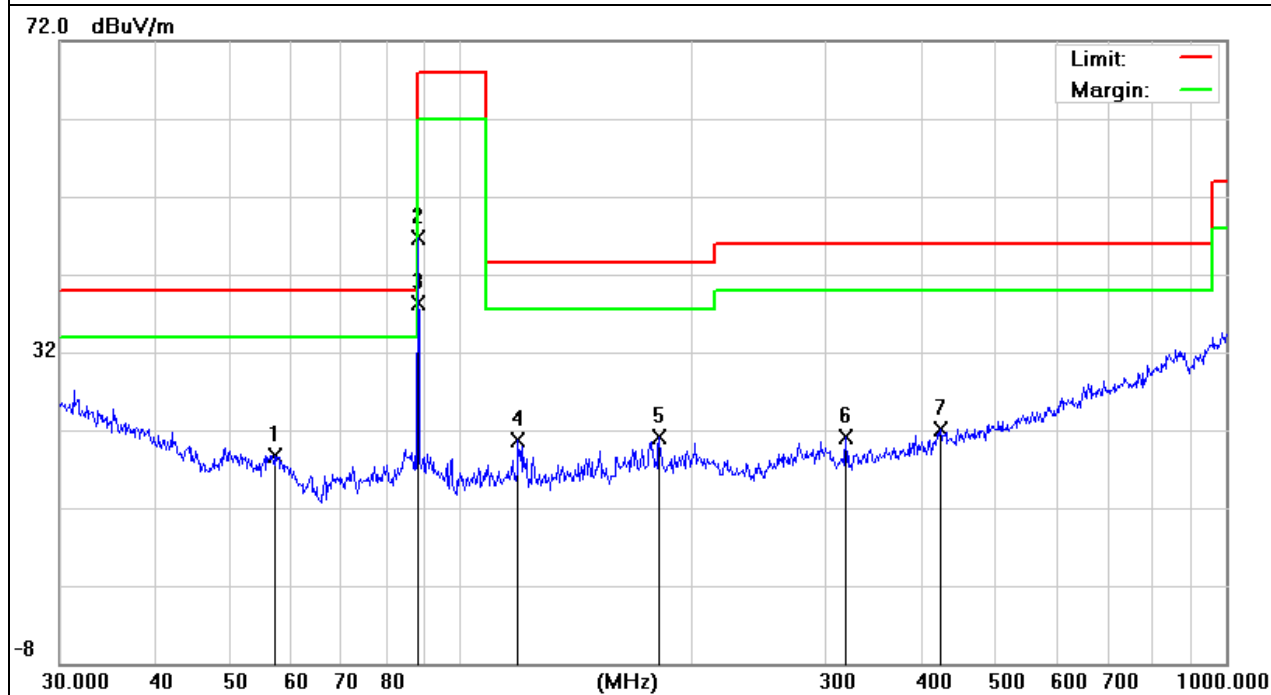


EUT :	Roav Smart Car Charger F0	Model Name :	R5113
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 12.0V
Test Mode :	88.1MHz	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
57.1914	6.88	11.88	18.76	40.00	-21.24	QP
88.1000	35.02	11.76	46.78	68.00	-21.22	peak
88.1000	26.49	11.76	38.25	68.00	-29.75	QP
119.0180	10.20	10.51	20.71	43.50	-22.79	QP
181.9201	8.29	12.73	21.02	43.50	-22.48	QP
318.8170	7.66	13.39	21.05	46.00	-24.95	QP
423.5403	5.31	16.71	22.02	46.00	-23.98	QP

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

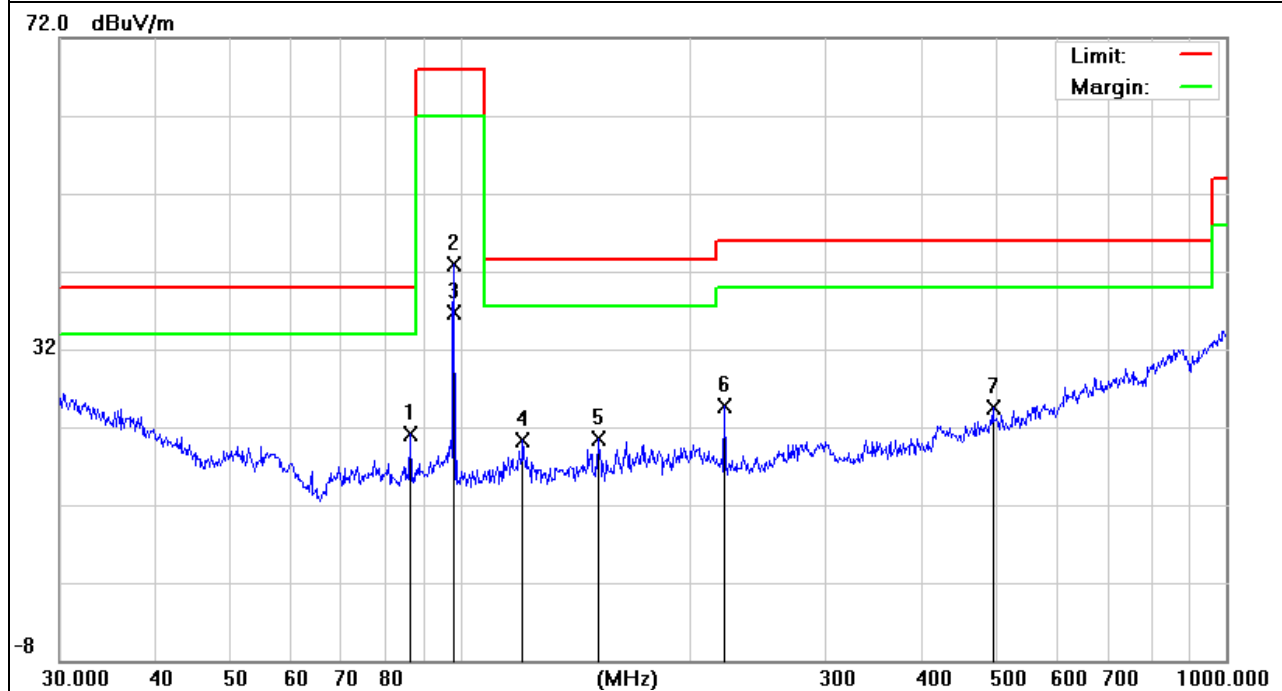


EUT :	Roav Smart Car Charger F0	Model Name :	R5113
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 12.0V
Test Mode :	98.1MHz	Polarization :	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
86.2001	9.77	11.25	21.02	40.00	-18.98	QP
98.1419	32.77	10.23	43.00	68.00	-25.00	peak
98.1419	26.46	10.23	36.69	68.00	-31.31	QP
120.6991	9.72	10.62	20.34	43.50	-23.16	QP
151.5971	9.20	11.22	20.42	43.50	-23.08	QP
221.3920	12.57	12.21	24.78	46.00	-21.22	QP
495.9343	6.96	17.54	24.50	46.00	-21.50	QP

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

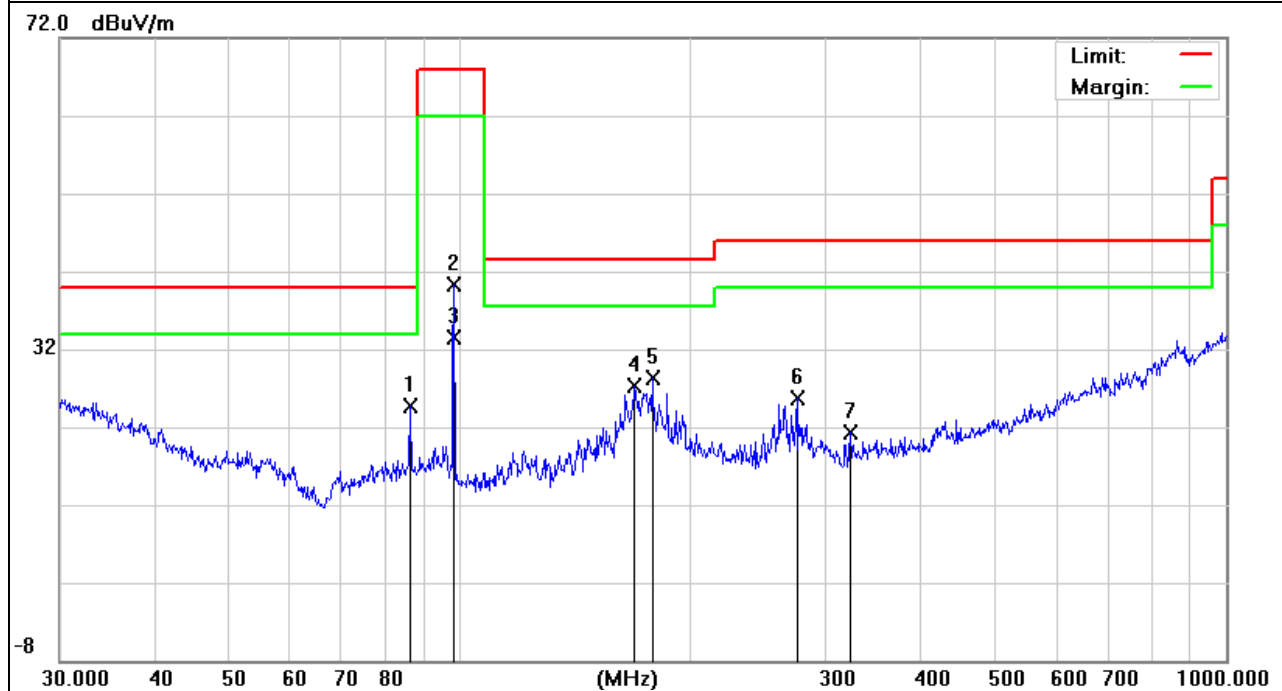


EUT :	Roav Smart Car Charger F0	Model Name :	R5113
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 12.0V
Test Mode :	98.1MHz	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
85.8983	13.56	11.20	24.76	40.00	-15.24	QP
98.1419	30.13	10.23	40.36	68.00	-27.64	peak
98.1419	23.36	10.23	33.59	68.00	-34.41	QP
169.0054	14.70	12.61	27.31	43.50	-16.19	QP
178.1325	15.50	12.71	28.21	43.50	-15.29	QP
275.1569	11.71	13.97	25.68	46.00	-20.32	QP
323.3204	7.76	13.57	21.33	46.00	-24.67	QP

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

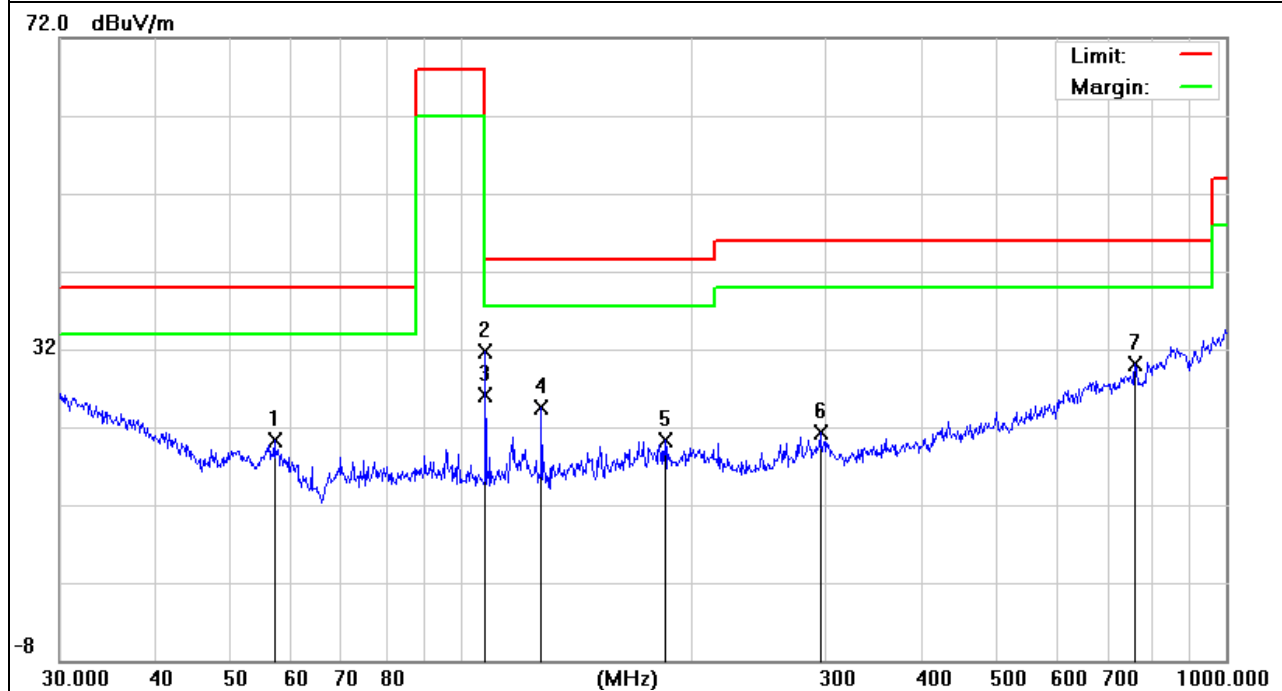


EUT :	Roav Smart Car Charger F0	Model Name :	R5113
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 12.0V
Test Mode :	107.9MHz	Polarization :	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
57.1914	8.39	11.88	20.27	40.00	-19.73	QP
107.8876	21.36	10.28	31.64	68.00	-36.36	peak
107.8877	15.74	10.28	26.02	68.00	-41.98	QP
127.6645	14.07	10.53	24.60	43.50	-18.90	QP
185.1379	7.66	12.70	20.36	43.50	-23.14	QP
295.1469	6.77	14.60	21.37	46.00	-24.63	QP
760.7036	7.79	22.32	30.11	46.00	-15.89	QP

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

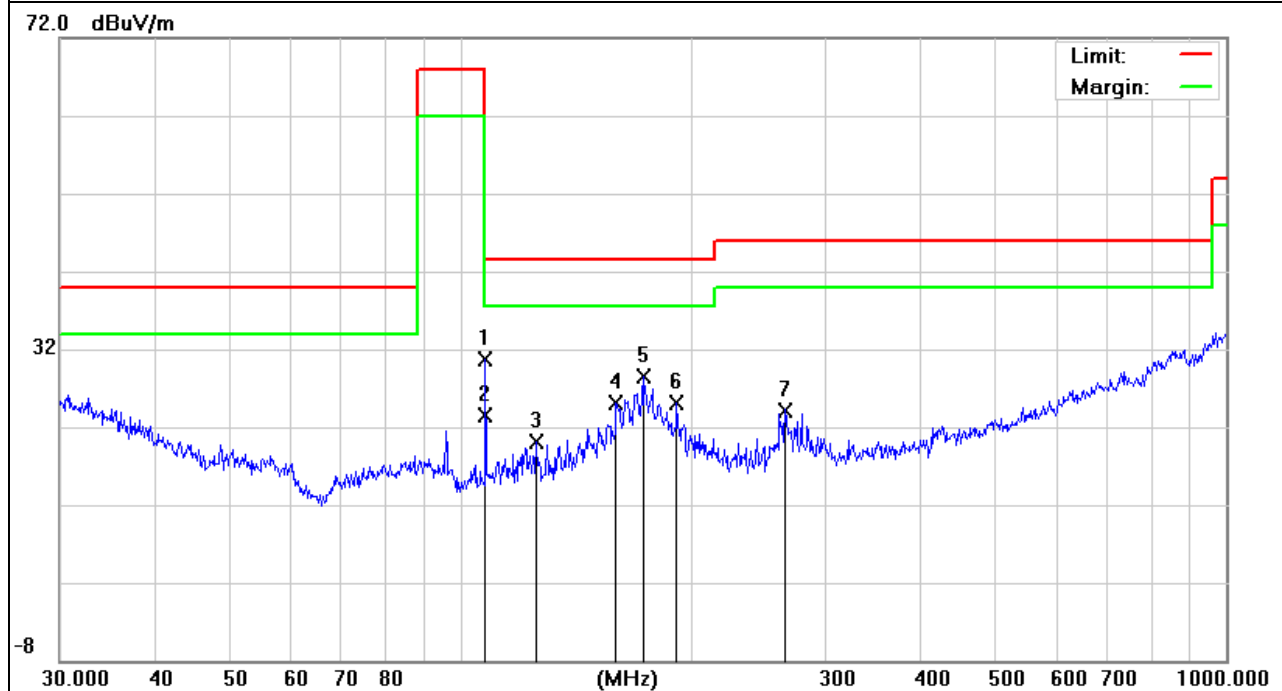


EUT :	Roav Smart Car Charger F0	Model Name :	R5113
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 12.0V
Test Mode :	107.9MHz	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
107.8876	20.42	10.28	30.70	68.00	-37.30	peak
107.8877	13.32	10.28	23.60	68.00	-44.40	QP
125.4457	9.60	10.56	20.16	43.50	-23.34	QP
159.7844	12.79	12.23	25.02	43.50	-18.48	QP
173.2050	15.77	12.64	28.41	43.50	-15.09	QP
191.7450	12.02	13.08	25.10	43.50	-18.40	QP
265.6757	10.75	13.45	24.20	46.00	-21.80	QP

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



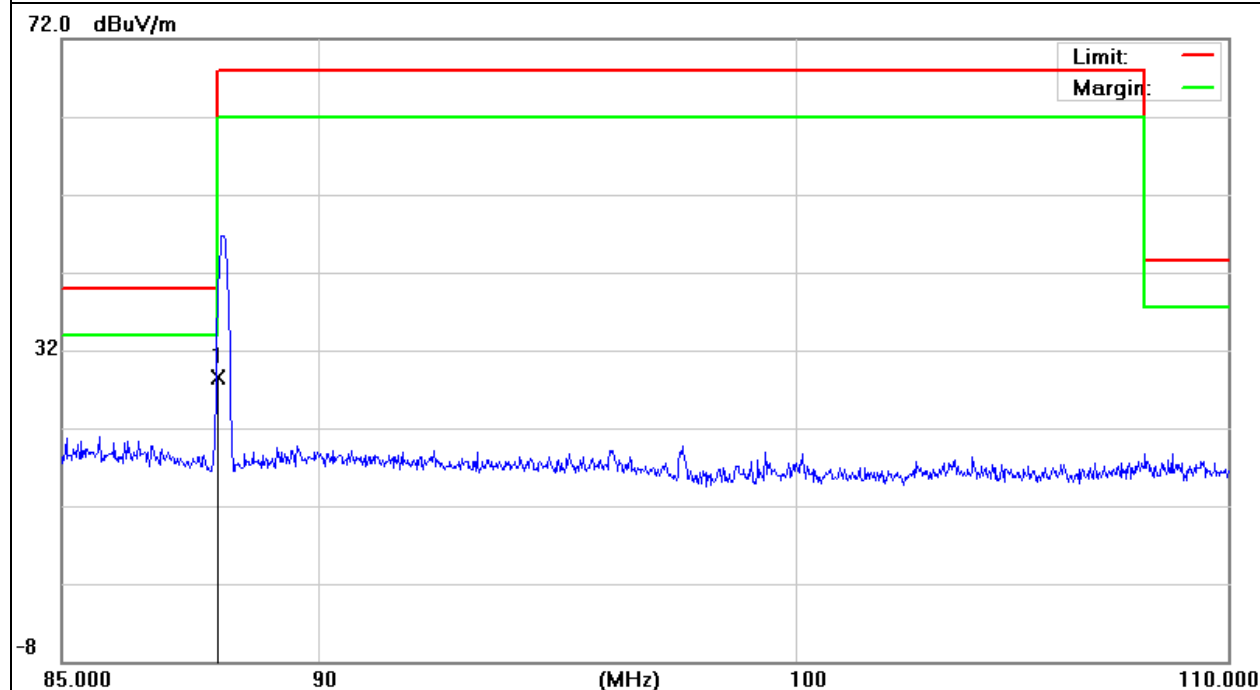
3.4.7 TEST RESULTS (BAND EDGE EMISSION)

EUT :	Roav Smart Car Charger F0	Model Name :	R5113
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 12.0V
Test Mode :	88.1MHz	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
88.0000	16.74	11.76	28.50	40.00	-11.50	QP

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

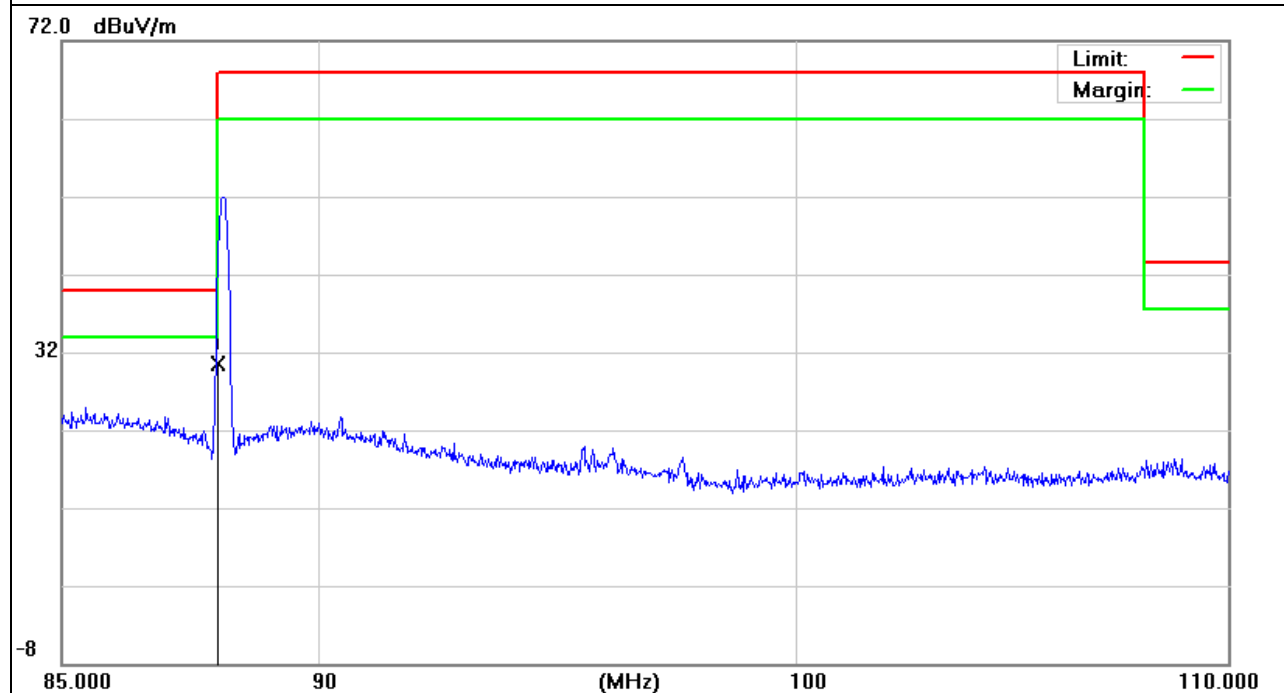


EUT :	Roav Smart Car Charger F0	Model Name :	R5113
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 12.0V
Test Mode :	88.1MHz	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
88.0000	18.74	11.76	30.50	40.00	-9.50	QP

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

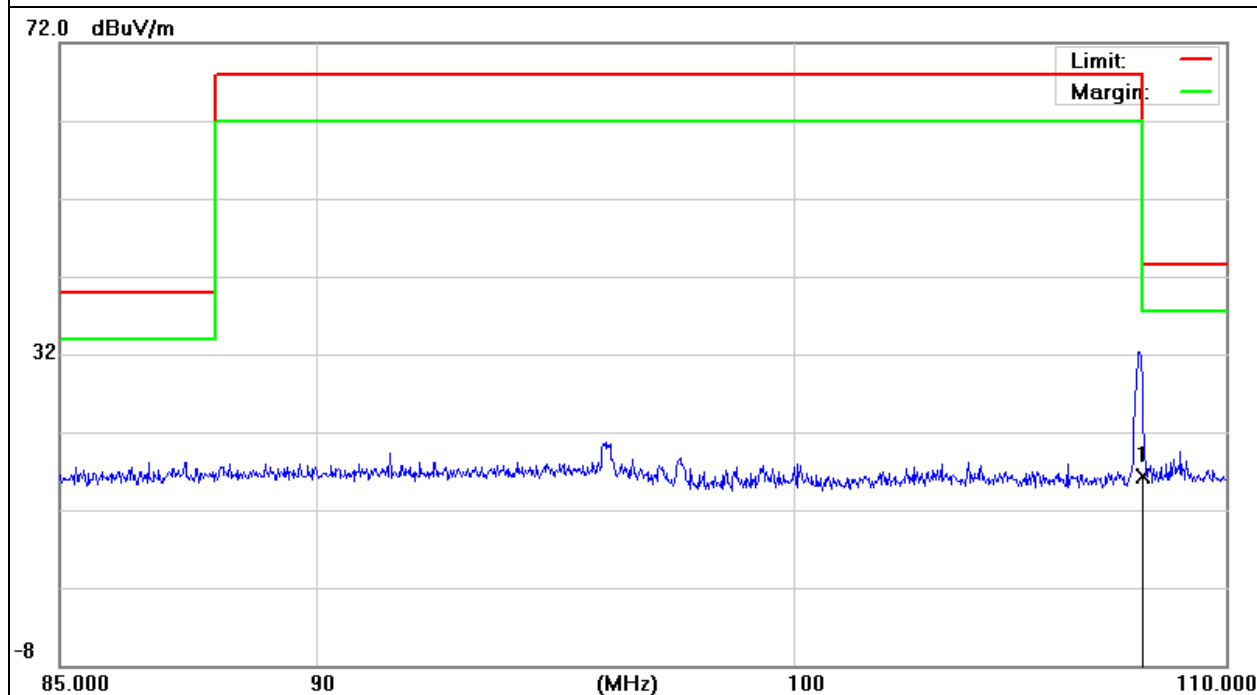


EUT :	Roav Smart Car Charger F0	Model Name :	R5113
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 12.0V
Test Mode :	107.9MHz	Polarization :	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
108.0000	6.02	10.28	16.30	43.50	-27.20	QP

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

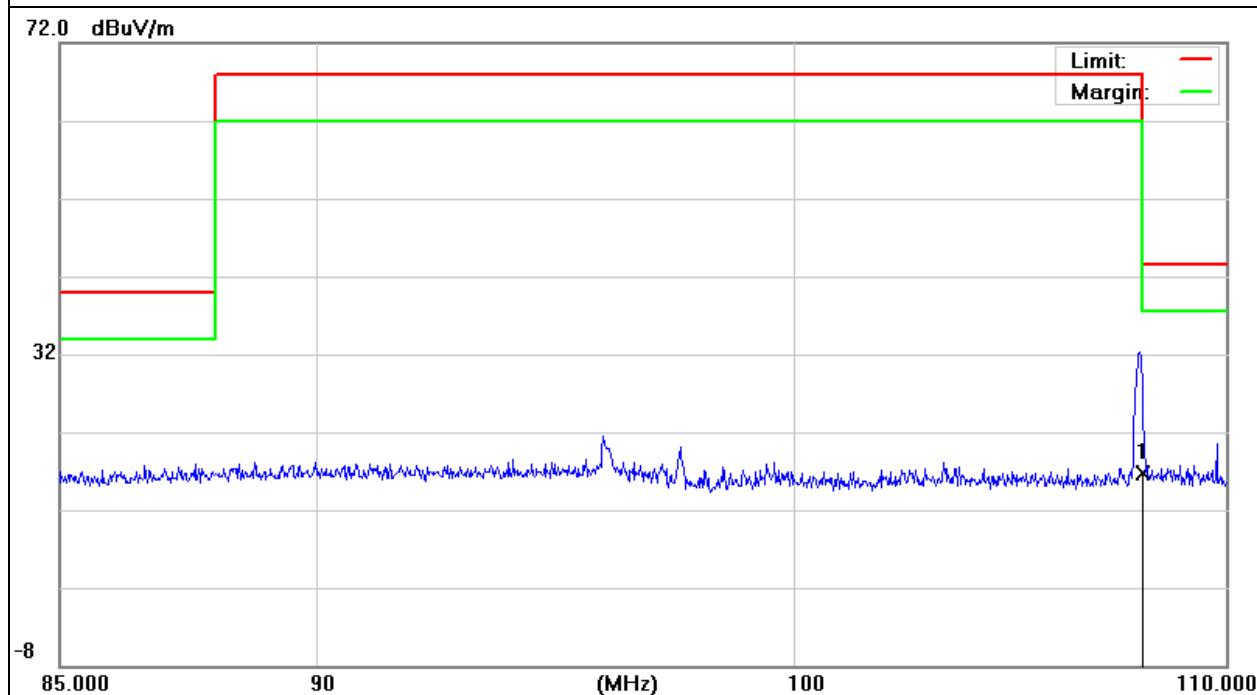


EUT :	Roav Smart Car Charger F0	Model Name :	R5113
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 12.0V
Test Mode :	107.9MHz	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
108.0000	6.52	10.28	16.80	43.50	-26.70	QP

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.



4. BANDWIDTH TEST

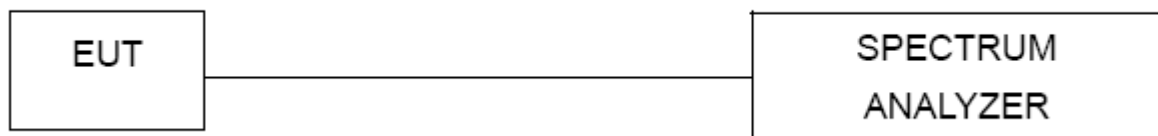
4.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting : RBW= 10KHz, VBW $\geq$ RBW, Sweep time = Auto.

4.2 DEVIATION FROM STANDARD

No deviation.

4.3 TEST SETUP

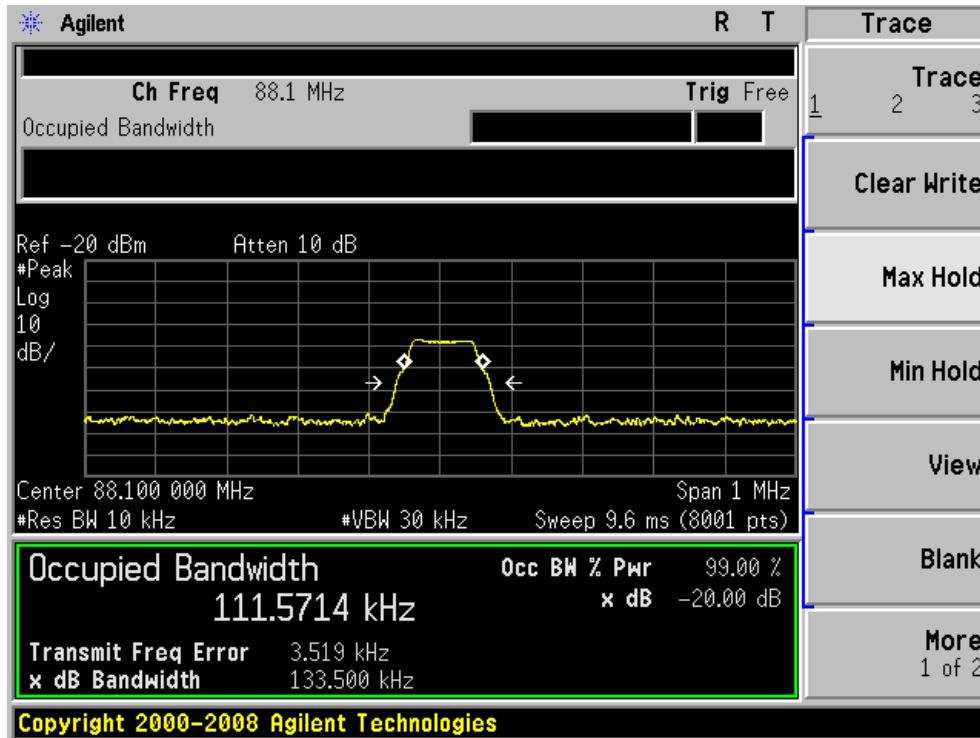


4.4 TEST RESULTS

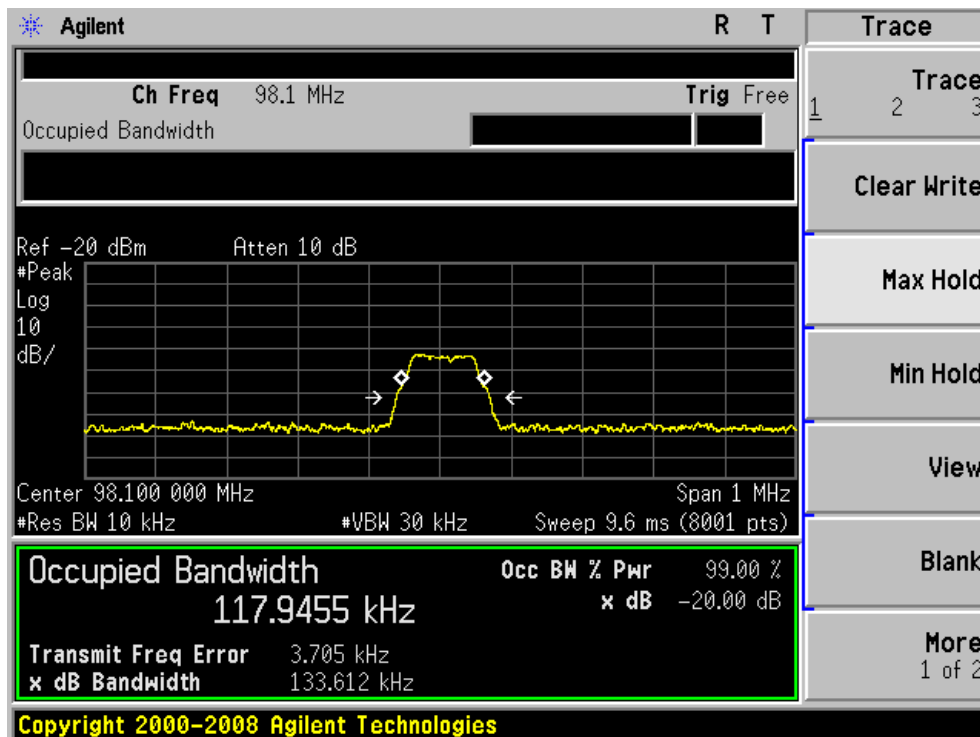
EUT :	Roav Smart Car Charger F0	Model Name :	R5113
Temperature :	26 °C	Relative Humidity :	53%
Pressure :	1020 hPa	Test Power :	DC 12.0V
Test Mode :	TX		

Test Channel	Frequency (MHz)	20 dBc Bandwidth (KHz)	Limit (KHz)
Low	88.1	133.500	200
Mid	98.1	133.612	200
High	107.9	166.193	200

The Lowest Channel:88.1MHz



The Middle Channel: 98.1MHz



The High Channel:107.9MHz

