TEST REPORT

of

FCC Part 15 Subpart C §15.209

FCC ID : 2ANS4-KWA-01

Equipment Under Test	:	Kabis Wireless Charger
Model Name	:	KWA-01
Applicant	:	BOO YOUNG INDUSTRY CO.
Manufacturer	:	BOO YOUNG INDUSTRY CO.
Date of Receipt	:	2017.06.13
Date of Test(s)	:	2017.09.06 ~ 2017.09.13
Date of Issue	:	2017.10.27

In the configuration tested, the EUT complied with the standards specified above.

Tested By: **Date:** **2017.10.27**

Jinhyoung Cho

Technical Manager: **Date:** **2017.10.27**

Harim Lee

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1. General information

1.1. Testing laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)
- Wireless Div. 2FL, 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807

All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx.

Phone No. : +82 31 688 0901
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1.2. Details of applicant

Applicant : BOO YOUNG INDUSTRY CO.
Address : Gasan-myeon, 1266-10, Hoguk-ro, Chilgok-gun, Gyeongsangbuk-do, Korea
Contact Person : Lee, Young-Kwon
Phone No. : +82 54 972 5500

1.3. Details of manufacturer

Applicant : BOO YOUNG INDUSTRY CO.
Address : Gasan-myeon, 1266-10, Hoguk-ro, Chilgok-gun, Gyeongsangbuk-do, Korea

1.4. Description of EUT

Kind of Product	Kabis Wireless Charger
Model Name	KWA-01
Power Supply	DC 12 V
Frequency Range	137 ㎑ ~ 183 ㎑
Antenna Type	Inductive loop coil antenna
H/W Version	FWTKA11C_Rev0.5C

1.5. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Interval	Cal. Due
Spectrum Analyzer	R&S	FSV30	100768	Mar. 20, 2017	Annual	Mar. 20, 2018
Signal Generator	R&S	SMBV100A	259067	Jun. 15, 2017	Annual	Jun. 15, 2018
DC Power Supply	Agilent	U8002A	MY50020026	Dec. 14, 2016	Annual	Dec. 14, 2017
Test Receiver	R&S	ESU26	100109	Feb. 17, 2017	Annual	Feb. 17, 2018
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Aug. 23, 2017	Biennial	Aug. 23, 2019
Turn Table	Innco systems GmbH	DS 1200 S	N/A	N.C.R.	N/A	N.C.R.
Anechoic Chamber	SY Corporation	L × W × H (9.6 m × 6.4 m × 6.6 m)	N/A	N.C.R.	N/A	N.C.R.
Shield Room	SY Corporation	L × W × H (6.5 m × 3.5 m × 3.5 m)	N/A	N.C.R.	N/A	N.C.R.
Controller	Innco systems GmbH	CONTROLLER CO3000-4P	CO3000/963/38330516/L	N. C. R.	N/A	N.C.R.
Coxial Cable	SUCOFLEX	104 (3m)	MY3258414	N.C.R.	N/A	N.C.R.
Coxial Cable	SUCOFLEX	104 (10m)	MY3145814	N.C.R.	N/A	N.C.R.

▶ Support equipment

Description	Manufacturer	Model	FCC ID
Samsung Mobile Phone	Samsung Electronics Co., Ltd.	SM-G930V	A3LSMG930US

1.6. Sample calculation

Where relevant, the following sample calculation is provided:

Field strength level (dBμV/m) = Measured level (dBμV) + Antenna factor (dB) + Cable loss (dB)

1.7. Worst case of test configurations

In order to check all kinds of possible configurations, EUT was evaluated with appropriate client and under each charging condition as below table.

EUT configuration	Description
Charging Mode with client device (Model : SM-G930V, FCC ID : A3LSMG930US)	Less than 1 % of battery
	Less than 50 % of battery
	100 % full charging of battery

1.8. Summary of Test Results

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15 Subpart C §15.209		
Section in FCC Part 15 Subpart C	**Test Item**	**Result**
15.209	Radiated emission, Spurious Emission and Field Strength of Fundamental	Complied
2.1049	20 ㏈ Bandwidth	Complied

Remark;

Due to the frequency range of the device (137 ㎑ ~ 183 ㎑) is less than 1 ㎒, so we didn't perform Highest and lowest frequency according to 15.31 requirement.

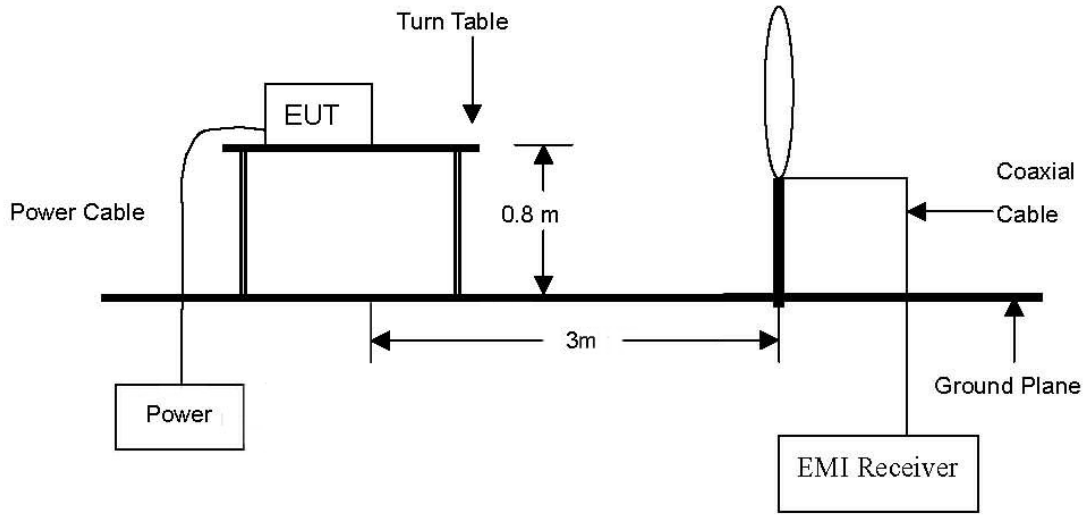
1.9. Test Report Revision

Revision	Report number	Date of Issue	Description
0	F690501/RF-RTL011866	2017.10.11	Initial
1	F690501/RF-RTL011866-1	2017.10.27	Listed coaxial cable in the equipment list

2. Field Strength of Fundamental and Spurious Emission

2.1. Test Setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒.



2.2. Limit

2.2.1. Radiated emission limits, general requirements

According to §15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (㎒)	Field Strength (microvolts/meter)	Measurement Distance (meter)
0.009 - 0.490	2 400/F(㎑)	300
0.490 - 1.705	24 000/F(㎑)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 ㎒, 76-88 ㎒, 174-216 ㎒ or 470-806 ㎒. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections §15.231 and §15.241

2.3. Test Procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.10:2013.

2.3.1. Test Procedures for emission from 9 ㎑ to 30 ㎒

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
b. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel and perpendicular of the antenna are set to make the measurement.
c. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading.
d. The test-receiver system was set to Quasi and Average Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note;

Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 meter open field test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788 D01 v01.

2.4. Field Strength of Fundamental Test Result

Ambient temperature : (23 ± 1) ℃
Relative humidity : 47 % R.H.

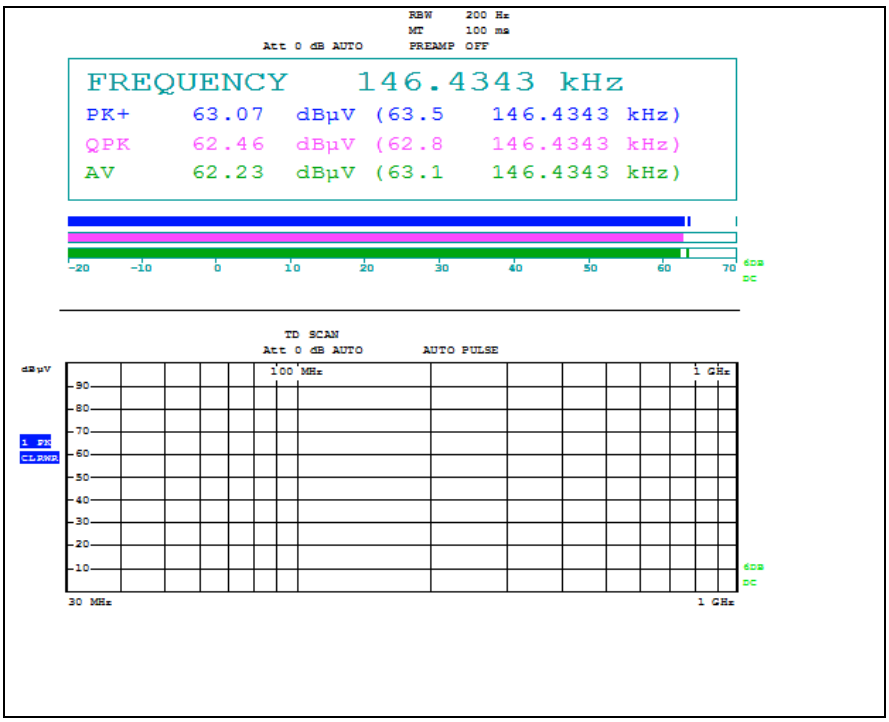
The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical. The field strength of spurious emission was measured in one orthogonal EUT position (X-axis).

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dB㎶/m) at 3 m	Actual (dB㎶/m) at 300 m	Limit (dB㎶/m) at 300 m	Margin (dB)
Charging mode with client (less than 1 % battery status)									
0.146	63.10	Average	H	19.68	0.06	82.84	2.84	24.32	21.48
Charging mode with client (less than 50 % battery status)									
0.146	63.10	Average	H	19.68	0.06	82.84	2.84	24.32	21.48
Charging mode with client (100 % battery status)									
0.146	63.10	Average	H	19.68	0.06	82.84	2.84	24.32	21.48

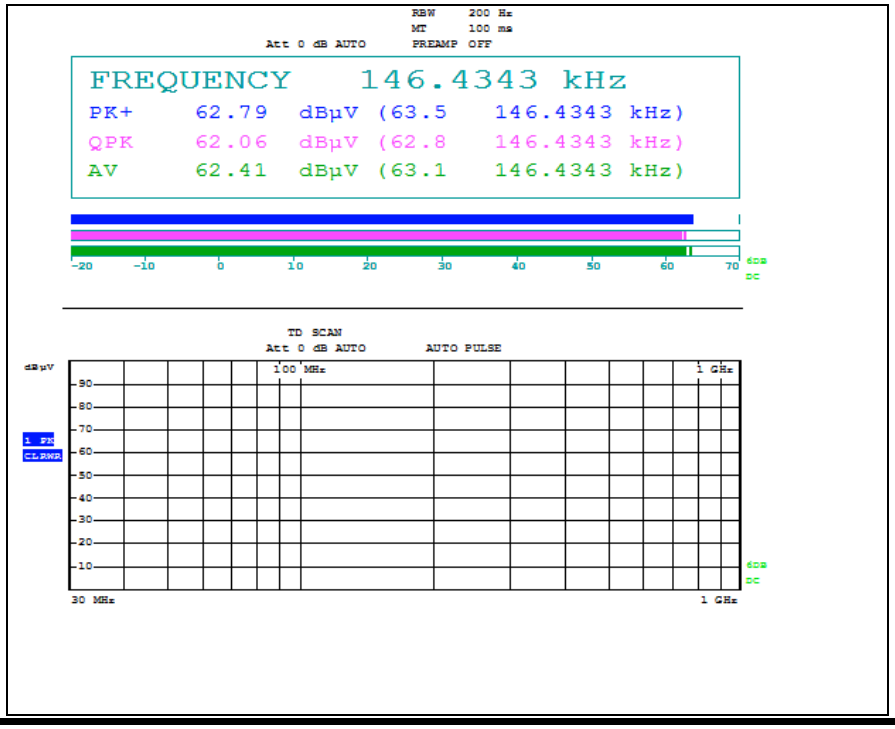
Note;
1. According to §15.31 (f)(2) 300 m Result (dB㎶/m) = 3 m Result (dB㎶/m) - 40log(300/3) (dB㎶/m).
2. According to §15.209 (d), the measurements were tested by using Quasi peak detector except for the frequency bands 9 – 90 ㎑, 110 – 490 ㎑ and above 1 ㎓ in these three bands on measurements employing an average detector.
3. The limit above was calculated based on table of §15.209 (a).

Test plots

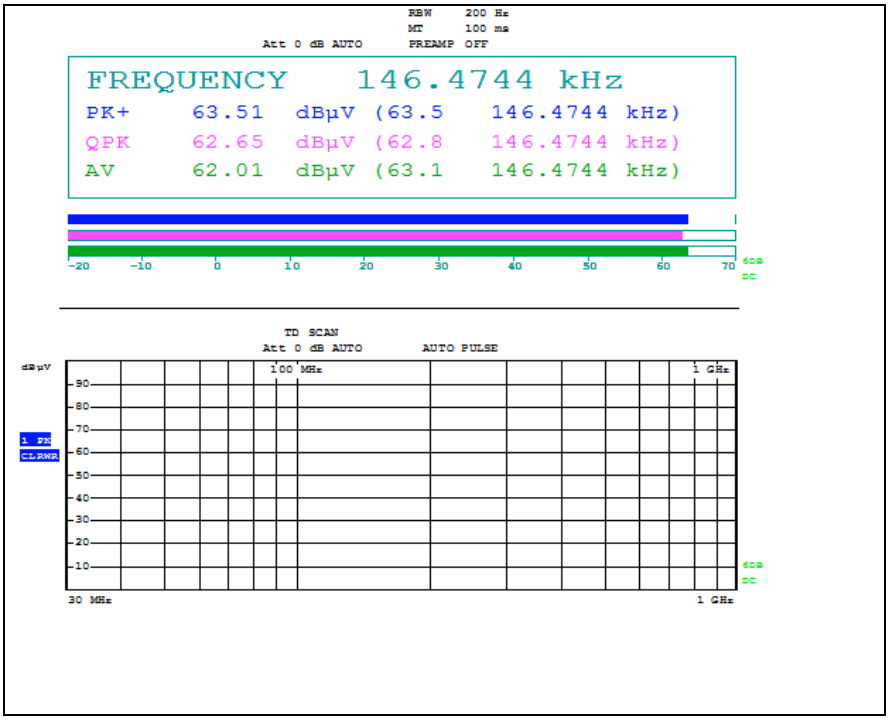
Charging mode (less than 1 % battery status of client device)



Charging mode (less than 50 % battery status of client device)



Charging mode (100 % battery status of client device)



2.5. Spurious Emission Test Result

Ambient temperature : (23 ± 1) ℃
Relative humidity : 47 % R.H.

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Charging mode with client device (less than 1 % battery status of client device)

- Band Edge

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dB㎶/m) at 3 m	Actual (dB㎶/m) at 300 m	Limit (dB㎶/m) at 300 m	Margin (dB)
0.096	8.50	Quasi Peak	H	19.71	0.03	28.24	-51.76	27.96	79.72

-Spurious

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dB㎶/m) at 3 m	Actual (dB㎶/m) at 300 m	Limit (dB㎶/m) at 300 m	Margin (dB)
0.067	24.10	Average	H	19.75	0.02	43.87	-36.13	31.08	67.21
0.122	21.40	Average	H	19.69	0.05	41.14	-38.86	25.88	64.74
0.439	40.70	Average	H	19.60	0.10	60.40	-19.60	14.75	34.35

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dB㎶/m) at 3 m	Actual (dB㎶/m) at 30 m	Limit (dB㎶/m) at 30 m	Margin (dB)
0.732	31.40	Quasi Peak	H	19.65	0.10	51.15	11.15	30.31	19.16
1.025	25.20	Quasi Peak	H	19.70	0.10	45.00	5.00	27.39	22.39
Above 2.000	Not detected	-	-	-	-	-	-	-	-

Charging mode with client device (less than 50 % battery status of client device)

- Band Edge

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dB㎶/m) at 3 m	Actual (dB㎶/m) at 300 m	Limit (dB㎶/m) at 300 m	Margin (dB)
0.098	11.80	Quasi Peak	H	19.70	0.03	31.53	-48.47	27.78	76.25

-Spurious

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dB㎶/m) at 3 m	Actual (dB㎶/m) at 300 m	Limit (dB㎶/m) at 300 m	Margin (dB)
0.067	24.70	Average	H	19.75	0.02	44.47	-35.53	31.08	66.61
0.122	21.40	Average	H	19.69	0.05	41.14	-38.86	25.88	64.74
0.435	41.10	Average	H	19.60	0.10	60.80	-19.20	14.83	34.03

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dB㎶/m) at 3 m	Actual (dB㎶/m) at 30 m	Limit (dB㎶/m) at 30 m	Margin (dB)
0.726	32.20	Quasi Peak	H	19.65	0.10	51.95	11.95	30.39	18.44
1.016	25.80	Quasi Peak	H	19.70	0.10	45.60	5.60	27.47	21.87
Above 2.000	Not detected	-	-	-	-	-	-	-	-

Charging mode with client device (100 % battery status of client device)

- Band Edge

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dB㎶/m) at 3 m	Actual (dB㎶/m) at 300 m	Limit (dB㎶/m) at 300 m	Margin (dB)
0.105	16.80	Quasi Peak	H	19.70	0.03	36.53	-43.47	27.18	70.65

-Spurious

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dB㎶/m) at 3 m	Actual (dB㎶/m) at 300 m	Actual (dB㎶/m) at 300 m	Margin (dB)
0.067	24.40	Average	H	19.75	0.02	44.17	-35.83	31.08	66.91
0.122	21.00	Average	H	19.69	0.05	40.74	-39.26	25.88	65.14
0.435	41.10	Average	H	19.60	0.10	60.80	-19.20	14.83	34.03

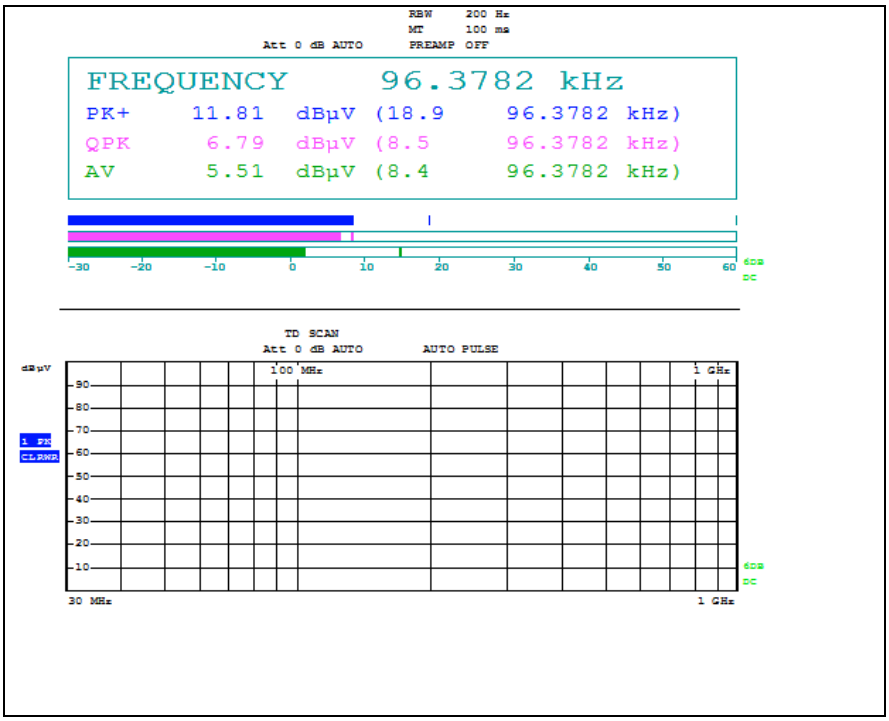
Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dB㎶/m) at 3 m	Actual (dB㎶/m) at 30 m	Limit (dB㎶/m) at 30 m	Margin (dB)
0.726	32.30	Quasi Peak	H	19.65	0.10	52.05	12.05	30.39	18.34
1.017	25.50	Quasi Peak	H	19.70	0.10	45.30	5.30	27.46	22.16
Above 2.000	Not detected	-	-	-	-	-	-	-	-

Note;

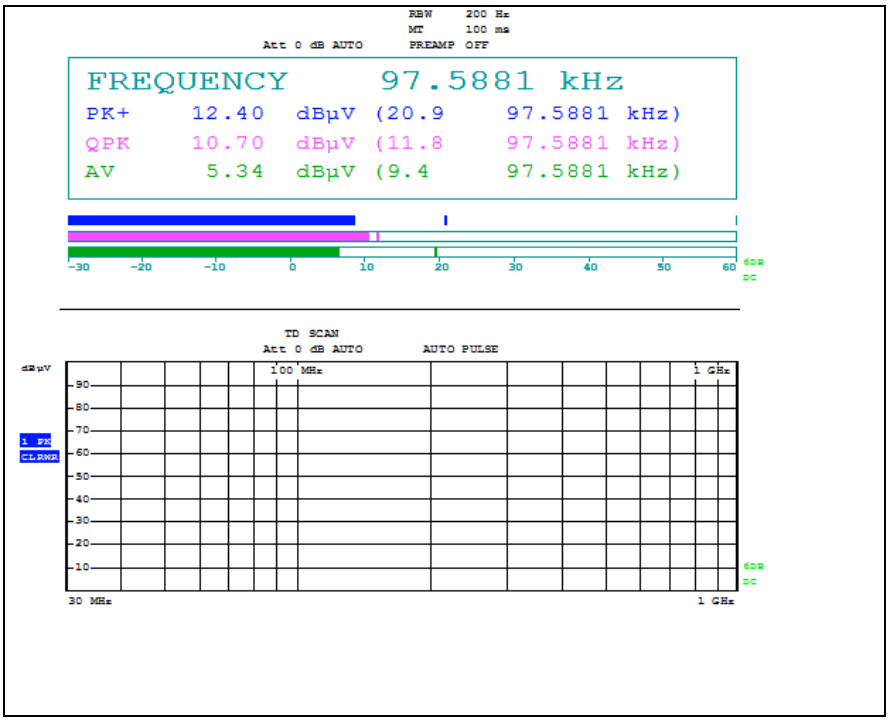
1. According to §15.31 (f)(2)
   - 300 m Result (dB㎶/m) = 3 m Result (dB㎶/m) - 40log(300/3) (dB㎶/m)
   - 30 m Result (dB㎶/m) = 3 m Result (dB㎶/m) - 40log(30/3) (dB㎶/m)
2. According to field strength table of general requirement in §15.209 (a), field strength limits below 1.705 ㎒ were calculated as below.
   - 9 ㎑ to 490 ㎑ : 20log(2 400 / F (㎑)) at 300 m (dB㎶/m)
   - 490 ㎑ to 1.705 ㎒ : 20log (24 000 / F (㎑)) at 30 m (dB㎶/m)
3. According to §15.209 (d), the measurements were tested by using Quasi peak detector except for the frequency bands 9 – 90 ㎑, 110 – 490 ㎑ and above 1 ㎓ in these three bands on measurements employing an average detector.

Test plots (Band Edge)

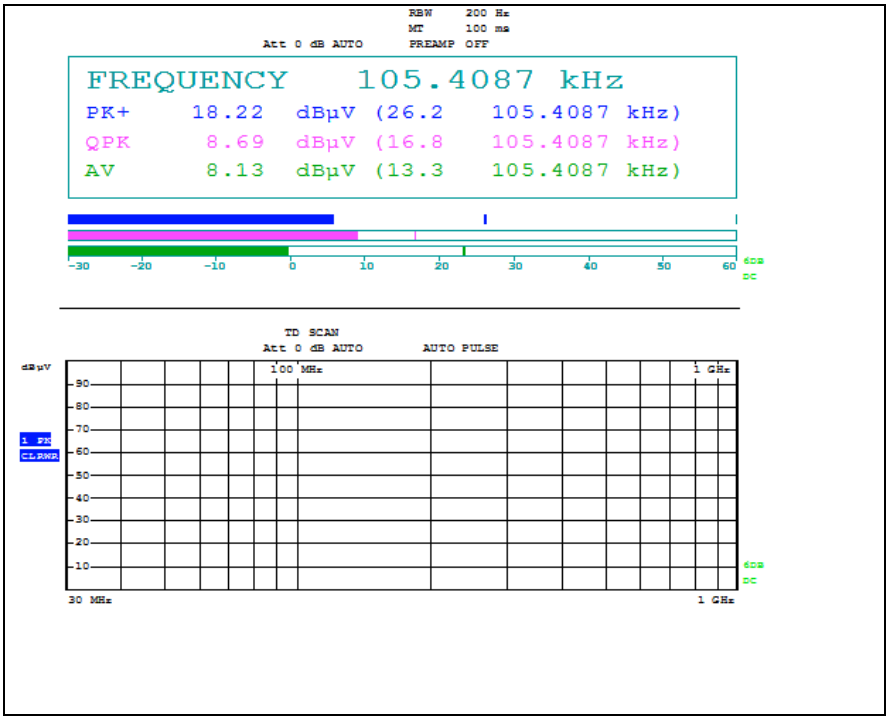
Charging mode (less than 1 % battery status of client device)



Charging mode (less than 50 % battery status of client device)

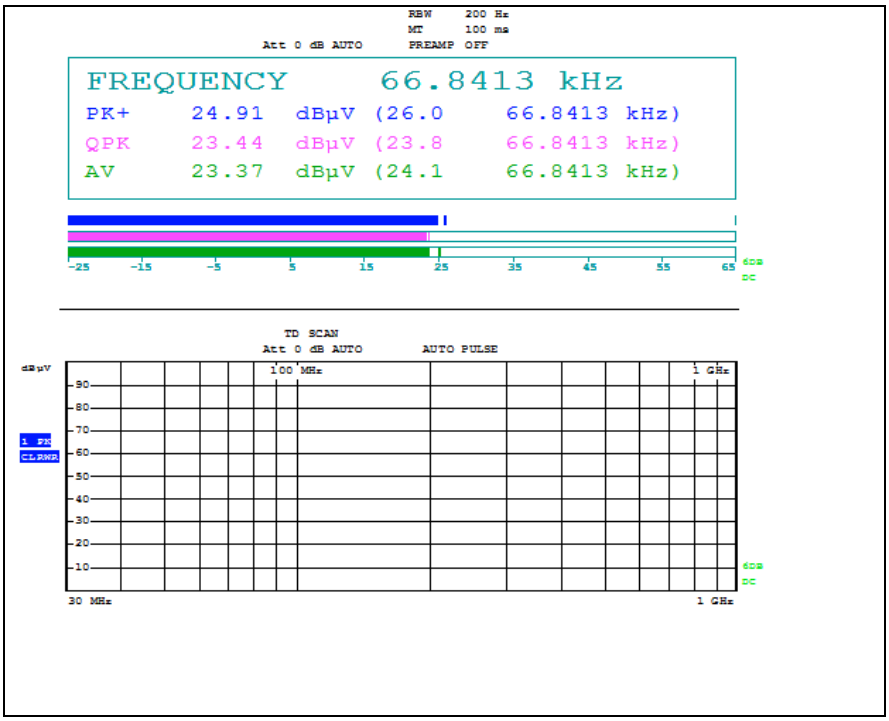


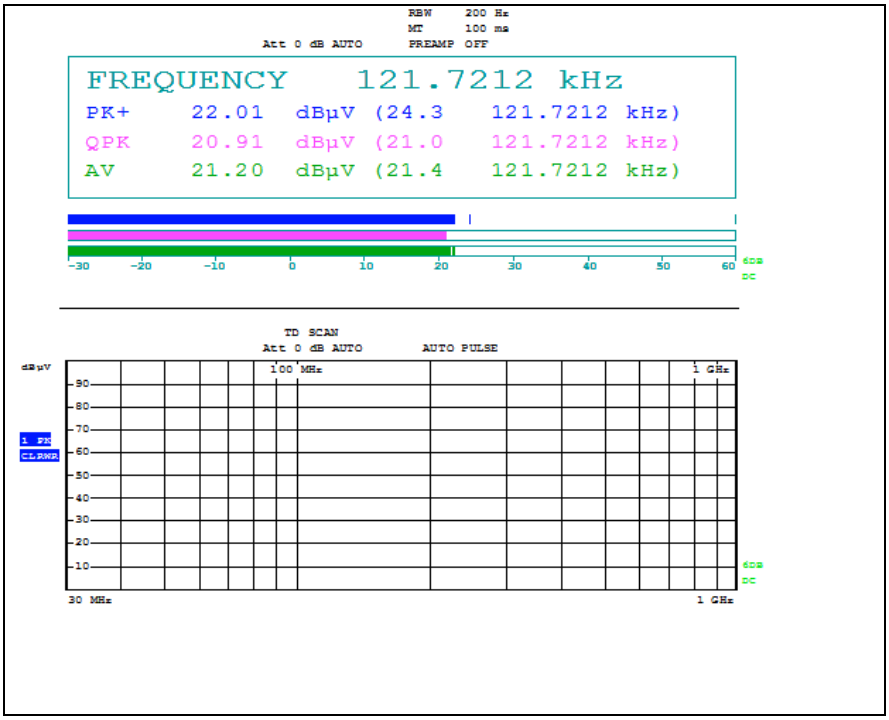
Charging mode (less than 100 % battery status of client device)

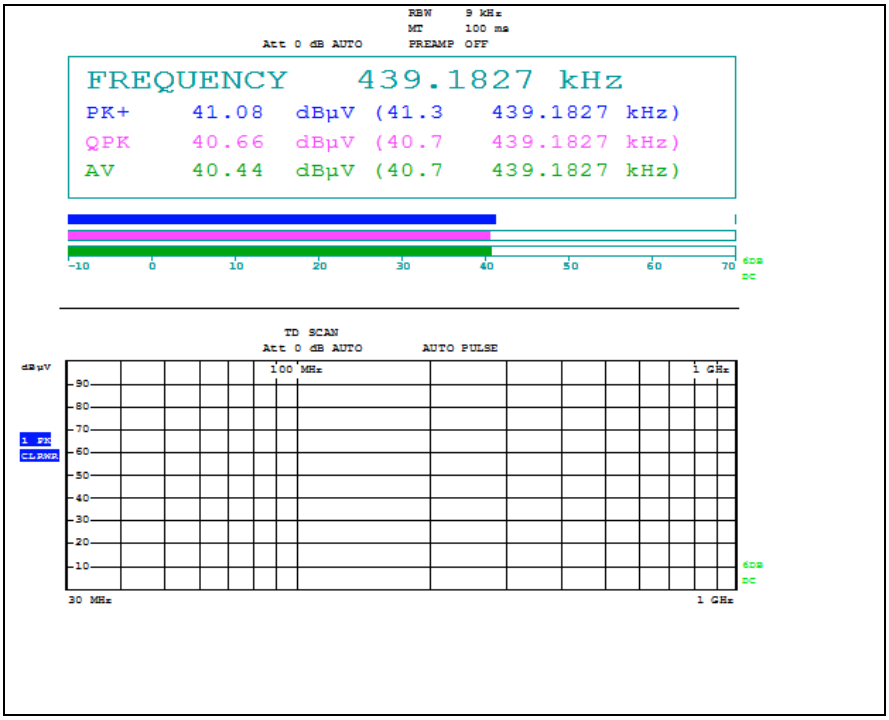


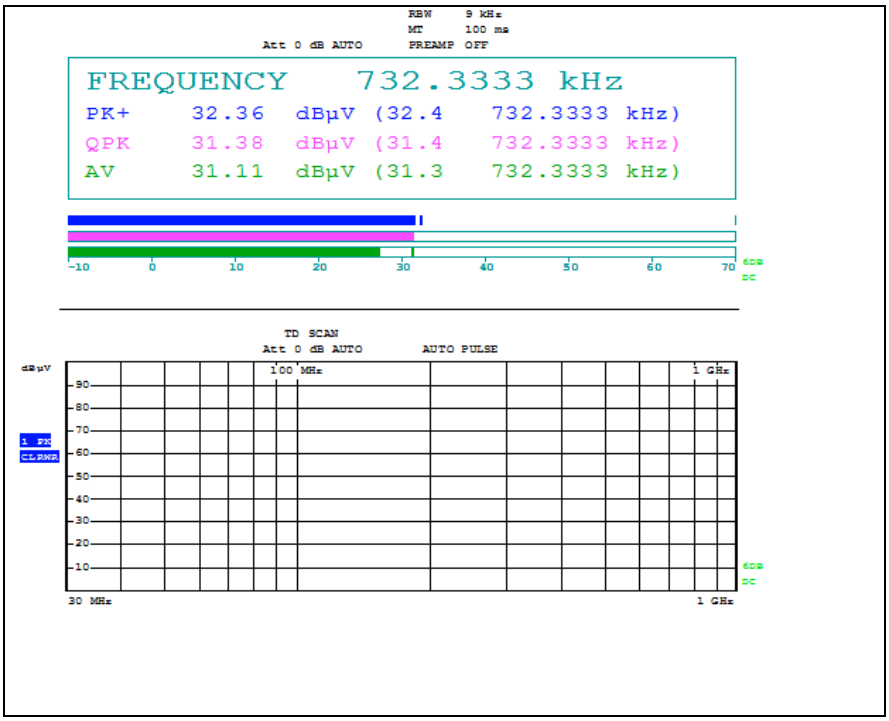
Test plots (Spurious)

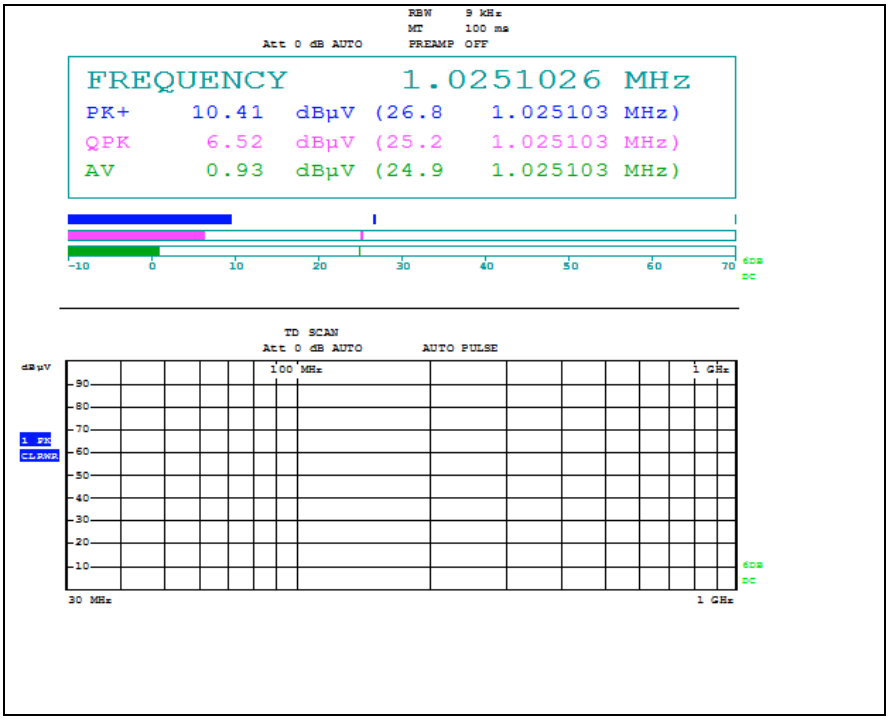
Charging mode (less than 1 % battery status of client device)



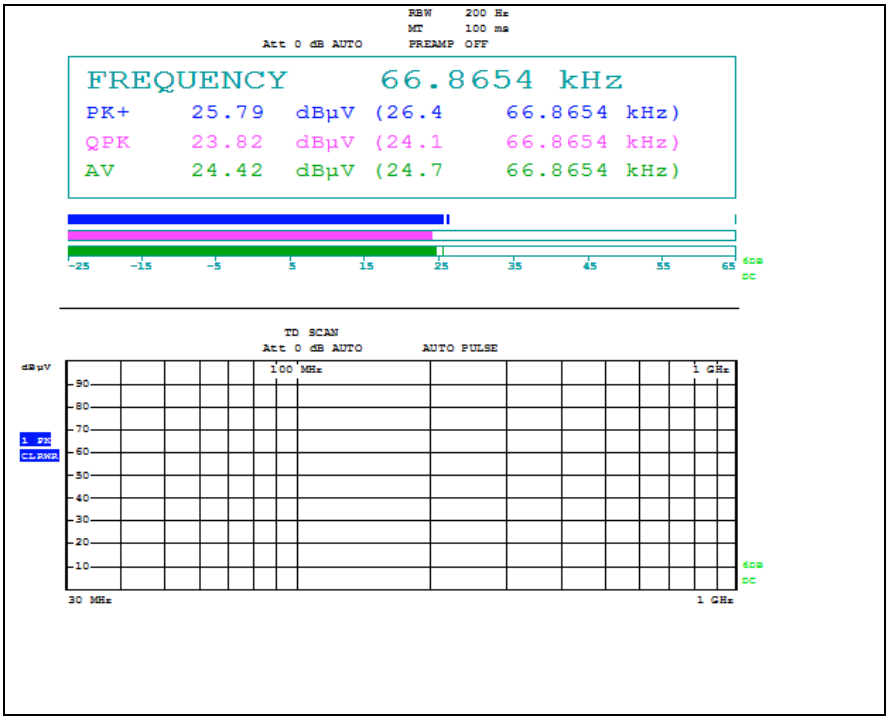


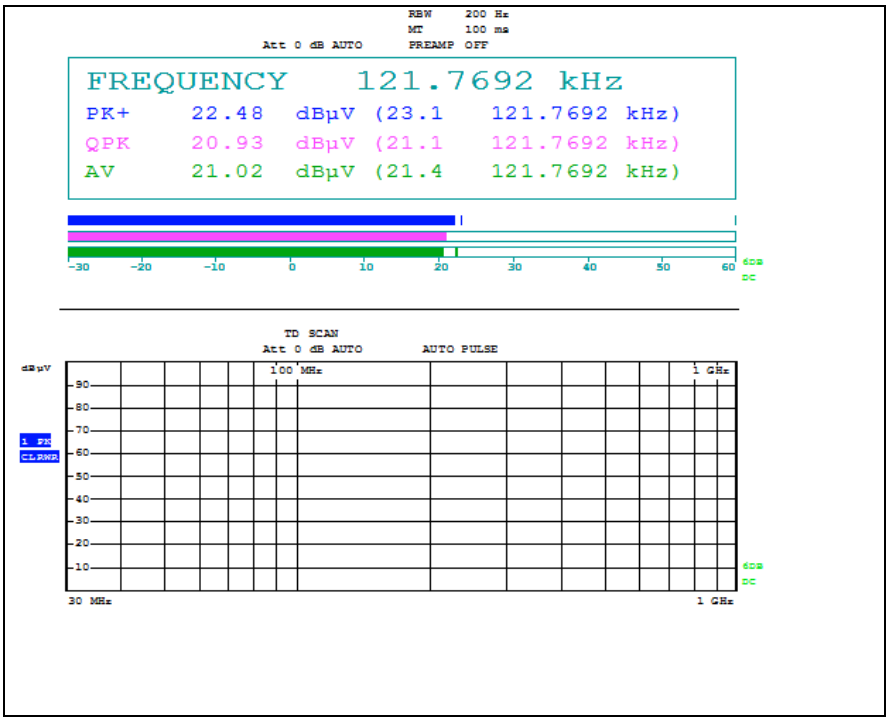


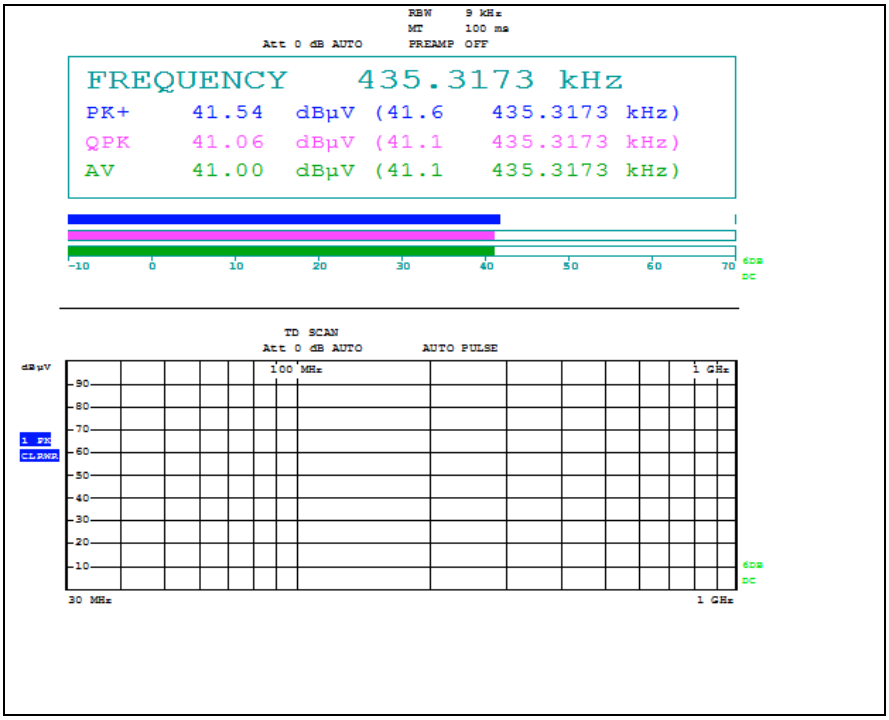


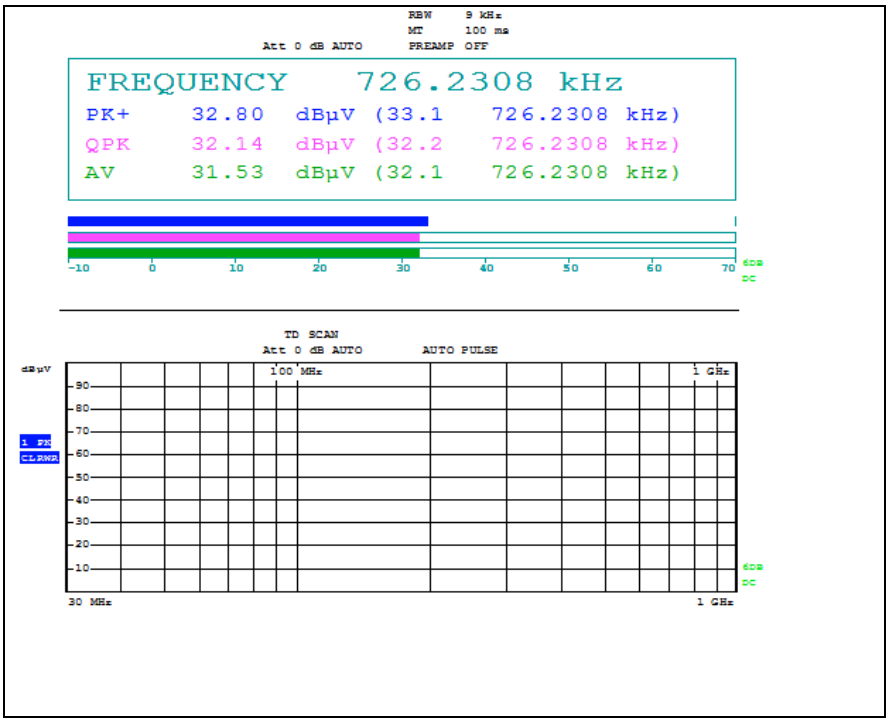


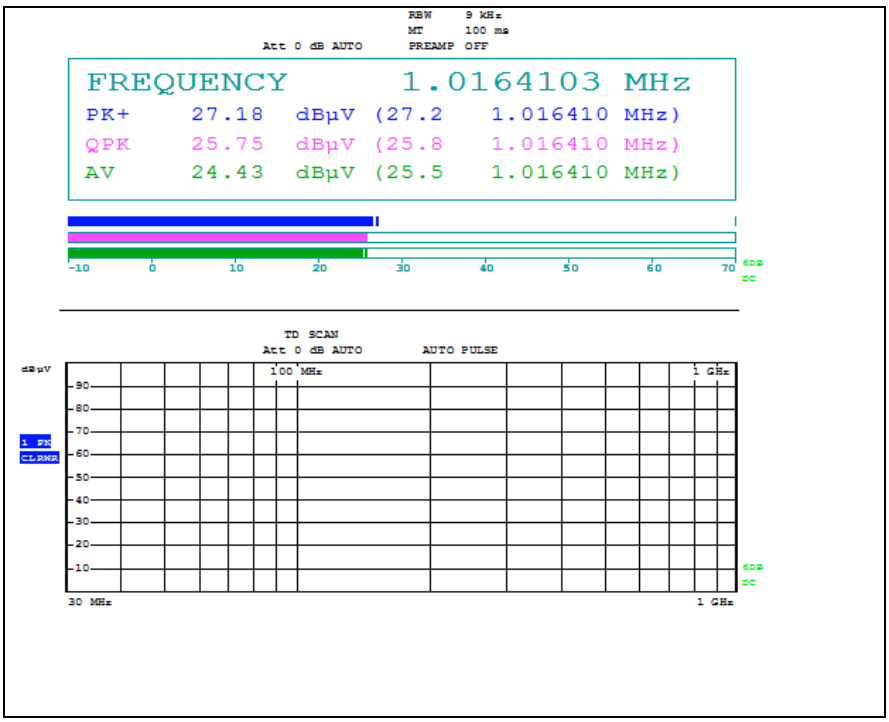
Charging mode (less than 50 % battery status of client device)



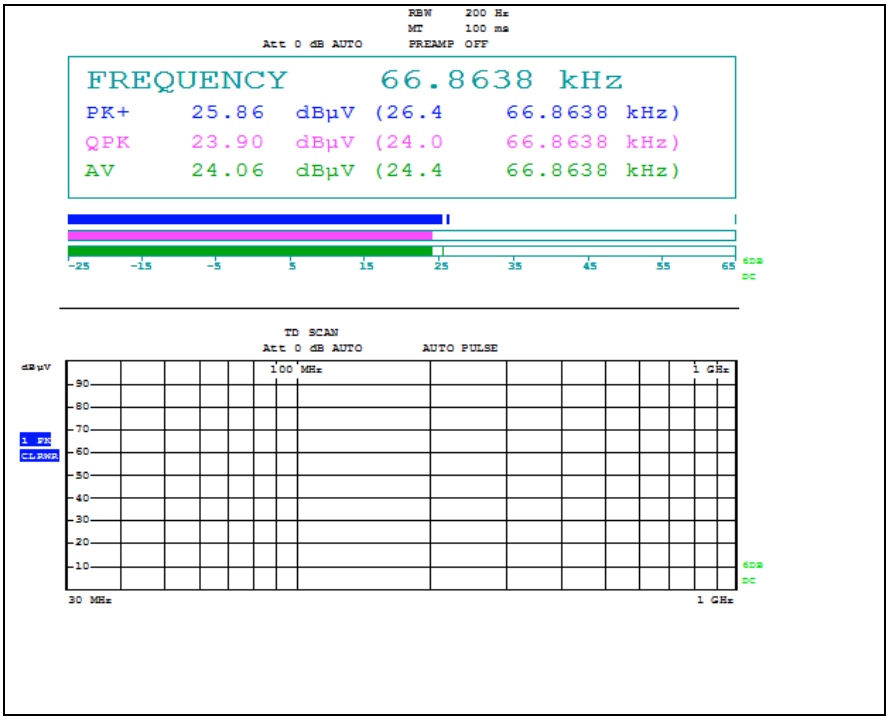


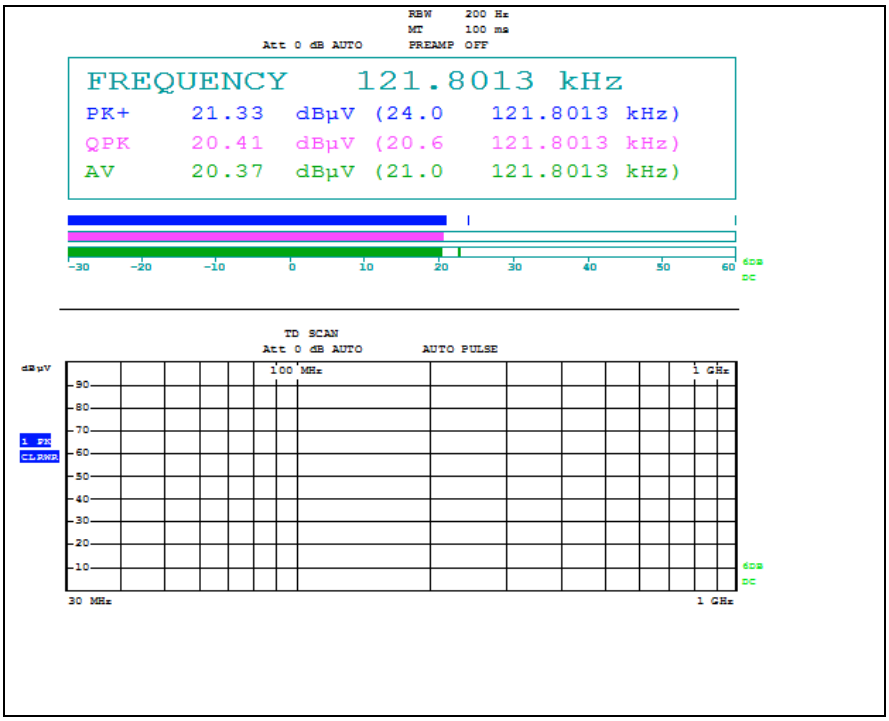


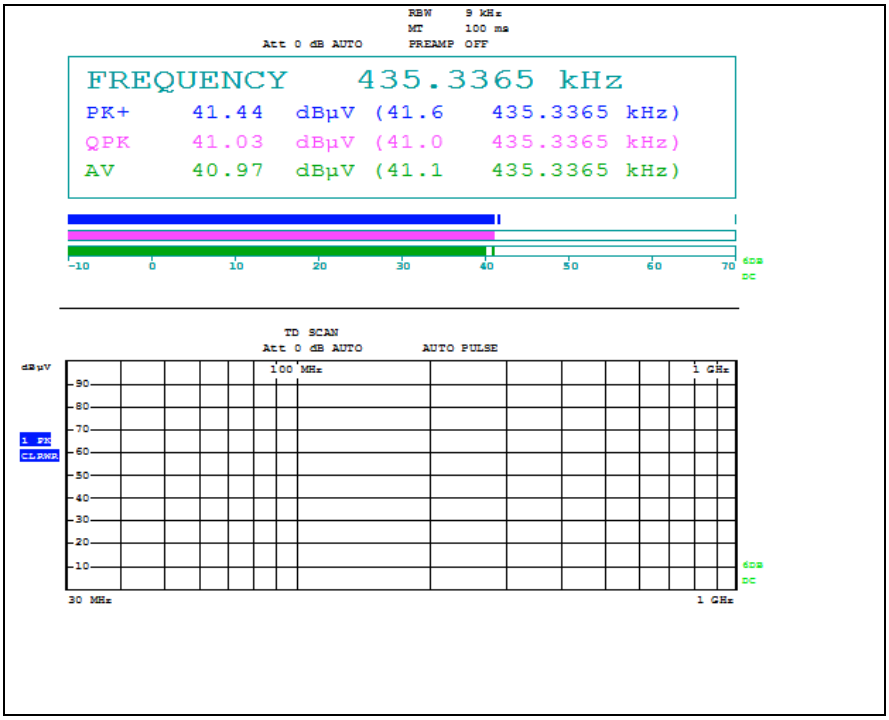


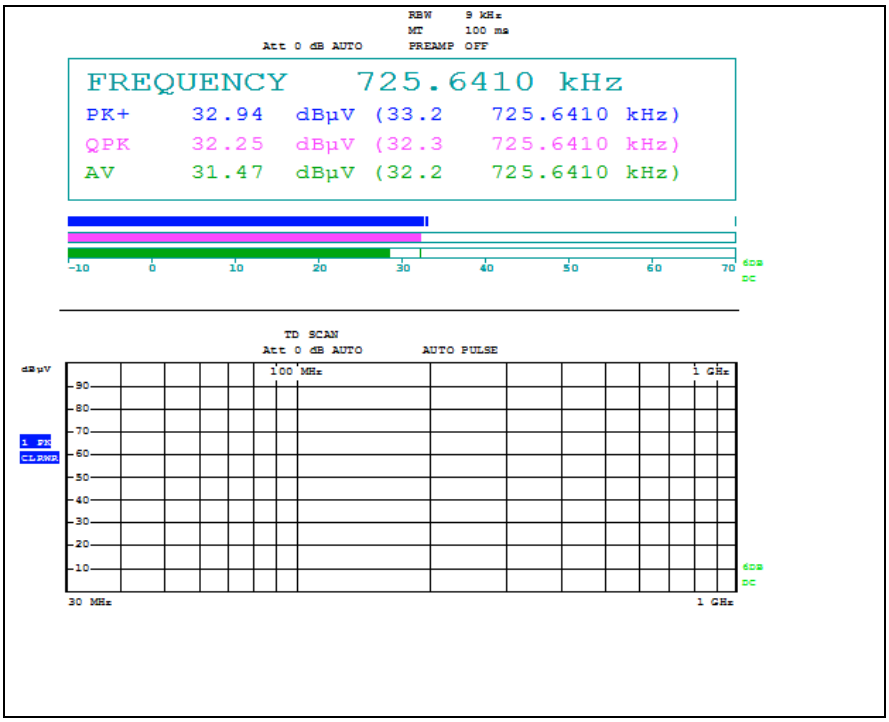


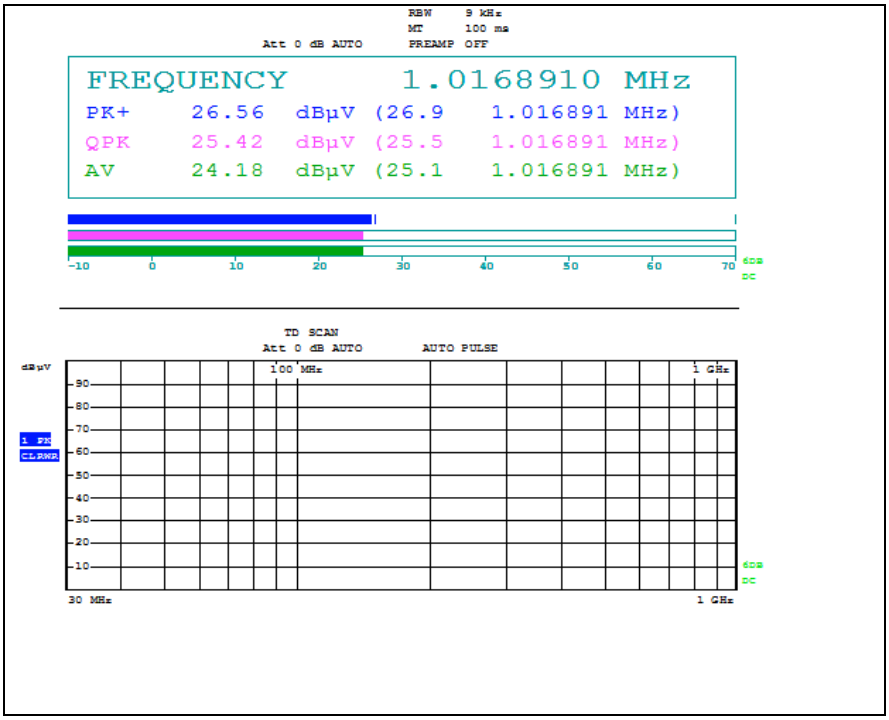
Charging mode (100 % battery status of client device)





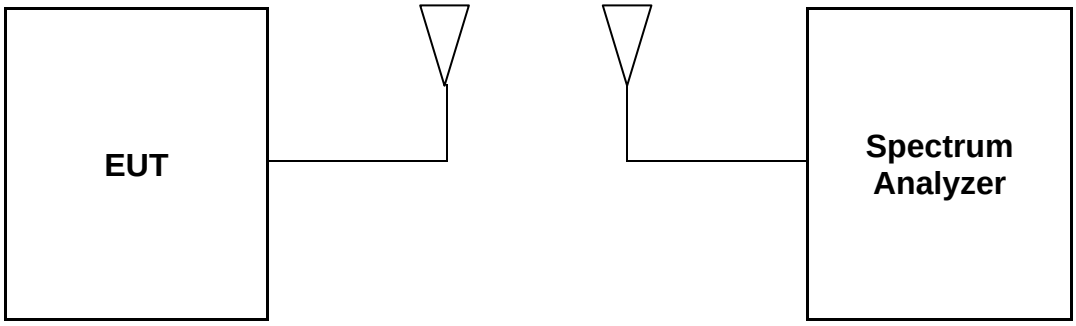






3. 20 dB Bandwidth

3.1. Test Setup



3.2. Limit

None; for reporting purposed only

3.3. Test Procedure

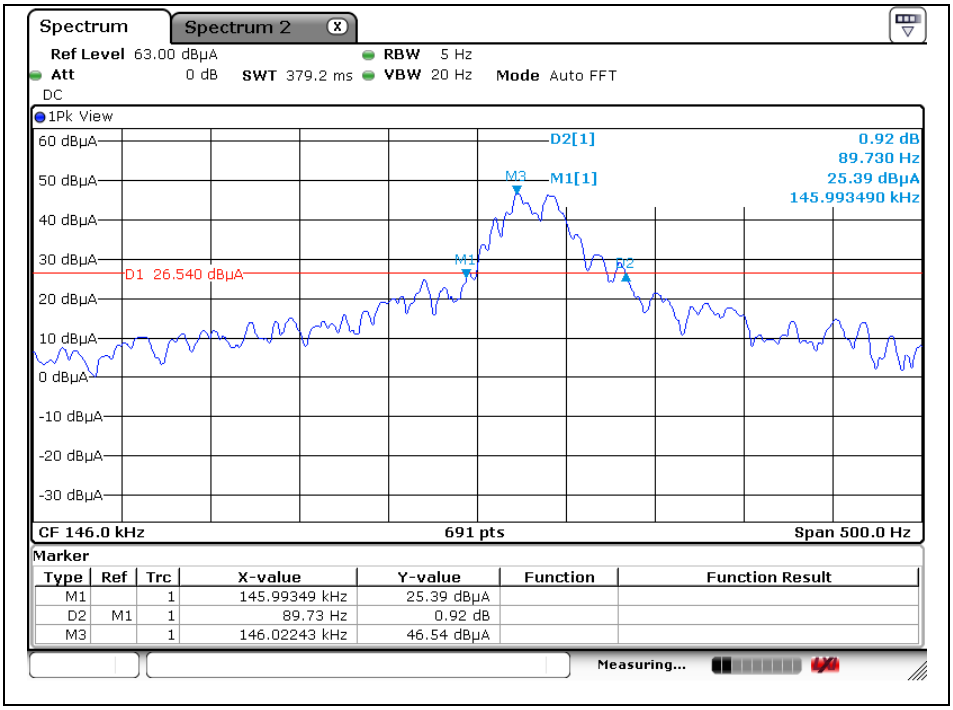
a. Span = set to capture all products of the modulation process, including the emission skirts.
RBW = in the range of 1 % to 5 % of the 20 dB Bandwidth,
VBW = approximately 3 x RBW, Sweep = auto, Detector = peak, Trace = max hold.
b. The marker-to-peak function to set the mark to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is 20 dB bandwidth of the emission.

3.4. Test Result

Ambient temperature : (23 ± 1) ℃
Relative humidity : 47 % R.H.

EUT status	20 dB Bandwidth (Hz)	Limit
With client device (100 % battery status of client device)	89.73	Reporting proposed only

20 dB Bandwidth



- End of the Test Report -