TEST REPORT

FCC Part 15C

Equipment under test	ANESTHESIA INJECTION SYSTEM(CRADLE)
Model name	AN100-C
FCC ID	2AXRNAN100-C
Applicant	DENTIS CO., LTD
Manufacturer	DENTIS CO., LTD
Date of test(s)	2021.09.01 ~ 2021.09.04
Date of issue	2021.09.10

Issued to

DENTIS CO., LTD
99, Seongseoseo-ro, Dalseo-gu, Daegu, Republic of Korea
Tel: +82-53-589-3667

Issued by

KES Co., Ltd.
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Test and report completed by :	**Report approval by :**
Gu-Bong, Kang Test engineer	Young-Jin, Lee Technical manager

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Revision history

Revision	Date of issue	Test report No.	Description
-	2021.09.10	KES-RF1-21T0173	Initial

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1. General information

Applicant	DENTIS CO., LTD
Applicant address	99, Seongseoseo-ro, Dalseo-gu, Daegu, Republic of Korea
Test site	KES Co., Ltd.
Test site address	☐ 3701, 40, Simin-daero 365beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea ☒ 473-29, Gayeo-ro, Yeoju-si, Gyeonggi-do, Korea
Test Facility	FCC Accreditation Designation No.: KR0100, Registration No.: 444148
FCC rule part(s):	Part 15C
FCC ID:	2AXRNAN100-C
Test device serial No.	☒ Production ☐ Pre-production ☐ Engineering

1.1. EUT description

Equipment under test	ANESTHESIA INJECTION SYSTEM(CRADLE)
Frequency	0.100 ~ 0.130 ㎒
Inductive charging technique	Magnetic Induction
Model:	AN100-C
Antenna specification	Internal type(Coil antenna)
Power source	AC 120 V(Adapter DC output 5 V)
S/W Version	1.0.0
H/W version	1.0.0

1.2. Test configuration

The **DENTIS CO., LTD / AN100-C / ANESTHESIA INJECTION SYSTEM(CRADLE) /FCC ID: 2AXRNAN100-C** was tested according to the specification of EUT, the EUT must comply with following standards.

FCC Part 15C
ANSI C63.10-2013

1.3. Test frequency

		Frequency Range
Power source	AC 120 V (Adapter DC output 5 V)	0.100 ~ 0.130 ㎒

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1.4. Test mode

Mode	Charging current	Description
Charging mode With load	90%	Using Max load
	50%	Using Mid load
	10%	Using Min load

1.5. Information about derivative model

N/A

1.6. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
AC/DC Adapter	Adapter Technology Co., Ltd.	ATM012T-W050V	-	DC 5 V
ANESTHESIA INJECTION SYSTEM	DENTIS CO., LTD.	AN100	-	DC 3.7 V(Battery)

1.7. Measurement Uncertainty`

Test Item		Uncertainty
Uncertainty for Conduction emission test		2.46 dB
Uncertainty for Radiation emission test (include Fundamental emission)	Below 1㎓	4.40 dB
	Above 1㎓	5.94 dB
Note. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.		

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2. Summary of tests

FCC Part Sections	Parameter	Test results
15.209	Radiated spurious emission	Pass
2.1049	20 dB Bandwidth	Pass
15.207	AC conducted emissions	Pass

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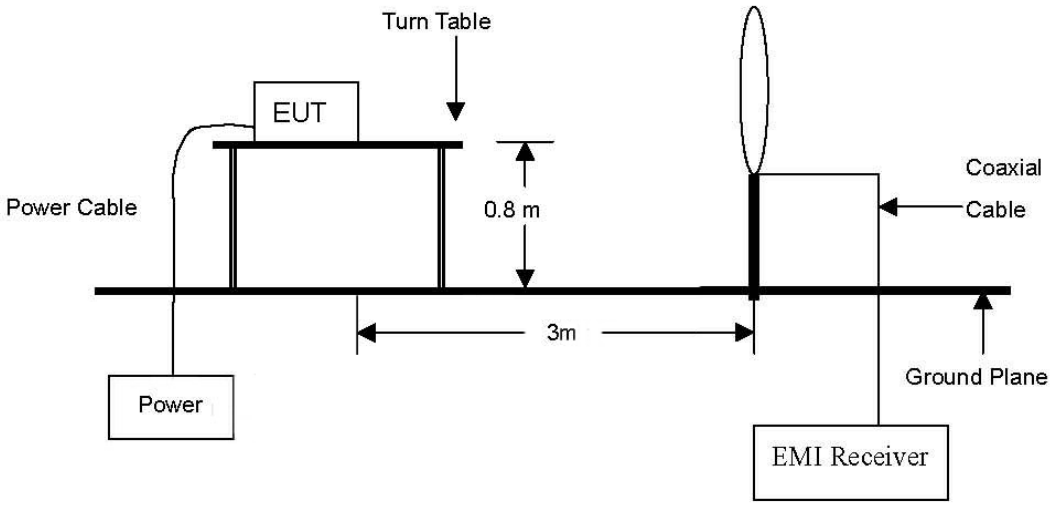
3. Test results

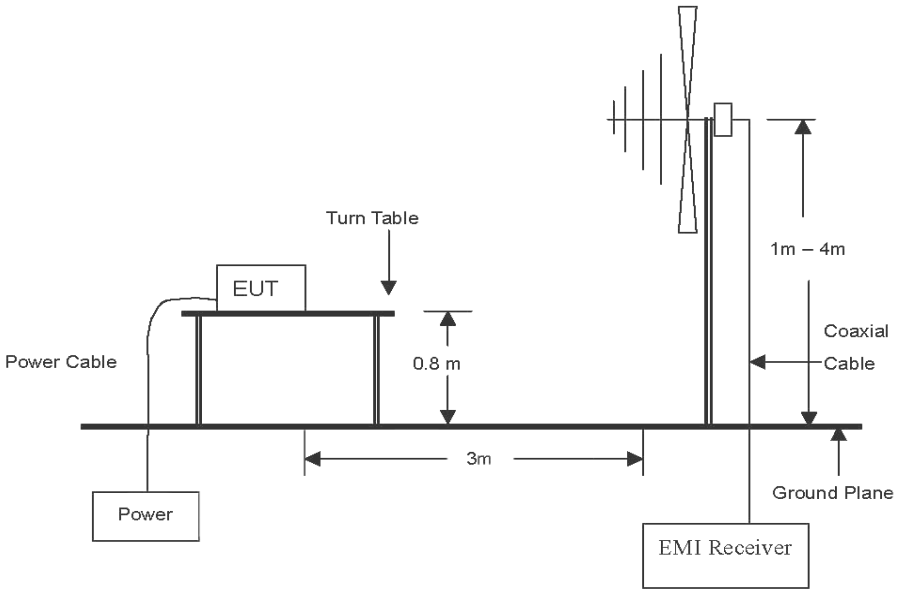
3.1. Radiated spurious emission

Test setup

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



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



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Test procedure

[9 ㎑ to 30 ㎒]

The EUT was placed on the top of a rotating table 0.8 meter 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. 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 and ground parallel of the antenna are set to make the measurement. 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. The test-receiver system was set to Quasi-peak function and specified bandwidth with maximum hold mode.

[30 ㎒ to 1 ㎓]

The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity.

The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

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Note:

1. According to exploratory test no any obvious emission were detected from 9 kHz to 30 MHz. Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are 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.
2. Measurement distance : 3 m.
3. Field strength = Level + Correction factor + F_d
4. $F_d = 40\log(D_m / D_s)$
   Where:
   F_d = Distance factor in dB
   D_m = Measurement distance in meters
   D_s = Specification distance in meters
   For 300m: 40log(300/3) = 80 dB for frequency band 0.009 MHz to 0.490 MHz
   For 30m: 40log(30/3) = 40 dB for frequency band 0.490 MHz to 30 MHz
5. No significant emissions were found in the 90 - 110kHz restricted band.

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Limit

According to 15.209(a), for an intentional radiator devices, the general required of field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values：

Frequency (㎒)	Distance (Meters)	Radiated (㎶/m)
0.009 ~ 0.490	300	2400 / F(㎑)
0.490 ~ 1.705	30	24000 / F(㎑)
1.705 ~ 30.0	30	30
30 ~ 88	3	100**
88 ~ 216	3	150**
216 ~ 960	3	200**
Above 960	3	500

**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.

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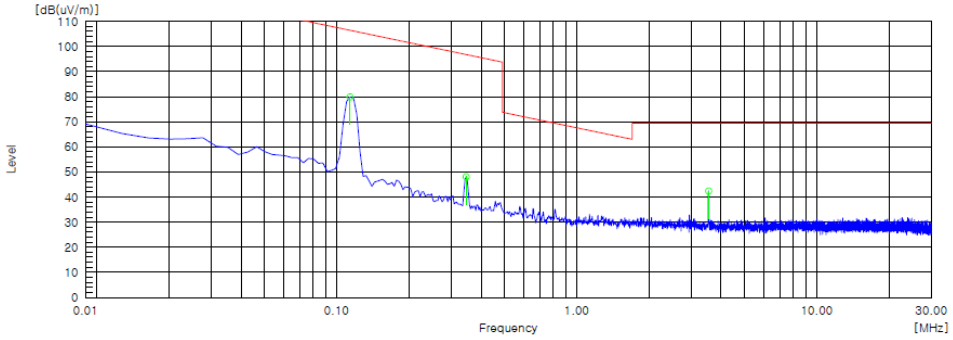
Test results (Below 30 ㎒)

Mode: 5W // 10 % charger

Distance of measurement: 3 meter

Parallel



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	0.135	H	68.9	19.9	88.8	105.0	16.2	100.0	64.0	
2	0.406	H	38.8	20.5	59.3	95.4	36.1	100.0	41.0	
3	0.676	H	28.7	21.1	49.8	71.0	21.2	100.0	25.0	

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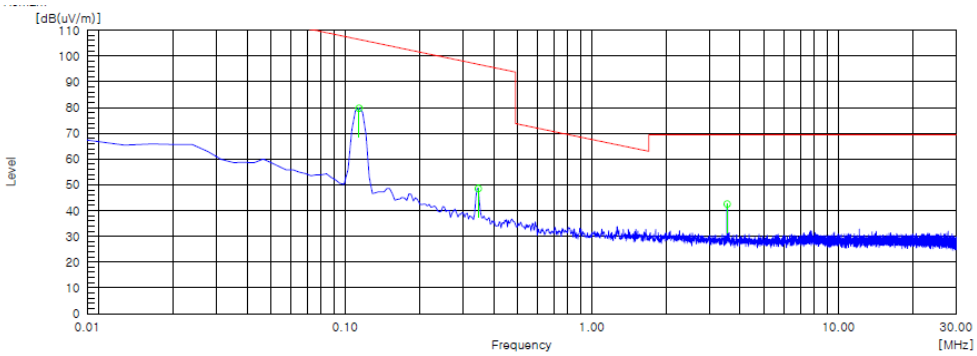
Mode: 5W // 50 % charger

Distance of measurement: 3 meter

Parallel



No.	Frequency [MHz]	(P)	Reading [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	0.114	H	60.1	19.6	79.7	106.5	26.8	99.8	1.6	
2	0.346	H	28.8	19.8	48.6	96.8	48.2	99.8	338.6	
3	3.540	H	22.7	19.8	42.5	69.5	27.0	99.8	288.9	

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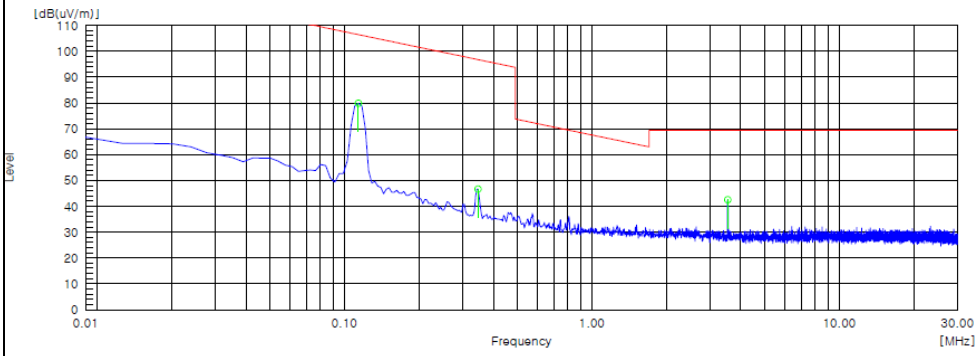
Mode: 5W // 90 % charge

Distance of measurement: 3 meter

Parallel



No.	Frequency [MHz]	(P)	Reading [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	0.114	H	60.3	19.6	79.9	106.5	26.6	99.8	21.2	
2	0.346	H	26.9	19.8	46.7	96.8	50.1	99.8	198.0	
3	3.540	H	22.7	19.8	42.5	69.5	27.0	99.8	323.3	

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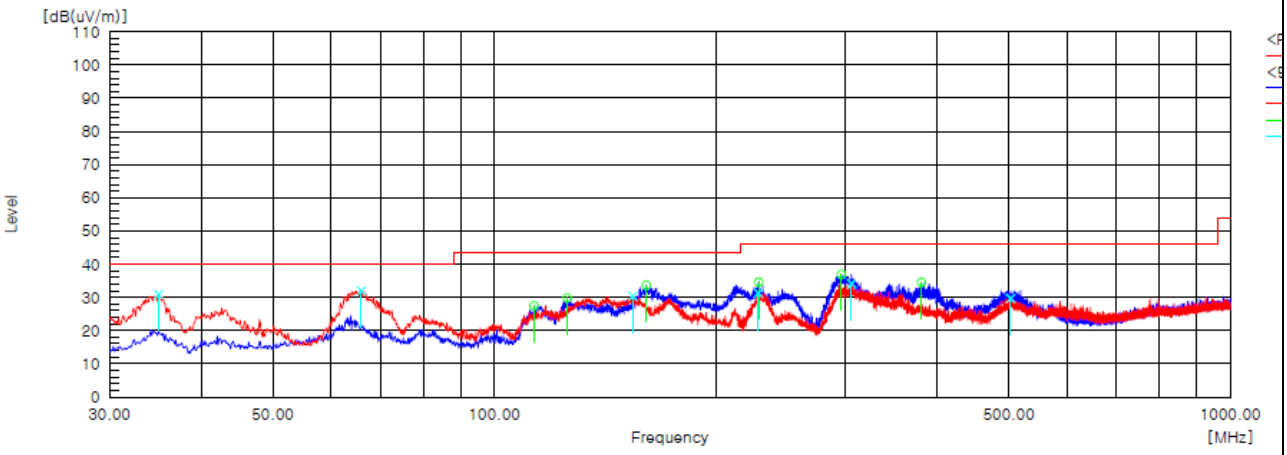
Test results (Below 1 000 ㎒)

Mode: 5W // 10 % charge

Distance of measurement: 3 meter

Horizontal // Vertical



No.	Frequency [MHz]	(P)	Reading [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	34.971	V	44.8	-13.9	30.9	40.0	9.1	149.8	162.8	
2	65.890	V	45.8	-13.7	32.1	40.0	7.9	99.8	129.2	
3	113.178	H	43.6	-16.1	27.5	43.5	16.0	200.1	78.8	
4	125.545	H	44.5	-14.6	29.9	43.5	13.6	200.1	62.0	
5	154.160	V	42.8	-12.4	30.4	43.5	13.1	99.8	149.5	
6	160.829	H	46.4	-12.7	33.7	43.5	9.8	200.1	256.7	
7	228.244	V	46.0	-14.7	31.3	46.0	14.7	99.8	330.6	
8	228.486	H	49.3	-14.7	34.6	46.0	11.4	200.1	269.6	
9	296.023	H	49.0	-12.1	36.9	46.0	9.1	99.8	68.1	
10	305.480	V	46.1	-11.9	34.2	46.0	11.8	99.8	77.3	
11	380.534	H	44.6	-10.1	34.5	46.0	11.5	99.8	125.9	
12	502.269	V	37.1	-7.4	29.7	46.0	16.3	149.8	110.9	

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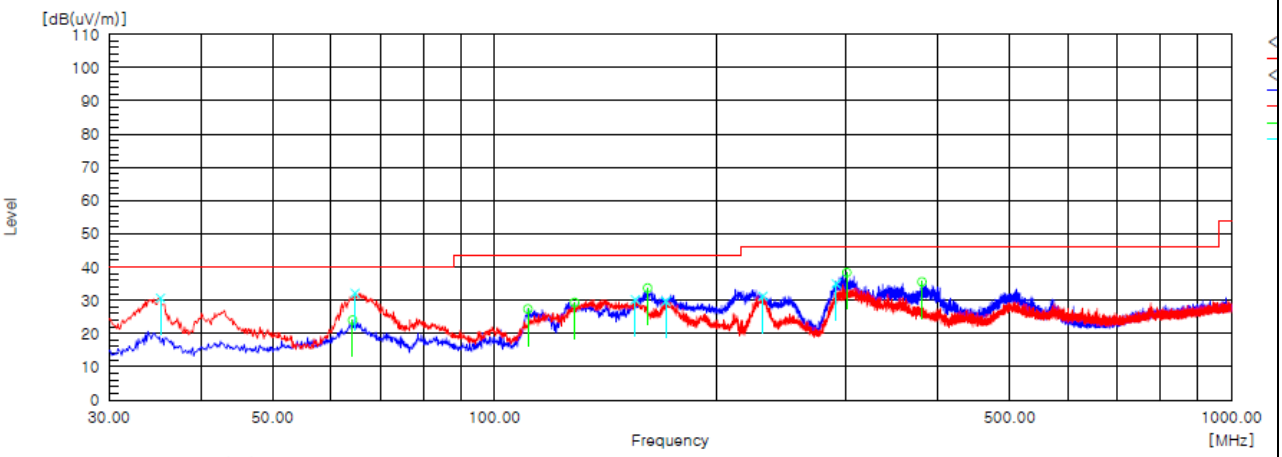
Mode: 5W // 50 % charge

Distance of measurement: 3 meter

Horizontal // Vertical



No.	Frequency [MHz]	(P)	Reading [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	35.214	V	44.6	-13.9	30.7	40.0	9.3	99.9	164.7	
2	64.193	H	37.4	-13.4	24.0	40.0	16.0	400.2	72.8	
3	64.678	V	45.7	-13.5	32.2	40.0	7.8	99.9	66.8	
4	110.995	H	43.8	-16.4	27.4	43.5	16.1	200.2	68.8	
5	128.455	H	43.6	-14.3	29.3	43.5	14.2	200.2	74.9	
6	155.251	V	42.6	-12.5	30.1	43.5	13.4	99.9	174.5	
7	161.314	H	46.4	-12.7	33.7	43.5	9.8	200.2	243.4	
8	170.771	V	43.2	-13.5	29.7	43.5	13.8	99.9	211.4	
9	231.275	V	45.9	-14.6	31.3	46.0	14.7	99.9	4.2	
10	290.688	V	47.2	-12.2	35.0	46.0	11.0	149.8	11.3	
11	300.630	H	50.4	-12.0	38.4	46.0	7.6	99.8	51.1	
12	380.170	H	45.6	-10.1	35.5	46.0	10.5	99.8	121.4	

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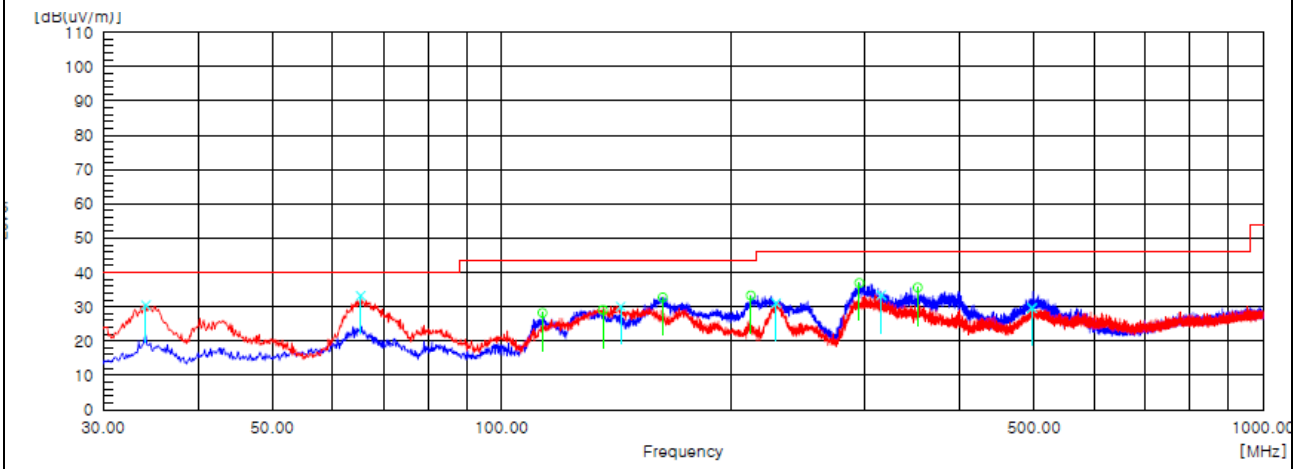
Mode: 5W // 90 % charge

Distance of measurement: 3 meter

Horizontal // Vertical



No.	Frequency [MHz]	(P)	Reading [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	34.123	V	44.4	-13.9	30.5	40.0	9.5	149.7	121.8	
2	65.284	V	46.8	-13.6	33.2	40.0	6.8	99.8	119.5	
3	113.178	H	44.3	-16.1	28.2	43.5	15.3	200.1	76.1	
4	135.851	H	42.6	-13.5	29.1	43.5	14.4	200.1	276.3	
5	143.369	V	42.8	-12.7	30.1	43.5	13.4	99.8	321.9	
6	162.769	H	45.5	-12.8	32.7	43.5	10.8	200.1	73.1	
7	212.360	H	48.6	-15.3	33.3	43.5	10.2	200.1	265.8	
8	229.214	V	45.8	-14.7	31.1	46.0	14.9	99.8	4.3	
9	294.931	H	49.1	-12.1	37.0	46.0	9.0	99.9	61.9	
10	314.938	V	45.2	-11.7	33.5	46.0	12.5	149.7	358.3	
11	351.798	H	46.5	-10.9	35.6	46.0	10.4	99.9	111.9	
12	496.691	V	37.0	-7.4	29.6	46.0	16.4	149.7	99.5	

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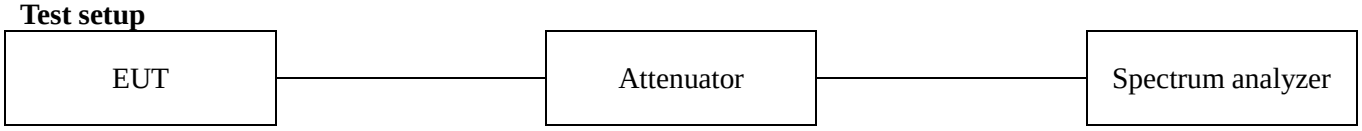
3.2. 20 dB Bandwidth

Test setup



Test procedures

The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the emission bandwidth. The VBW is set to ≥RBW. The sweep time is coupled.

Limit

None; for reporting purposes only.

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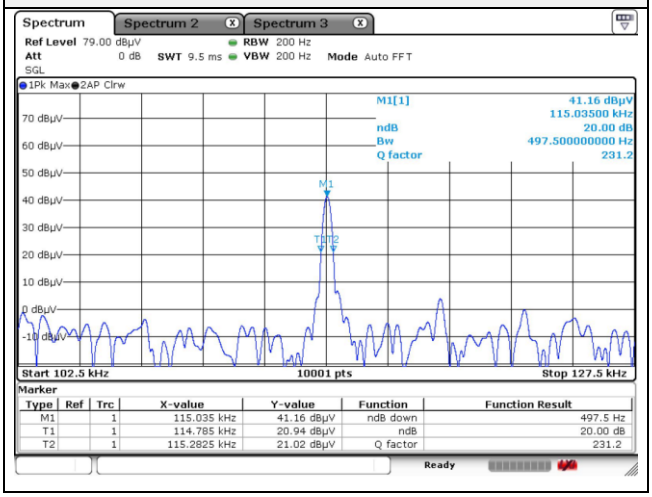
Test results

Test Mode	Frequency(㎒)	Measured bandwidth(㎑)
5W	0.115	0.497

5W



Note.
Because the measured signal is CW/CW-like, adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.

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3.3. AC conducted emissions

Limit

According to 15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 ㎑ to 30 ㎒, shall not exceed the limits in the following table, as measured using a 50uH/50 ohm line impedance stabilization network (LISN). Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequencies ranges.

Frequency of Emission (㎒)	Conducted limit (dBμV/m)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

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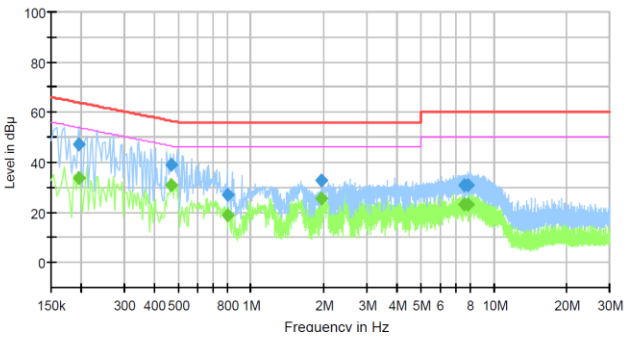
Test results

Mode: 5W // 10 % charge (Worst Case)

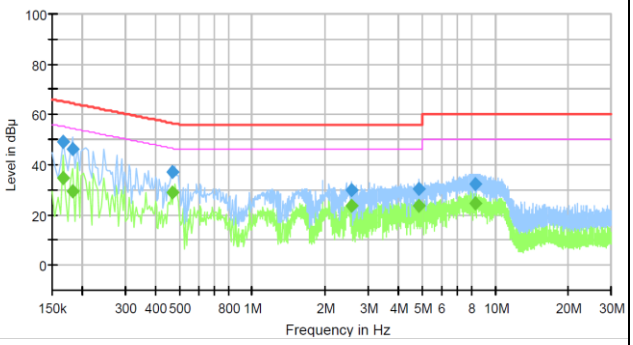
Hot Line



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.194000	47.35	---	63.86	16.51	1000.0	9.000	L1	19.8
0.194000	---	33.54	53.86	20.32	1000.0	9.000	L1	19.8
0.470000	38.97	---	56.51	17.54	1000.0	9.000	L1	20.1
0.470000	---	30.59	46.51	15.92	1000.0	9.000	L1	20.1
0.798000	26.88	---	56.00	29.12	1000.0	9.000	L1	20.4
0.798000	---	19.03	46.00	26.97	1000.0	9.000	L1	20.4
1.954000	---	25.76	46.00	20.24	1000.0	9.000	L1	20.7
1.954000	32.77	---	56.00	23.23	1000.0	9.000	L1	20.7
7.586000	---	23.20	50.00	26.80	1000.0	9.000	L1	20.1
7.586000	30.98	---	60.00	29.02	1000.0	9.000	L1	20.1
7.822000	---	23.07	50.00	26.93	1000.0	9.000	L1	20.1
7.822000	30.96	---	60.00	29.04	1000.0	9.000	L1	20.1

Neutral Line



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.166000	49.15	---	65.16	16.01	1000.0	9.000	N	19.7
0.166000	---	34.79	55.16	20.37	1000.0	9.000	N	19.7
0.182000	46.06	---	64.39	18.33	1000.0	9.000	N	19.8
0.182000	---	29.51	54.39	24.88	1000.0	9.000	N	19.8
0.470000	36.86	---	56.51	19.65	1000.0	9.000	N	20.0
0.470000	---	29.09	46.51	17.42	1000.0	9.000	N	20.0
2.558000	---	23.67	46.00	22.33	1000.0	9.000	N	20.6
2.558000	29.83	---	56.00	26.17	1000.0	9.000	N	20.6
4.870000	---	23.82	46.00	22.18	1000.0	9.000	N	20.1
4.870000	30.37	---	56.00	25.63	1000.0	9.000	N	20.1
8.318000	---	24.35	50.00	25.65	1000.0	9.000	N	20.2
8.318000	32.29	---	60.00	27.71	1000.0	9.000	N	20.2

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Appendix A. Measurement equipment

Equipment	Manufacturer	Model	Serial No.	Calibration interval	Calibration due.
Spectrum Analyzer	R&S	FSV40-N	102194	1 year	2022.06.18
8360B Series Swept Signal Generator	HP	83630B	3844A00786	1 year	2022.01.15
Loop Antenna	Schwarzbeck	FMZB1513	225	2 years	2023.01.18
BILOG ANTENNA	Schwarzbeck	VULB 9168	9168-461	2 years	2022.12.22
Attenuator	HUBER+SUHNER	6806.17.A	-	1 year	2021.11.03
Amplifier	SONOMA INSTRUMENT	310N	401123	1 year	2022.06.07
EMI Test Receiver	R&S	ESU26	100552	1 year	2022.04.01
AC POWER SOURCE/ ANALYZER	HP	6813A	3729A00754	1 year	2022.01.15
LISN	ENV216	R & S	101787	1 year	2021.12.29
EMI TEST RECEIVER	ESR3	R & S	101783	1 year	2022.01.15
PULSE LIMITER	ESH3-Z2	R & S	101915	1 year	2021.12.29

Peripheral device

Device	Manufacturer	Model No.	S/N	Note
-	-	-	-	-

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