



TEST REPORT

Eurofins KCTL Co.,Ltd. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-70-5008-1021 FAX: 82-505-299-8311 www.kctl.co.kr	Report No.: KR23-SRF0201-A Page (1) of (19)	 KCTL
1. Client		
◦ Name : Effinet Systems, Inc. ◦ Address : (Gasan-dong, 5th Byucksan Digital Valley) 705, 244 Beotkkot-ro, Geumcheon-gu, Seoul 153-788, Republic of Korea ◦ Date of Receipt : 2023-06-21		
2. Use of Report : Certification		
3. Name of Product / Model : LCD Monitor / EFL-1903B		
4. Manufacturer / Country of Origin : Effinet Systems, Inc. / Korea		
5. FCC ID : 2BB7O-EFL1903B		
7. Date of Test : 2023-07-21 to 2023-08-10		
8. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing (Address: 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)		
9. Test method used : FCC Part 15 Subpart C, 15.209		
10. Test Result : Refer to the test result in the test report		
Affirmation	Tested by Name : Jungwon Seo  (Signature)	Technical Manager Name : Heesu Ahn  (Signature)
2023-09-07		
Eurofins KCTL Co.,Ltd.		
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REPORT REVISION HISTORY

Date	Revision	Page No
2023-08-25	Originally issued	-
2023-09-07	Updated	All

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Note. The report No. KR23-SRF0201 is superseded by the report No. KR23-SRF0201-A.

General remarks for test reports

Statement concerning the uncertainty of the measurement systems used for the tests

(may be required by the product standard or client)

☐ Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:

Procedure number, issue date and title:

Calculations leading to the reported values are on file with the testing laboratory that conducted the testing.

☒ Statement not required by the standard or client used for type testing

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1. General information

Client : Effinet Systems, Inc.
 Address : (Gasan-dong, 5th Byucksan Digital Valley) 705, 244 Beotkkot-ro,
 Geumcheon-gu, Seoul 153-788, Republic of Korea
 Manufacturer : Effinet Systems, Inc.
 Address : 1730 Byeokbong-ro, Nongso-myeon, Gimcheon-si, Gyeongsangbuk-do,
 740-881, Republic of Korea
 Laboratory : Eurofins KCTL Co.,Ltd.
 Address : 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
 Accreditations : FCC Site Designation No: KR0040, FCC Site Registration No: 687132
 VCCI Registration No. : R-20080, G-20078, C-20059, T-20056
 CAB Identifier: KR0040
 ISED Number: 8035A
 KOLAS No.: KT231

2. Device information

Equipment under test : LCD Monitor
 Model : EFL-1903B
 Modulation technique : ASK
 Frequency range : 110~148 kHz (WPT)
 Power source : DC 12 V
 Antenna specification : Coil Loop Antenna
 Software version : 1922G_F1_230428
 Hardware version : Rev. 00
 Test device serial No. : TN6R0242001
 Operation temperature : 0 °C ~ 40 °C

2.1. Companion device information

Equipment	Manufacturer	Model	Serial No.
Smart Phone	SAMSUNG ELECTRONICS	SM-G975N	N/A

2.2. Frequency/channel operations

This device contains the following capabilities:
WPT

Frequency (kHz)
127

Table 2.2.1. WPT System

2.3. Worst-Case configuration and mode

Test Case	Description
1	Charging from EUT to Phone (<10% Power Charging, Fast charging mode)
2	Charging from EUT to Phone (50~55% Power Charging, Fast charging mode)
3	Charging from EUT to Phone (90~95% Power Charging, Fast charging mode)

According to current client device's battery level, test results are different. Because the test result were worst when the battery level was below 10%, tests were performed when the battery level was below 10%.(Client device)

Test results of case 1 is worst, so this test report described test case 1.

2.4. Normal and extreme test conditions

- Ambient Conditions

Item	Temperature [°C]	Relative humidity [%]
Requirement for tests	15 to 35	20 to 75
Ambient Conditions	21	51

- Test Conditions

Test condition	Temperature [°C]	Voltage [V]
NTNV	21	DC 12

Note 1 : N:Normal T:Temperature V:Voltage

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3. Antenna requirement

Requirement of FCC part section 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.



4. Summary of tests

FCC Part section(s)	Parameter	Test mode	Test results
15.209	Field Strength of Fundamental and Spurious Emission	Radiated	Pass
2.1049	20dB Bandwidth	Conducted	Pass
15.203	Antenna requirement		Pass
15.207	AC Conducted Emission		Pass

Notes:

- The test results shown in the following sections represent the worst case emissions.
- The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that X orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in X orientation.
- The test procedure(s) in this report were performed in accordance as following.
 - ANSI C63.10-2013
- The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

5. Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of $k=2$ to indicated a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

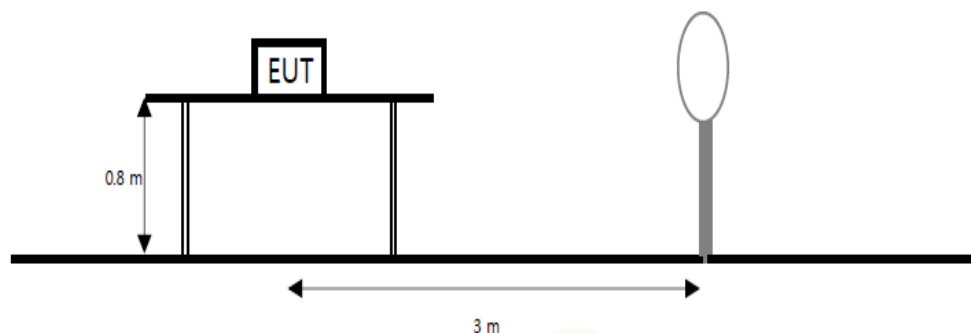
Parameter	Expanded uncertainty ($\pm$)	
Radiated spurious emissions	9 kHz ~ 30 MHz	2.4 dB
Conducted emissions	9 kHz ~ 150 kHz	0.9 dB
	150 kHz ~ 30 MHz	0.9 dB
Occupied Bandwidth		1.0 %

6. Test results

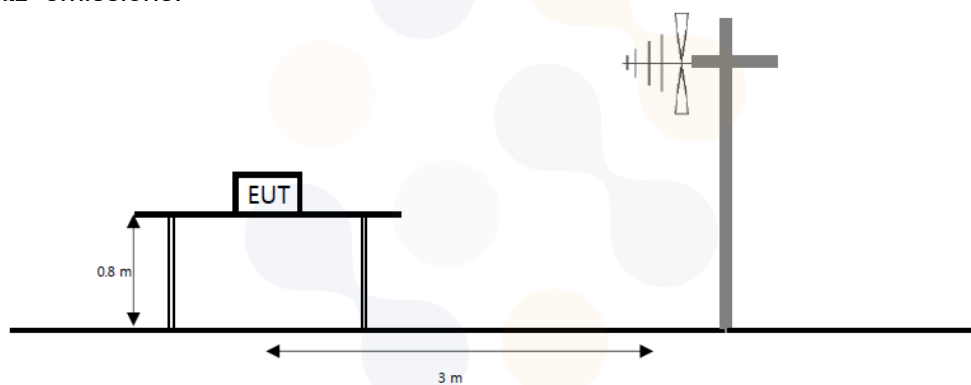
6.1. Field Strength of Fundamental and Spurious Emission

Test setup

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



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



Limit FCC

According to section 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 (MHz)	Field strength ($\mu V/m$)	Measurement distance (m)
0.009 - 0.490	2 400/F(kHz)	300
0.490 - 1.705	24 000/F(kHz)	30
1.705 - 30	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 MHz, 76–88 MHz, 174–216 MHz or 470–806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., Section 15.231 and 15.241.



Test procedure

ANSI C63.10-2013

Test settings

Test Procedures for emission from 9 kHz to 30 MHz

- 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.
- 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.
- 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 peak and average detect function and specified bandwidth with maximum hold mode.
- Below 30 MHz frequency range, all orientations about parallel, perpendicular, and ground-parallel were investigated then reported and the worse orientations of Face-on and Face-off were set for final test.
 - Face-on = Parallel, Face-off = Perpendicular

Notes:

- $f < 30$ MHz, extrapolation factor of 40 dB/decade of distance. $F_d = 40 \log(D_m/D_s)$
Where:
 - F_d = Distance factor in dB
 - D_m = Measurement distance in meters
 - D_s = Specification distance in meters
- The test measurement distance is 3 meter
- Limit (dB(μ V/m)) =
 - For 0.009 MHz - 0.490 MHz, $20 \cdot \log(2400/F(\text{kHz}))$ dB(μ V/m)
 - For 0.490 MHz - 1.705 MHz, $20 \cdot \log(24000/F(\text{kHz}))$ dB(μ V/m)
 - For 1.705 MHz - 30 MHz, $20 \cdot \log(30) = 29.54$ dB(μ V/m)

Test results

FCC Radiated Emissions Fundamental & 9 kHz to 30 MHz (5W)

[Face-on]

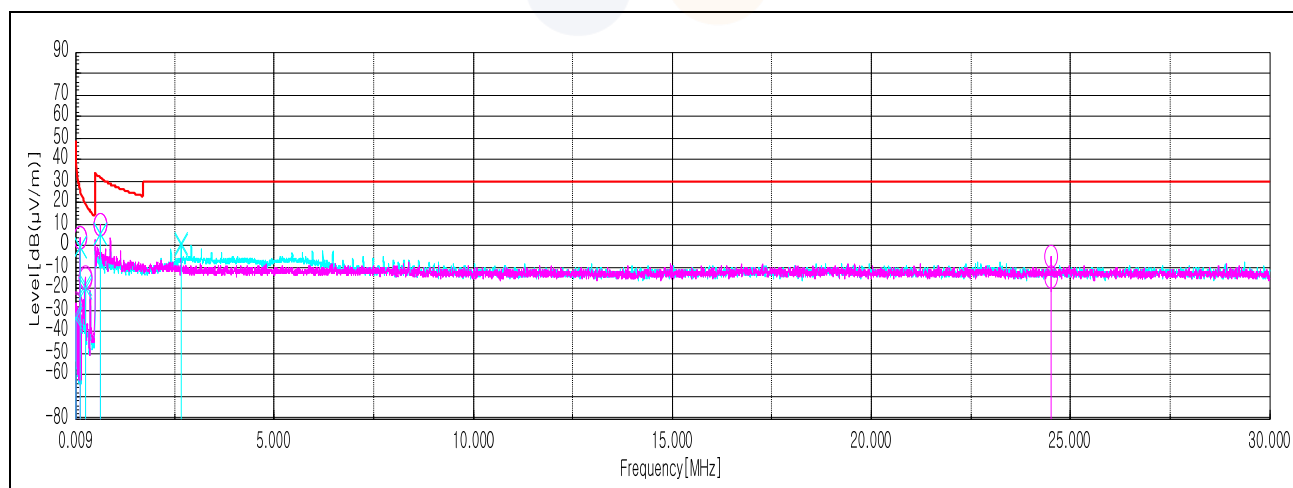
Frequency	Reading	Detector	Ant. Factor	Amp. + Cable	Distance factor	Result	Limit	Margin
(MHz)	(dB(μV))	Mode	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
0.02	64.20	AV	20.68	-31.31	80.00	-26.43	42.50	68.93
0.13	95.70	AV	19.99	-32.43	80.00	3.26	25.50	22.24
0.25	76.90	AV	19.92	-32.31	80.00	-15.49	19.50	34.99
0.63	61.60	QP	19.93	-32.20	40.00	9.33	31.60	22.27
24.52	35.00	QP	20.97	-30.60	40.00	-14.63	29.50	44.13

[Face-off]

Frequency	Reading	Detector	Ant. Factor	Amp. + Cable	Distance factor	Result	Limit	Margin
(MHz)	(dB(μV))	Mode	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
0.02	58.50	AV	20.48	-31.48	80.00	-32.50	40.40	72.90
0.13	91.20	AV	19.99	-32.43	80.00	-1.24	25.50	26.74
0.25	72.70	AV	19.92	-32.31	80.00	-19.69	19.50	39.19
0.64	57.70	QP	19.93	-32.20	40.00	5.43	31.50	26.07
2.67	51.30	QP	20.08	-31.79	40.00	-0.41	29.50	29.91

Note.

¹⁾ 80 is distance factor = $40 \cdot \log(3/300)$, 40 is distance factor = $40 \cdot \log(3/30)$



FCC Radiated Emissions Fundamental & 9 kHz to 30 MHz (7.5W)

[Face-on]

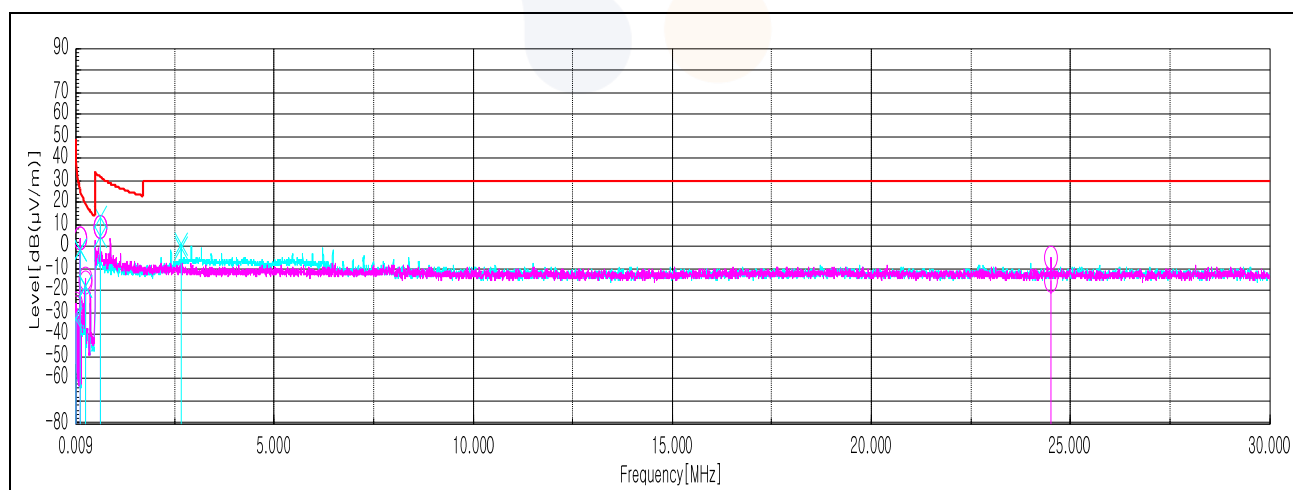
Frequency	Reading	Detector	Ant. Factor	Amp. + Cable	Distance factor	Result	Limit	Margin
(MHz)	(dB(μV))	Mode	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
0.02	64.50	AV	20.68	-31.31	80.00	-26.13	42.50	68.63
0.13	95.90	AV	19.99	-32.43	80.00	3.46	25.50	22.04
0.25	76.40	AV	19.92	-32.31	80.00	-15.99	19.50	35.49
0.64	61.00	QP	19.93	-32.20	40.00	8.73	31.50	22.77
24.52	34.20	QP	20.97	-30.60	40.00	-15.43	29.50	44.93

[Face-off]

Frequency	Reading	Detector	Ant. Factor	Amp. + Cable	Distance factor	Result	Limit	Margin
(MHz)	(dB(μV))	Mode	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
0.13	90.50	AV	19.99	-32.43	80.00	-1.94	25.50	27.44
0.02	59.10	AV	20.80	-31.21	80.00	-31.31	44.10	75.41
0.63	65.50	QP	19.93	-32.20	40.00	13.23	31.60	18.37
0.25	73.90	AV	19.92	-32.31	80.00	-18.49	19.50	37.99
2.67	50.50	QP	20.08	-31.79	40.00	-1.21	29.50	30.71

Note.

¹⁾ 80 is distance factor = $40 \cdot \log(3/300)$, 40 is distance factor = $40 \cdot \log(3/30)$



FCC Radiated Emissions Fundamental & 9 kHz to 30 MHz (10W)

[Face-on]

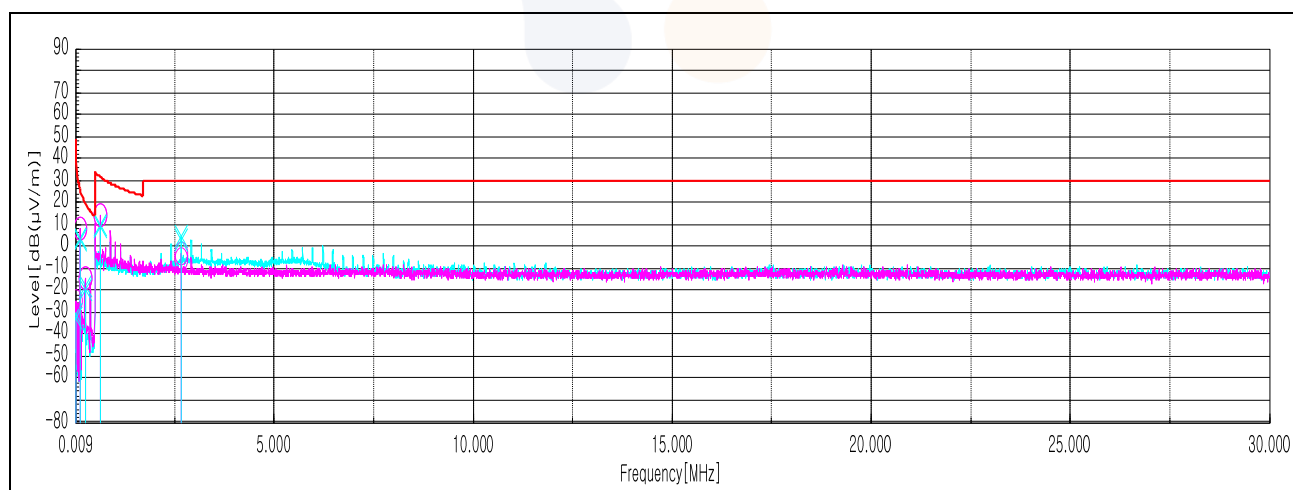
Frequency	Reading	Detector	Ant. Factor	Amp. + Cable	Distance factor	Result	Limit	Margin
(MHz)	(dB(μV))	Mode	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
0.04	59.70	AV	20.18	-31.89	80.00	-32.01	36.70	68.71
0.13	100.40	AV	19.99	-32.43	80.00	7.96	25.50	17.54
0.25	78.10	AV	19.92	-32.31	80.00	-14.29	19.50	33.79
0.63	65.90	QP	19.93	-32.20	40.00	13.63	31.60	17.97
2.67	45.90	QP	20.08	-31.79	40.00	-5.81	29.50	35.31

[Face-off]

Frequency	Reading	Detector	Ant. Factor	Amp. + Cable	Distance factor	Result	Limit	Margin
(MHz)	(dB(μV))	Mode	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
0.02	59.30	AV	20.48	-31.48	80.00	-31.70	40.40	72.10
0.13	95.30	AV	19.99	-32.43	80.00	2.86	25.50	22.64
0.25	72.20	AV	19.92	-32.31	80.00	-20.19	19.50	39.69
0.63	61.20	QP	19.93	-32.20	40.00	8.93	31.60	22.67
2.67	54.10	QP	20.08	-31.79	40.00	2.39	29.50	27.11

Note.

¹⁾ 80 is distance factor = $40 \cdot \log(3/300)$, 40 is distance factor = $40 \cdot \log(3/30)$



FCC Radiated Emissions Fundamental & 9 kHz to 30 MHz (15W)

[Face-on]

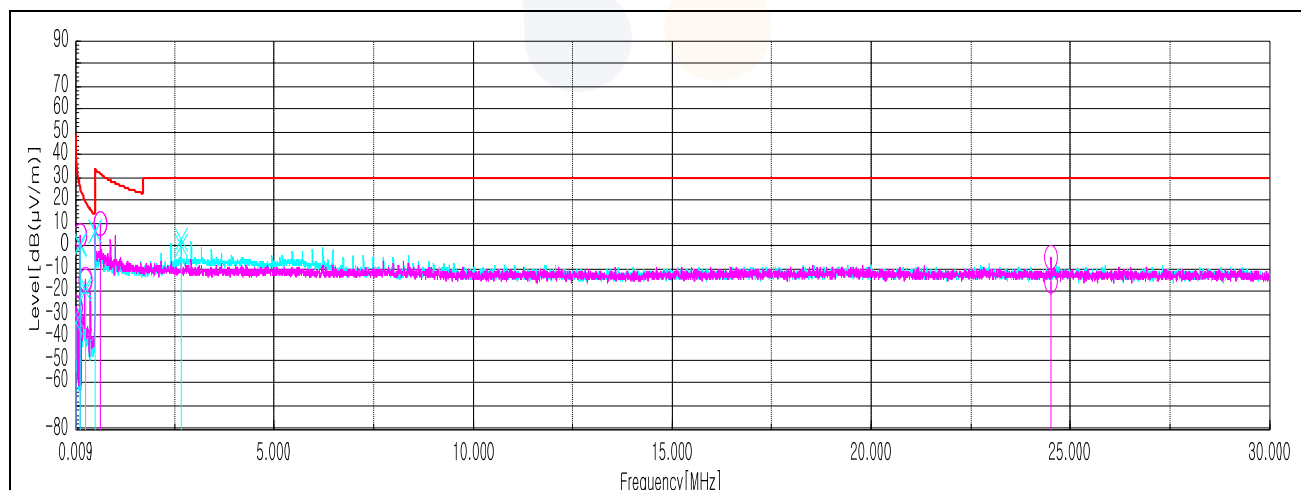
Frequency	Reading	Detector	Ant. Factor	Amp. + Cable	Distance factor	Result	Limit	Margin
(MHz)	(dB(μV))	Mode	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
0.02	64.20	AV	20.68	-31.31	80.00	-26.43	42.50	68.93
0.13	95.70	AV	19.99	-32.43	80.00	3.26	25.50	22.24
0.25	76.90	AV	19.92	-32.31	80.00	-15.49	19.50	34.99
0.63	61.60	QP	19.93	-32.20	40.00	9.33	31.60	22.27
24.52	35.00	QP	20.97	-30.60	40.00	-14.63	29.50	44.13

[Face-off]

Frequency	Reading	Detector	Ant. Factor	Amp. + Cable	Distance factor	Result	Limit	Margin
(MHz)	(dB(μV))	Mode	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
0.02	58.50	AV	20.48	-31.48	80.00	-32.50	40.40	72.90
0.13	91.20	AV	19.99	-32.43	80.00	-1.24	25.50	26.74
0.25	72.70	AV	19.92	-32.31	80.00	-19.69	19.50	39.19
0.64	57.70	QP	19.93	-32.20	40.00	5.43	31.50	26.07
2.67	51.30	QP	20.08	-31.79	40.00	-0.41	29.50	29.91

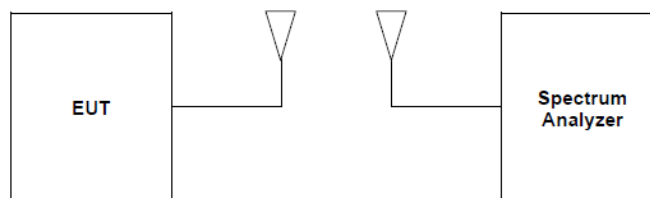
Note.

¹⁾ 80 is distance factor = $40 \cdot \log(3/300)$, 40 is distance factor = $40 \cdot \log(3/30)$



6.2. 20dB Bandwidth

Test setup



Limit

For reporting purpose only

Test settings

The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

A peak, or peak hold, may be used in place of the sampling detector as this may produce a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold may be necessary to determine the occupied bandwidth if the device is not transmitting continuously.

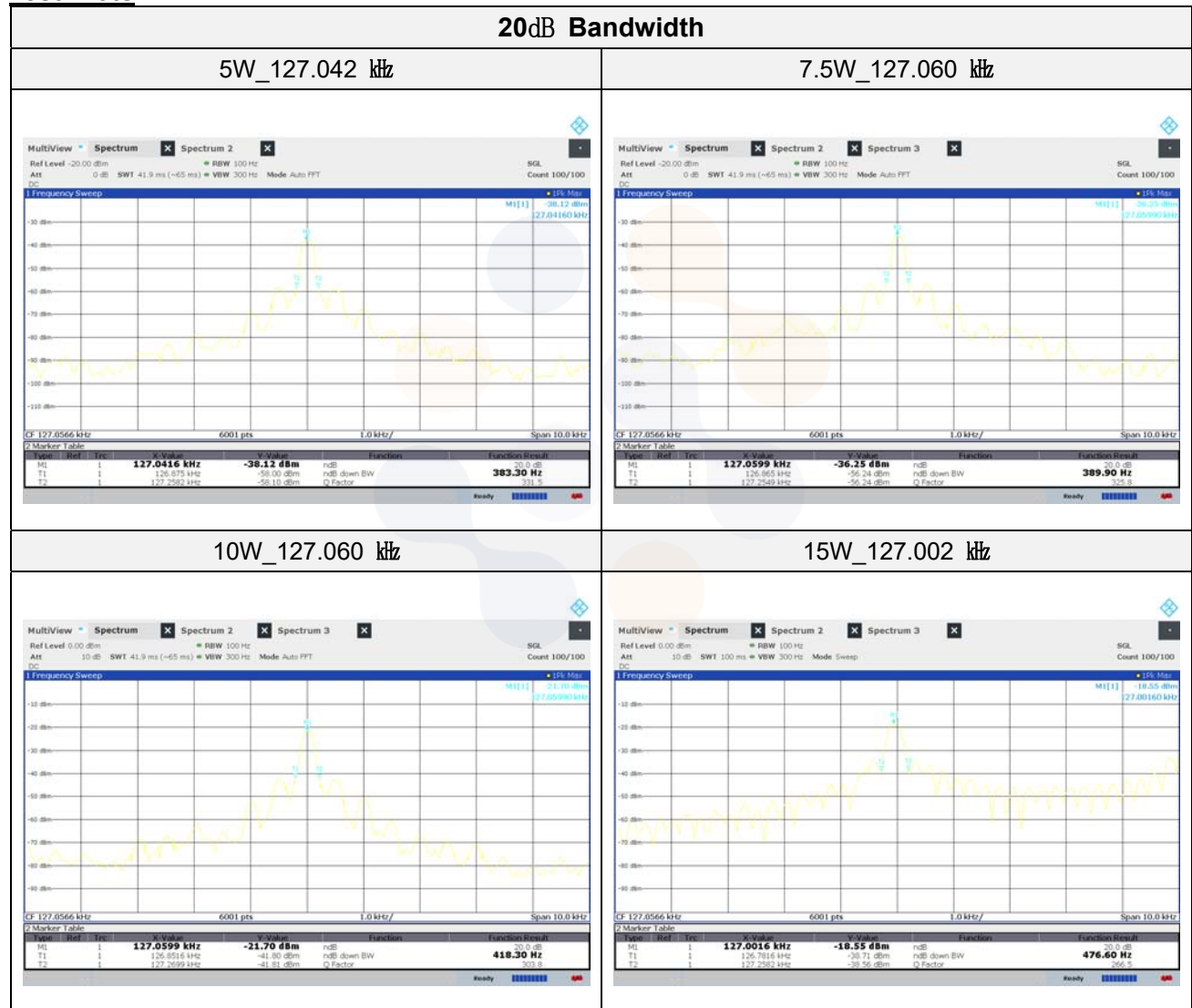
The trace data points are recovered and are directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded.

The difference between the two recorded frequencies is the 99% occupied bandwidth.

Test results

Mode	Frequency (kHz)	20dB Bandwidth (kHz)	Limit
5W	127.042	0.38	Reporting purpose only
7.5W	127.060	0.39	
10W	127.060	0.42	
15W	127.002	0.48	

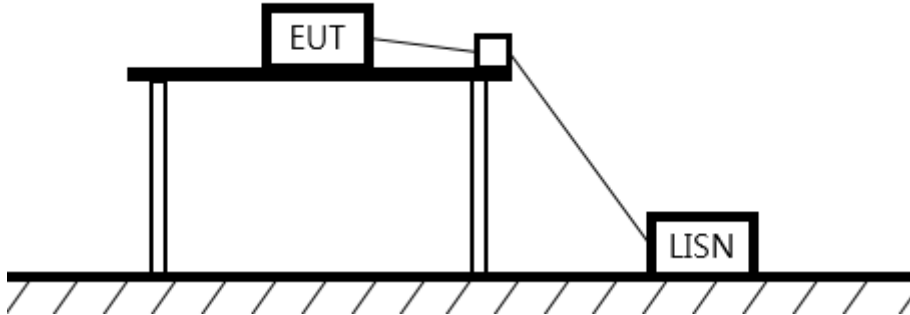
Test Plots



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.

6.3. AC Conducted emission

Test setup



Limit

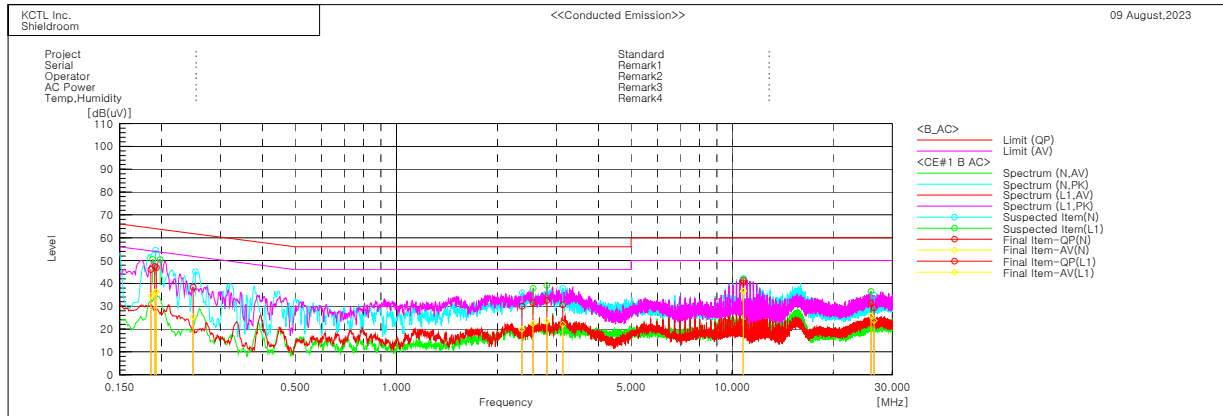
According to 15.207(a) and RSS-Gen(8.8), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the 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 (MHz)	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

Measurement procedure

1. The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 cm in which is located 40 cm away from the vertical wall and 1.5m away from the side wall of the shielded room.
2. Each current-carrying conductor of the EUT power cord was individually connected through a 50Ω/50μH LISN, which is an input transducer to a spectrum analyzer or an EMI/Field Intensity Meter, to the input power source.
3. Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
4. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.
5. The measurements were made with the detector set to peak amplitude within a bandwidth of 10 kHz or to quasi-peak and average within a bandwidth of 9 kHz. The EUT was in transmitting mode during the measurements.

Test results (Worst case : 10W)



Final Result

--- N Phase ---										
No.	Frequency	Reading QP	Reading CAV	c. f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV
	[MHz]	[dB(μV)]	[dB(μV)]	[dB]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]
1	0.19082	37.4	26.2	10.0	47.4	36.2	64.0	54.0	16.6	17.8
2	0.24849	28.7	15.8	9.6	38.3	25.4	61.8	51.8	23.5	26.4
3	2.36714	20.2	10.2	9.7	29.9	19.9	56.0	46.0	26.1	26.1
4	3.1315	20.8	12.4	9.7	30.5	22.1	56.0	46.0	25.5	23.9
5	10.80441	31.2	26.7	10.0	41.2	36.7	60.0	50.0	18.8	13.3
6	26.44768	19.4	13.7	10.0	29.4	23.7	60.0	50.0	30.6	26.3

--- L1 Phase ---										
No.	Frequency	Reading QP	Reading CAV	c. f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV
	[MHz]	[dB(μV)]	[dB(μV)]	[dB]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]
1	0.1859	36.1	24.6	10.0	46.1	34.6	64.2	54.2	18.1	19.6
2	0.19311	36.9	26.2	10.0	46.9	36.2	63.9	53.9	17.0	17.7
3	2.55311	21.8	12.7	9.7	31.5	22.4	56.0	46.0	24.5	23.6
4	2.80883	22.8	13.7	9.7	32.5	23.4	56.0	46.0	23.5	22.6
5	10.80156	30.3	26.6	10.0	40.3	36.6	60.0	50.0	19.7	13.4
6	25.9332	21.1	15.6	10.1	31.2	25.7	60.0	50.0	28.8	24.3

7. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSW50	101013	24.07.03
Signal & Spectrum Analyzer	R&S	FSV3030	1330.5000K30-101710-Wt	24.07.03
DC Power Supply	AGILENT	E3632A	KR94907664	24.04.27
Attenuator	HUBER+SUHNER	6610_SK-50-1/199_NE	ATT01	23.10.28
Signal Generator	R&S	SMB100A	176206	24.01.19
EMI TEST RECEIVER	R&S	ESCI7	100732	24.03.03
Bilog Antenna	SCHWARZBECK	VULB9168	583	24.04.19
COAXIAL FIXED ATTENUATOR	Agilent	8491B-003	2708A18758	24.04.19
Loop Antenna	R&S	HFH2-Z2	100355	24.08.10
AMPLIFIER	SONOMA	310N	284608	23.08.18
Antenna Mast	Innco Systems	MA4000-EP	303	N/A
Turn Table	Innco Systems	DT2000	79	N/A
ISOLATION TRANSFORMER	ONETECH CO., LTD	OT-IT500VA	OTR1-16026	24.03.23
TWO-LINE V - NETWORK	R&S	ENV216	101358	23.09.29
EMI TEST RECEIVER	R&S	ESCI3	100001	23.08.18

End of test report