

Power Bright (SIP) Ltd.

RF TEST REPORT

Report Type:

FCC Part 15C RF report

Model:

ENJ1000, ENX1000, KRJ1000, KRX1000

REPORT NUMBER:

200702601SHA-001

ISSUE DATE:

November 19, 2020

DOCUMENT CONTROL NUMBER:

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Manufacturer : Power Bright (SIP) Ltd.
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FCC ID : 2AXD6-JS1000

SUMMARY:

The equipment complies with the requirements according to the following standard(s) or Specification:

47CFR Part 15 (2019): Radio Frequency Devices (Subpart C)

ANSI C63.10 (2014): American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

PREPARED BY:**REVIEWED BY:**

Project Engineer
Erick Liu



Reviewer
Daniel Zhao

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TEST REPORT

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Revision History

Report No.	Version	Description	Issued Date
200702601SHA-001	Rev. 01	Initial issue of report	November 19, 2020

Measurement result summary

TEST ITEM	FCC REFERENCE	RESULT
Radiated emissions	15.209	Pass
Conducted emissions	15.207	Pass

Notes: 1: NA =Not Applicable

2: Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.

3: Additions, Deviations and Exclusions from Standards: None.

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1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	Multi-function Jump Starter
Type/Model:	ENJ1000, ENX1000, KRJ1000, KRX1000
Description of EUT:	The product covered by this report is a portable power pack with wireless charging function, all models are same except the model name, after evaluation, we choose ENJ1000 for all tests.
Rating:	Input: 5V, 2.4A or 9V 2.0A Output: USB: 5VDC 2A; 9V 2A; 12V 2A Boost: 12Vdc, 1000A (1ms); 12Vdc, 100A (5s) wireless output: 10W
Category of EUT:	Class B
EUT type:	☒ Table top ☐ Floor standing
Software Version:	/
Hardware Version:	/
Sample number:	0200717-45-005
Sample received date:	July 17, 2020
Date of test:	June 22, 2020 ~ September 05, 2020

1.2 Technical Specification

Frequency Range:	110kHz – 149kHz
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1.3 Description of Test Facility

Name:	Intertek Testing Services Shanghai
Address:	Building 86, No. 1198 Qinzhou Road (North), Shanghai 200233, P.R. China
Telephone:	86 21 61278200
Telefax:	86 21 54262353

The test facility is recognized, certified, or accredited by these organizations:	CNAS Accreditation Lab Registration No. CNAS L0139
	FCC Accredited Lab Designation Number: CN1175
	IC Registration Lab CAB identifier.: CN0051
	VCCI Registration Lab Registration No.: R-14243, G-10845, C-14723, T-12252
	A2LA Accreditation Lab Certificate Number: 3309.02

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2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2019)
ANSI C63.10 (2014)

2.2 Mode of operation during the test

Within this test report, EUT was tested under all available operation modes and tested under its rating voltage and frequency. Other voltage and frequency are specified if used.

2.3 Test software list

Test Items	Software	Manufacturer	Version
Conducted emission	ESxS-K1	R&S	V2.1.0
Radiated emission	ES-K1	R&S	V1.71

2.4 Test peripherals list

Item No.	Name	Brand and Model	Description
1	Wireless load	EESON	100%/50%/0% power level
2	USB load	RX21	-

2.5 Test environment condition:

Test items	Temperature	Humidity
Radiated emission	25°C	54% RH
Power line conducted emission	24°C	54% RH

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2.6 Instrument list

Conducted Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESCS 30	EC 2107	2021-07-15
☒	A.M.N.	R&S	ESH2-Z5	EC 3119	2021-12-07
☐	A.M.N.	R&S	ENV 216	EC 3393	2021-07-04
☐	A.M.N.	R&S	ENV4200	EC 3558	2021-06-10
☒	Shielding room	Zhongyu	-	EC 2838	2021-01-07
Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESIB 26	EC 3045	2021-09-12
☒	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2021-05-30
☐	Pre-amplifier	R&S	AFS42-00101800-25-S-42	EC5262	2021-06-10
☐	Horn antenna	R&S	HF 906	EC 3049	2021-11-17
☐	Horn antenna	ETS	3117	EC 4792-1	2021-01-09
☐	Horn antenna	R&S	STLP9149	EC5881	2021-06-19
☒	Active loop antenna	Schwarzbeck	FMZB1519	EC 5345	2021-03-07
☒	Semi-anechoic chamber	Albatross project	-	EC 3048	2021-09-15

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2.7 Measurement uncertainty

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

Measurement	Frequency	Expanded Uncertainty ($k=2$)
Conducted emission at mains ports	9kHz ~ 150kHz	3.52 dB
	150kHz ~ 30MHz	3.19 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	4.90 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.02 dB
	6GHz ~ 18GHz	5.28 dB

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3 Radiated emissions

Test result: Pass

3.1 Limit

Frequencies (MHz)	Field Strength (microvolts/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

3.2 Measurement Procedure

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 meters chamber room. 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.
- 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 rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz:

- The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meters 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.

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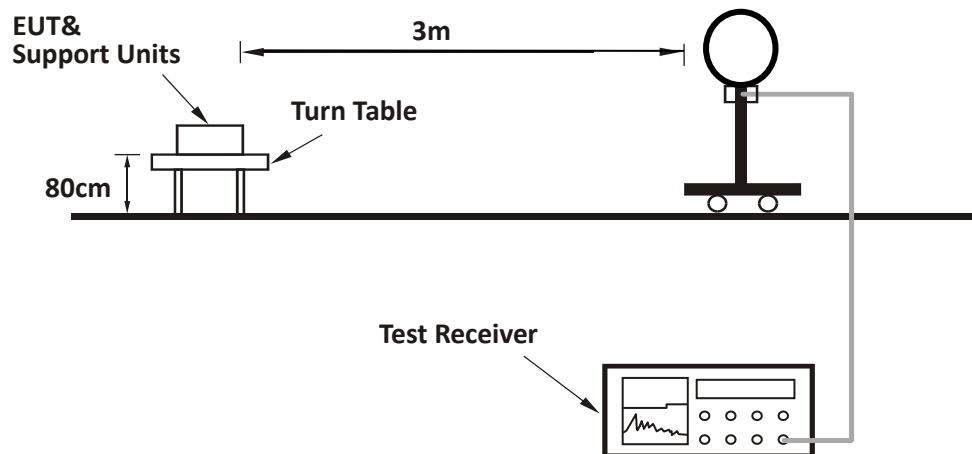
- d) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e) The test-receiver system was set to quasi-peak detect function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

Note:

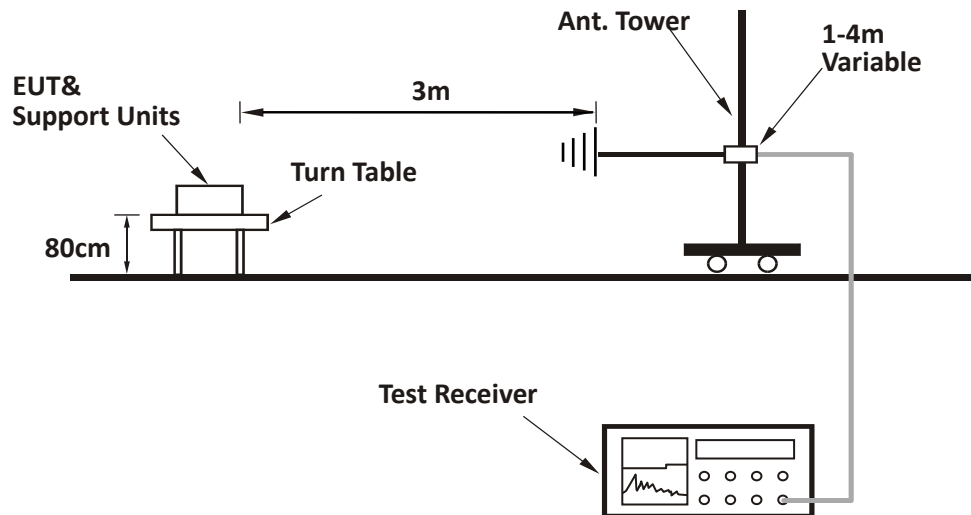
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. All modes of operation were evaluated and the worst-case emissions were reported

3.3 Test Configuration

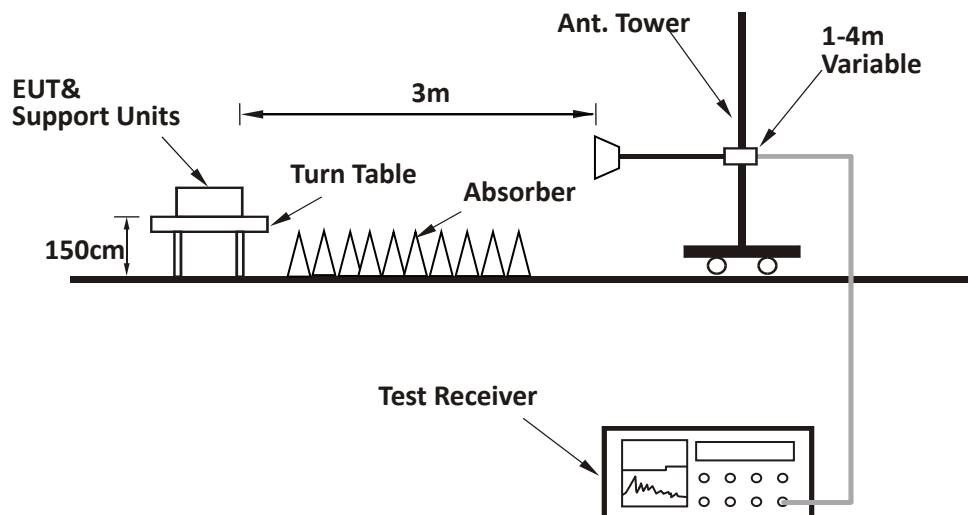
For Radiated emission below 30MHz:



For Radiated emission 30MHz to 1GHz:



For Radiated emission above 1GHz:



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3.4 Test Results of Radiated Emissions

EUT was tested with empty load, half load and full load, the full load is the worst case and we listed the results in the report.

Test data below 30MHz:

Antenna Polarization	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin	Detector	Remark
X	0.146	67.60	10.60	88.20	20.60	PK	Fundamental
X	0.390	49.40	10.60	71.60	22.20	PK	Spurious
X	0.450	49.30	10.60	69.10	19.80	PK	Spurious
X	1.590	27.40	11.60	47.20	19.80	PK	Spurious
X	3.860	49.10	11.70	59.10	10.00	PK	Spurious
X	6.970	40.60	11.80	59.10	18.50	PK	Spurious
Y	0.146	66.70	10.60	88.50	21.80	PK	Fundamental
Y	0.390	44.30	10.60	71.60	27.30	PK	Spurious
Y	0.630	40.90	10.60	63.30	22.40	PK	Spurious
Y	0.990	28.90	11.60	55.40	26.50	PK	Spurious
Y	1.590	25.20	11.60	47.20	22.00	PK	Spurious
Y	6.970	34.20	11.80	59.10	24.90	PK	Spurious
Z	0.146	57.00	10.60	88.50	31.50	PK	Fundamental
Z	0.630	41.30	10.60	63.30	22.00	PK	Spurious
Z	0.870	31.70	11.10	57.70	26.00	PK	Spurious
Z	1.590	23.20	11.60	47.20	24.00	PK	Spurious
Z	6.850	33.50	11.80	59.10	25.60	PK	Spurious
Z	10.740	34.30	11.70	59.10	24.80	PK	Spurious

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Test data from 30MHz to 1000MHz:

Charging Mode:

Antenna Polarization	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin	Detector
H	35.83	26.20	18.70	40.00	13.80	PK
H	90.26	28.00	10.50	43.50	15.50	PK
H	107.76	30.30	11.40	43.50	13.20	PK
H	191.34	15.70	11.20	43.50	27.80	PK
H	364.35	26.40	16.20	46.00	19.60	PK
H	881.42	39.70	24.70	46.00	6.30	PK
V	30.00	22.10	21.30	40.00	17.90	PK
V	72.77	16.20	9.20	40.00	23.80	PK
V	121.36	15.00	11.80	43.50	28.50	PK
V	195.23	15.80	11.20	43.50	27.70	PK
V	547.07	24.70	20.00	46.00	21.30	PK
V	881.42	33.40	24.70	46.00	12.60	PK

Working Mode:

Antenna Polarization	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin	Detector
H	30.00	23.10	21.30	40.00	16.90	PK
H	78.60	34.40	9.60	40.00	5.60	PK
H	150.52	32.50	10.20	43.50	11.00	PK
H	214.67	41.70	11.40	43.50	1.80	PK
H	313.81	29.20	15.10	46.00	16.80	PK
H	881.42	32.30	24.70	46.00	13.70	PK
V	53.33	30.80	7.20	40.00	9.20	PK
V	78.60	37.40	9.60	40.00	2.60	PK
V	150.52	38.30	10.20	43.50	5.20	PK
V	214.67	41.70	11.40	43.50	1.80	PK
V	535.41	25.90	19.80	46.00	20.10	PK
V	881.42	33.80	24.70	46.00	12.20	PK

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.

2. Corrected Reading = Original Receiver Reading + Correct Factor

3. Margin = Limit - Corrected Reading

4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

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4 Conducted emissions

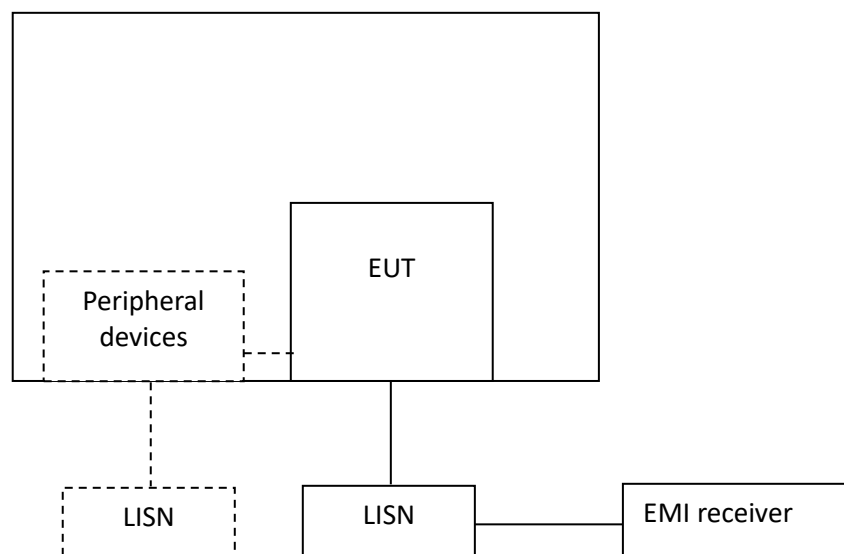
Test result: Pass

4.1 Limit

Frequency of Emission (MHz)	Conducted Emissions Limit (dBuV)	
	QP	AV
0.15-0.5	66 to 56*	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

4.2 Test Configuration



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Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements using a LISN, the 50 Ω measuring port is terminated by a measuring instrument having 50 Ω input impedance. All other ports are terminated in 50 Ω loads.

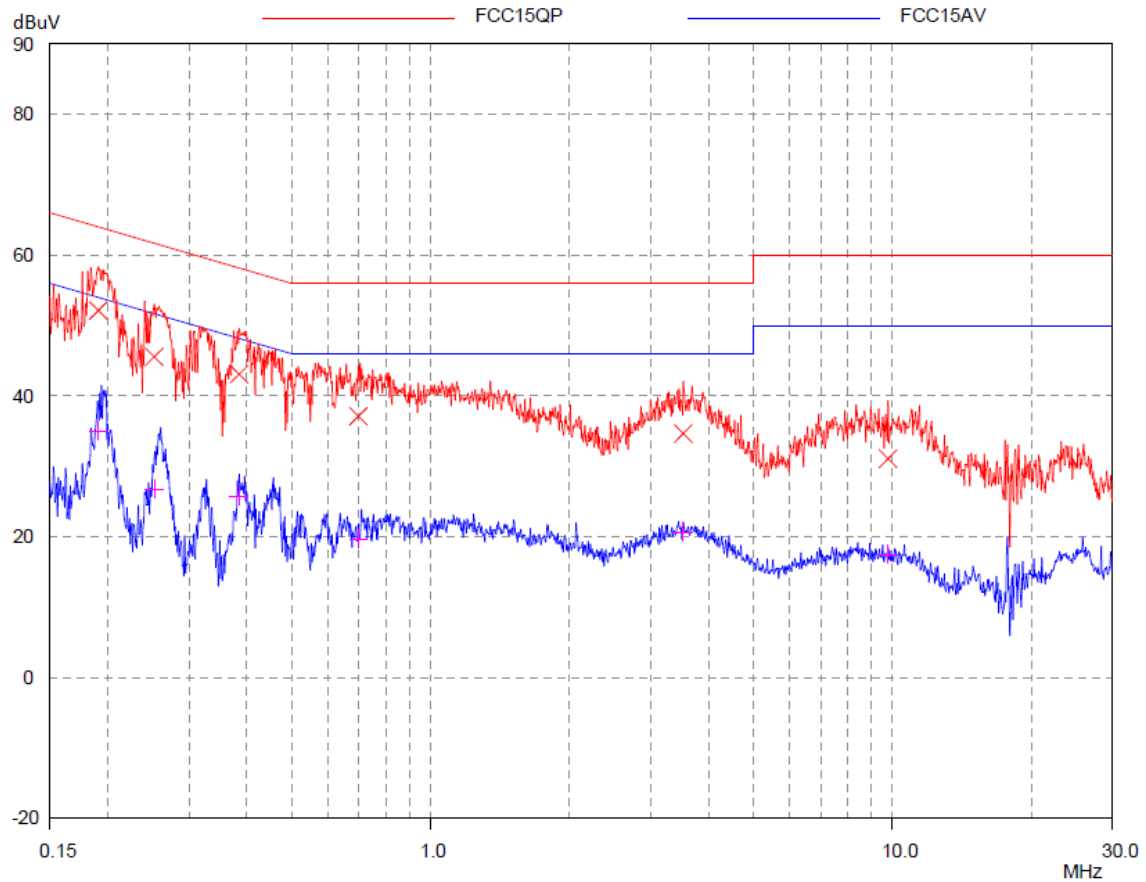
Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

The bandwidth of the test receiver is set at 9 kHz.

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4.4 Test Results of Conducted Emissions

L-Line

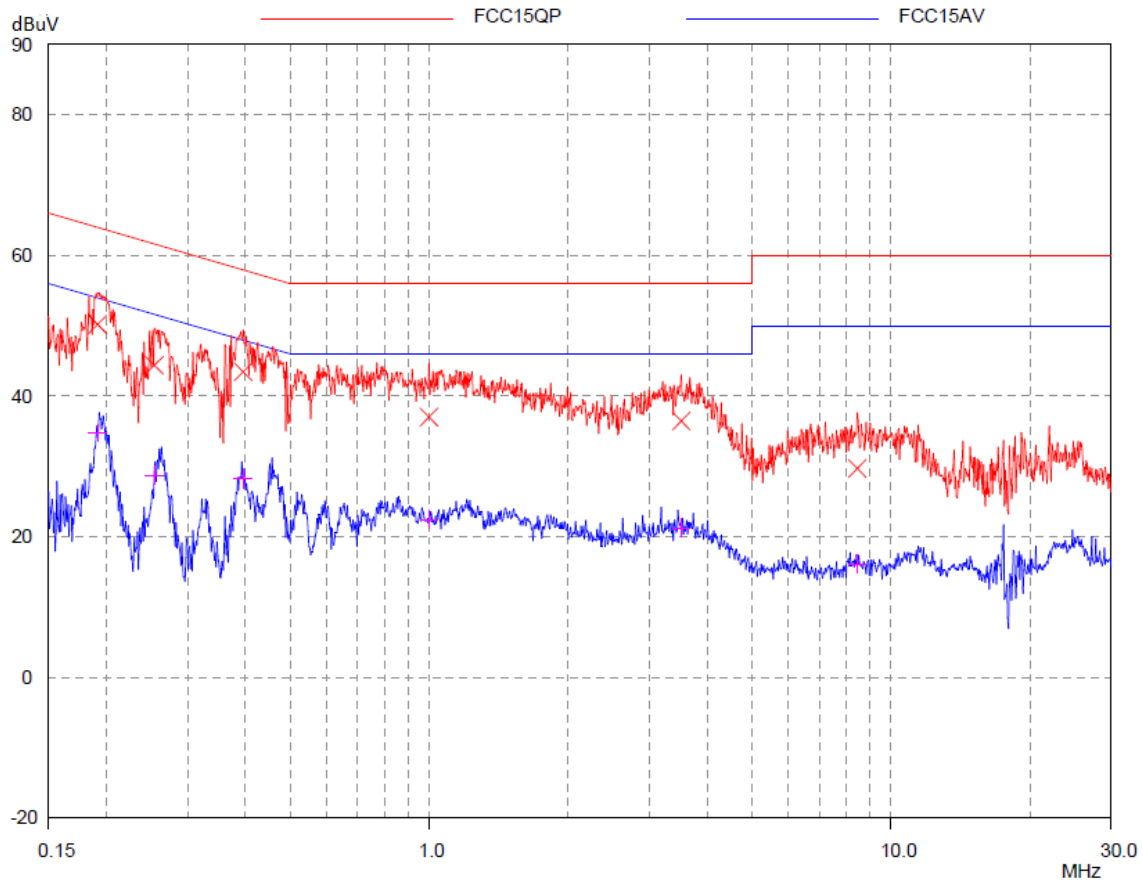


Frequency (MHz)	Quasi-peak			Average		
	Corrected Reading (dBuV)	Limit (dBuV)	Margin (dB)	Corrected Reading (dBuV)	Limit (dBuV)	Margin (dB)
0.19	52.15	64.01	11.86	35.03	54.01	18.98
0.25	45.56	61.69	16.13	26.75	51.69	24.94
0.38	43.09	58.17	15.08	25.76	48.17	22.41
0.70	37.13	56.00	18.87	19.67	46.00	26.33
3.53	34.68	56.00	21.32	20.70	46.00	25.30
9.80	31.10	60.00	28.90	17.53	50.00	32.47

Note: * means the emission level 20dB below the relevant limit.

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N-Line



Frequency (MHz)	Quasi-peak			Average		
	Corrected Reading (dBuV)	Limit (dBuV)	Margin (dB)	Corrected Reading (dBuV)	Limit (dBuV)	Margin (dB)
0.19	50.19	63.98	13.79	34.78	53.98	19.20
0.25	44.40	61.62	17.22	28.75	51.62	22.87
0.40	43.45	57.94	14.49	28.24	47.94	19.70
1.00	37.02	56.00	18.98	22.42	46.00	23.58
3.51	36.46	56.00	19.54	21.23	46.00	24.77
8.46	29.72	60.00	30.28	16.12	50.00	33.88

Note: * means the emission level 20dB below the relevant limit.

Remark: 1. Correct Factor = LISN Factor + Cable Loss, the value was added to Original Receiver Reading by the software automatically.

2. Corrected Reading = Original Receiver Reading + Correct Factor

3. Margin = Limit - Corrected Reading

4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

***** END *****