FCC 47 CFR PART 15 SUBPART E 15.407

TEST REPORT

FOR

Wireless Solution

Model : JH-DPK235159, JH-DPK145159, JH-DPK185159

Trade name: JH

Issued to
Jian Hua technology co., Ltd.
No. 870-12, Datong Road, Datong District, Kaohsiung City Taiwan

Issued by
WH Technology Corp.

EMC Test Site	**Xizhi Office and Lab**	**7F., No.262, Sec. 3, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan (R.O.C.)**
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APPENDIX 1 PHOTOS OF TEST CONFIGURATION
PHOTOS OF EUT

1. General Information

Applicant : **Jian Hua technology co., Ltd.**
Address : **No. 870-12, Datong Road, Datong District, Kaohsiung City Taiwan**
Manufacturer : **Jian Hua technology co., Ltd.**
Address : **No. 870-12, Datong Road, Datong District, Kaohsiung City Taiwan**
EUT : **Wireless Solution**
Model Name : **JH-DPK235159, JH-DPK145159, JH-DPK185159**

Model Differences :

	Model no.: JH-DPK235159	Model no.: JH-DPK145159	Model no.: JH-DPK185159
Enclosure Size	Big	Small	Middle
Antenna Gain	23 dBi	14d dBi	18 dBi

Is here with confirmed to comply with the requirements set out in the FCC Rules and Regulations Part 15 Subpart C and the measurement procedures were according to ANSI C63.4-2014. The said equipment in the configuration described in this report shows the maximum emission levels emanating

FCC part 15 subpart E

Receipt Date : 03/27/2019 Final Test Date : 03/19/2020

Tested By: **Reviewed by:**

Mar. 19, 2020 Mar. 19, 2020
Date Bing Chang/ Engineer **Date** Bell Wei / Manager
Designation Number: TW2954

2. Report of Measurements and Examinations

2.1 List of Measurements and Examinations

FCC Rule	Description of Test	Section	Result
15.203	Antenna requirement	5	Pass
15.207 15.407(b)(6)	Conducted Emission	6	N/A
15.205/15.209/ 15.407(b)(5), (6), (7)	Radiated Emission	7	Pass
15.407(e)	6dB Bandwidth	8	Pass
15.407(a)(3)	Maximum conducted output Power	9	Pass
15.407(a)(3)	Maximum Power Spectral Density	10	Pass
15.407(b)(4)	Band Edge	11	Pass
15.407(a)(5)	26dB Bandwidth	12	Pass

3. Test Configuration of Equipment under Test

3.1 Description of the tested samples

EUT Name	:	Wireless Solution
Model Number	:	JH-DPK235159, JH-DPK145159, JH-DPK185159
FCC ID	:	2AVW4E53238496
Receipt Date	:	03/27/2019
Power From	:	☐Inside ☑Outside RJ45 port ☐Adaptor ☐Battery ☐AC Power Source ☐DC Power Source ☐Support Unit PC or NB
Power Range	:	POE
Battery	:	N/A
Operate Frequency	:	WiFi: 802.11a, 802.11n HT20: 5745MHz ~ 5825MHz 802.11n HT40: 5755 MHz ~ 5795MHz
Modulation Technique	:	802.11a, 802.11n HT20, 802.11n HT40: OFDM
Number of Channels	:	Refer to the channel list as described below
Antenna Type	:	Antenna R: Panel Antenna Antenna L: Panel Antenna
Antenna gain		23 dBi(for Model no.: JH-DPK235159) 18 dBi(for Model no.: JH-DPK185159) 14 dBi(for Model no.: JH-DPK145159)

3.2 Carrier Frequency of Channels

802.11a, 802.11n,HT20

Channel	Frequency(MHz)
149	5745
157	5785
165	5825

802.11n,HT40

Channel	Frequency(MHz)	Channel	Frequency(MHz)
151	5755	159	5795

3.3 Test Mode and Test Software

a. EUT is power on and connected to PC via RJ45. Log in "10.10.10.10" on website and alter to "10.10.10.10/.rftest". Then we can choose frequency to make sure EUT is continuing trasmitting.
b. The following test modes were performed for test:
   - 802.11a, 802.11n,HT20: CH149: 5745MHz, CH157: 5785MHz, CH165: 5825MHz
   - 802.11n HT40: CH151: 5755MHz, CH159: 5795MHz

3.4 TEST Methodology & General Test Procedures

All testing as described bellowed were performed in accordance with ANSI C63.4:2014 and ANSI C63.10:2013.

Conducted Emissions

The EUT is placed on a wood table, which is at 0.8 m above ground plane acceding to clause 15.207 and requirements of ANSI C63.4:2014. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz are using CISPR Quasi-Peak / Average detectors.

Radiated Emissions

The EUT is a placed on a turn table, which is 0.8 m above ground plane. The turntable was rotated through 360 degrees to determine the position of maximum emission level. The EUT is placed at 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

1) Putting the EUT on the platform and turning on the EUT (on/off button on the bottom of the EUT).
2) Setting test channel described as “Channel setting and operating condition”, and testing channel by channel.
3) For the maximum output power measurement, we followed the method of measurement KDB 789033 D02.
4) For the spurious emission test based on ANSI(2014), at the frequency where below 1GHz used quasi-peak detector mode; where above 1GHz used the peak and average detector mode. IF the peak value may be under average limit, the average mode will not be performed.

3.5 Measurement Uncertainty

Measurement Item	Uncertainty
Peak Output Power(conducted)	±1.345dB
Power Spectral Density	±1.347dB
Radiated emission(1G-40GHz)	±5.00dB
Radiated emission(30M-1GHz)	±3.89dB
Conducted emission	±1.81dB

3.6 Description of the Support Equipments

Setup Diagram

See test photographs attached in appendix 1 for the actual connections between EUT and support equipment.

Support Equipment

Peripherals Devices:

OUTSIDE SUPPORT EQUIPMENT							
No.	Equipment	Model	Serial No.	FCC ID/ BSMI ID	Trade name	Data Cable	Power Cord
	N/A	N/A	N/A	N/A	N/A	N/A	N/A
INSIDE SUPPORT EQUIPMENT							
No.	Equipment	Model	Serial No.	FCC ID/ BSMI ID	Trade name	Data Cable	Power Cord
	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note: All the above equipment /cable were placed in worse case position to maximize emission signals during emission test

Grounding: Grounding was in accordance with the manufacturer's requirement and conditions for the intended use.

4. Test and measurement equipment

4.1 calibration

The measuring equipment utilized to perform the tests documented in the report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2 equipment

The following list contains measurement equipment used for testing. The equipment conforms to the requirement of CISPR 16-1, ANSI C63.2 and. Other required standards.

Calibration of all test and measurement, including any accessories that may effect such calibration, is checked frequently to ensure the accuracy. Adjustments are made and correction factors are applied in accordance with the instructions contained in the respective.

TABLELIST OF TEST AND MEASUREMENT EQUIPMENT

Test Site	Instrument	Manufacturer	Model No.	S/N	Next Cal. Date
Conduction	Spectrum (9K--3GHz)	R&S	FSP3	833387/010	2020/09/20
	EMI Receiver	R&S	ESHS10	830223/008	2020/05/22
	LISN	Rolf Heine Hochfrequenztechnik	NNB-2/16z	98062	2020/05/25
	ISN	Schwarzbeck	8-Wire ISN CAT5	CAT5-8158-0094	2020/09/21
	RF Cable	N/A	N/A	EMI-3	2020/10/19
Radiation	Bilog antenna(30M -1G)	ETC	MCTD2786B	BLB16M04004/JB-5-004	2020/05/03
	Double Ridged Guide Horn antenna(1G-18G)	ETC	MCTD 1209	DRH15N0 2009	2020/11/23
	Horn antenna (18G-26G)	com-power	AH-826	81000	2020/08/15
	LOOP Antenna (Below 30M)	com-power	AL-130	17117	2020/10/04
	Pre amplifier (30M-1G)	EMC INSTRUMENT	EMC9135	980334	2020/05/04
	Microwave Preamplifier (1G-18G)	EMC INSTRUMENT	EMC051845	980108&AT -18001	2020/10/23
	Pre amplifier (18G~26G)	MITEQ	JS4-18002600-30-5A	808329	2020/08/10
	EMI Test Receiver	R&S	ESVS30 (20M-1000MHz)	826006/002	2020/11/28
	RF Cable	EMCI	N male on end	30m	2020/10/19

	(open site)		of both sides (EMI4)		
	RF CABLE (1~26.5G)	HARBOUT INDUSTRIES	LL142MI(4M+4M)	NA	2021/03/08
	RF CABLE (1~26.5G)	HARBOUR INDUSTRIES	LL142MI(7M)	NA	2020/08/11
	Spectrum (9K--7GHz)	R&S	FSP7	830180/006	2020/03/25
	Spectrum (9K--40GHz)	AGILENT	8564EC	4046A0032	2021/03/01
--	Power Meter	R&S	NRVS	100696	2020/08/10
--	Power Sensor	R&S	URV5-Z4	0395.1619.05	2020/08/10

***CALIBRATION INTERVAL OF INSTRUMENTS LISTED ABOVE IS ONE YEAR**

5. Antenna Requirements

5.1 Standard Applicable

For intentional device, according to FCC 47 CFR 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.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

5.2 Antenna Construction and Directional Gain

Model no.: JH-DPK235159
Antenna Type: Panel Antenna
Antenna Gain: Gain: 23 dBi

Model no.: JH-DPK185159
Antenna Type: Panel Antenna
Antenna Gain: Gain: 18 dBi

Model no.: JH-DPK145159
Antenna Type: Panel Antenna
Antenna Gain: Gain: 14 dBi

6. Test of Conducted Emission

6.1 Test Limit

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz on the 110 VAC power and return leads of the EUT according to the methods defined in ANSI C63.4-2014 Section 3.1. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 2.2. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

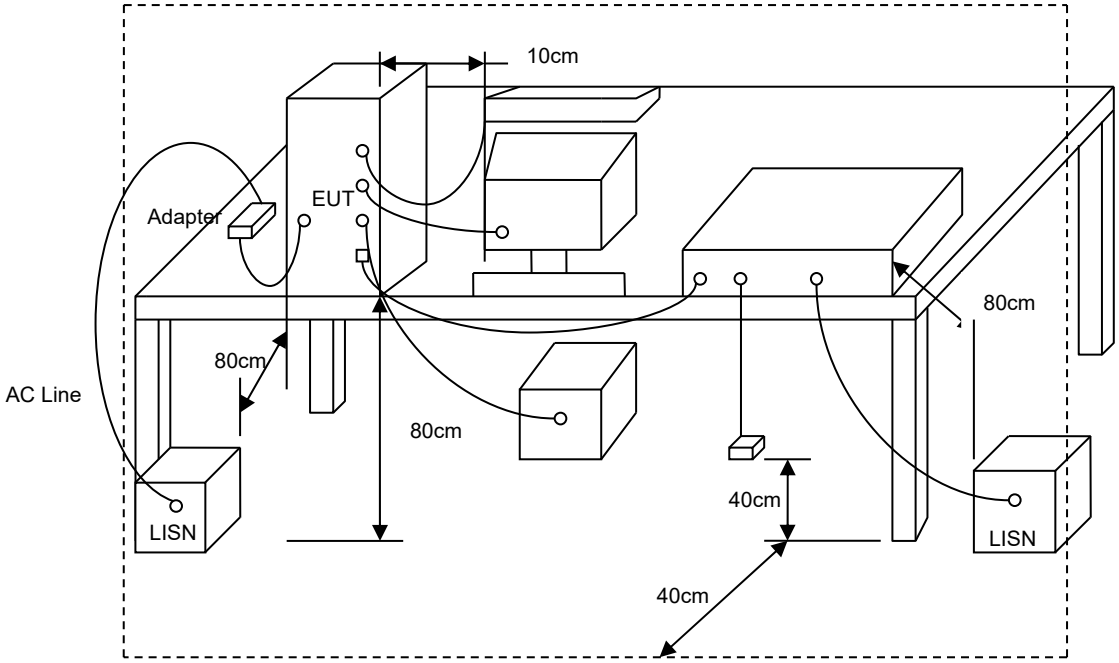
Frequency (MHz)	Quasi Peak (dB μ V)	Average (dB μ V)
0.15 – 0.5	66-56*	56-46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

*Decreases with the logarithm of the frequency.

6.2 Test Procedures

a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
c. All the support units are connecting to the other LISN.
d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
e. The FCC states that a 50 ohm, 50 micro-Henry LISN should be used.
f. Both sides of AC line were checked for maximum conducted interference.
g. The frequency range from 150 kHz to 30 MHz was searched.
h. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

6.3 Typical Test Setup



6.4 Test Result and Data: N/A

EUT is powered by POE.

7. Test of Radiated Emission

7.1 Test Limit

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter measurement is based on the maximum conducted output power, the attenuation required under this paragraph shall be 30dB instead of 20dB. In addition, radiated emissions which fall in section 15.205(a) the restricted bands must also comply with the radiated emission limit specified in section 15.209(a).

Frequency (MHz)	Field Strength (microvolt/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

7.2 Test Procedures

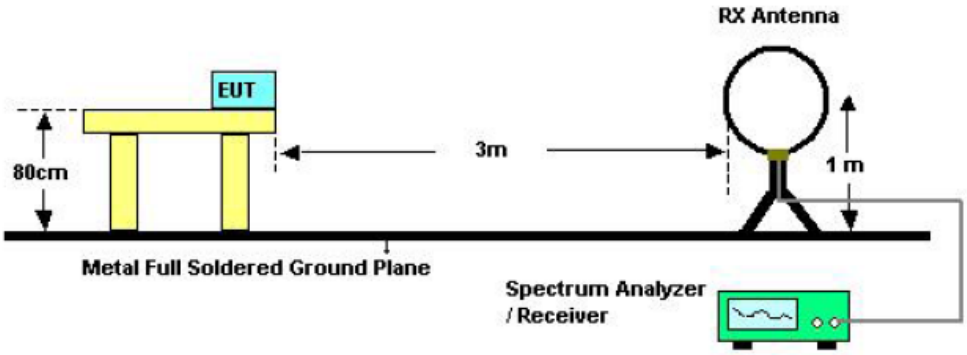
a. The EUT was placed on a rotatable table top 0.8 meter above ground.
b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
c. The table was rotated 360 degrees to determine the position of the highest radiation.
d. The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
f. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
h. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise,

the emissions will be measured in average mode again and reported.

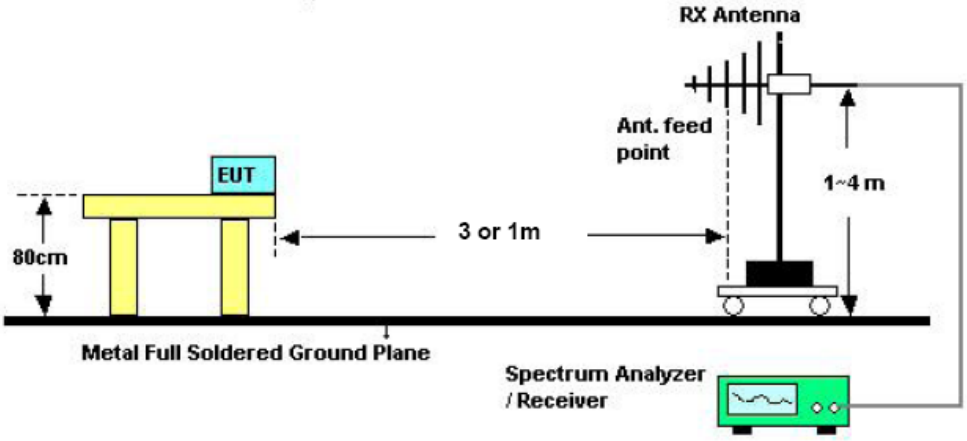
i. “Cone of radiation” has been considered to be 3dB bandwidth of the measurement antenna.

7.3 Typical Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.
Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1m]) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].

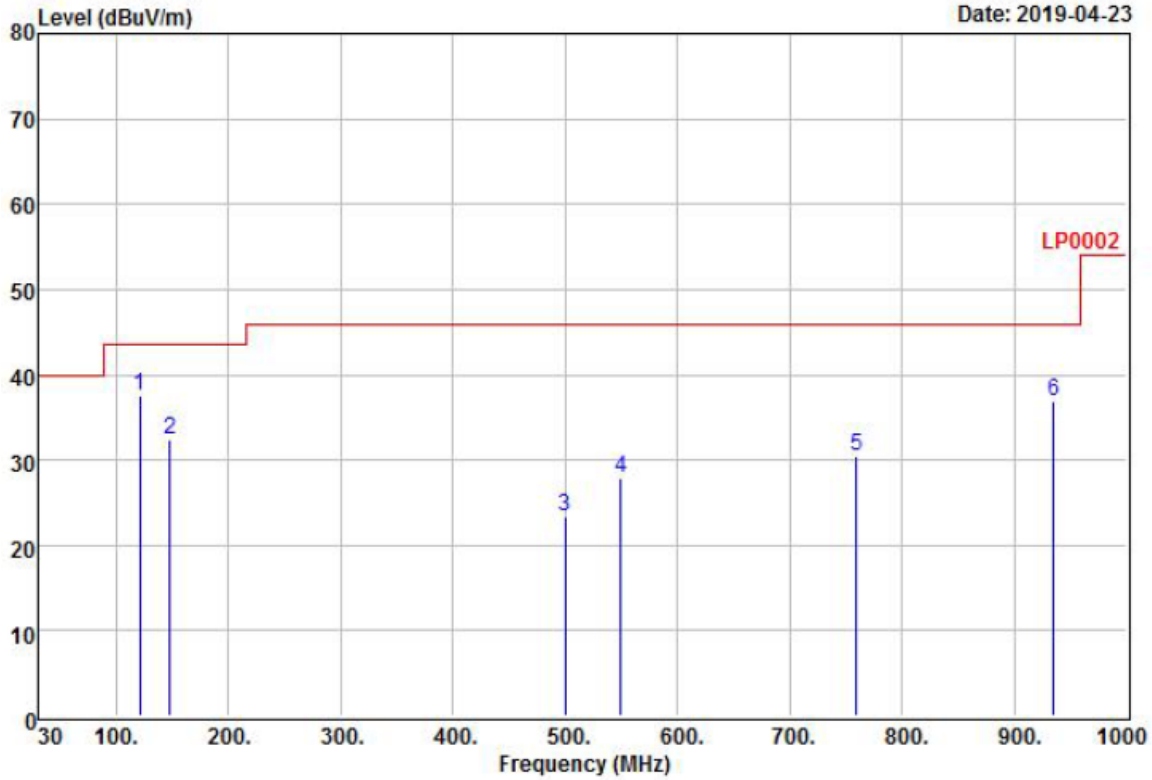
7.4 Test Result and Data (9kHz ~ 30MHz)

The 9kHz - 30MHz spurious emission is under limit 20dB more.

7.5 Test Result and Data (30MHz ~ 1GHz, worst emissions found)

JH-DPK235159

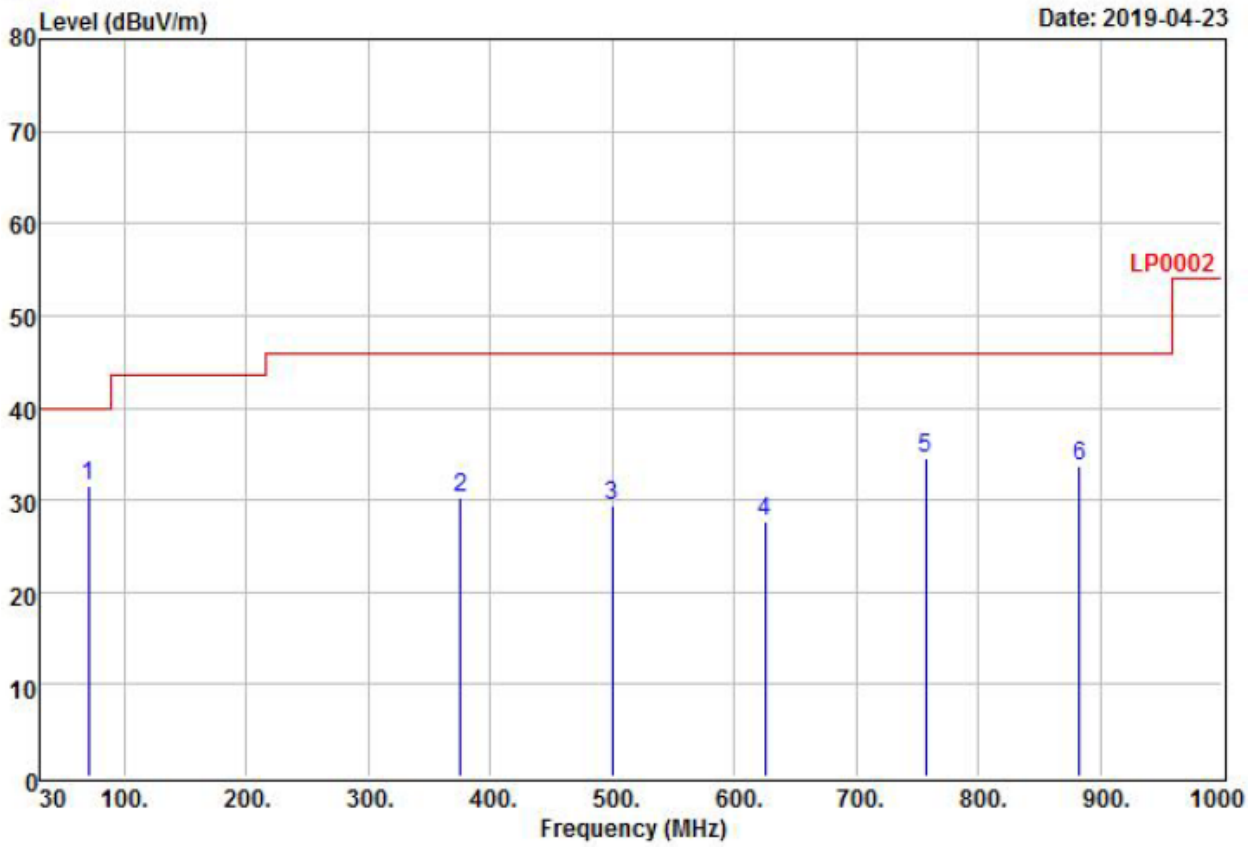
Power	:	POE	Pol/Phase	:	HORIZONTAL
Test Mode	:	TX 5825MHz(worst-case)	Temperature	:	30 °C
Humidity	:	65%			



---------- : ----------
Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	@	120.59	52.69	-15.21	37.48	43.50	-6.02	QP
2		147.70	47.83	-15.46	32.37	43.50	-11.13	QP
3		500.07	32.36	-8.91	23.45	46.00	-22.55	QP
4		549.80	36.47	-8.55	27.92	46.00	-18.08	QP
5		759.22	35.96	-5.52	30.44	46.00	-15.56	QP
6		935.07	38.68	-1.70	36.98	46.00	-9.02	QP

Power	:	POE	Pol/Phase	:	VERTICAL
Test Mode	:	TX 5825MHz(worst-case)	Temperature	:	30 °C
Humidity	:	65%			



Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

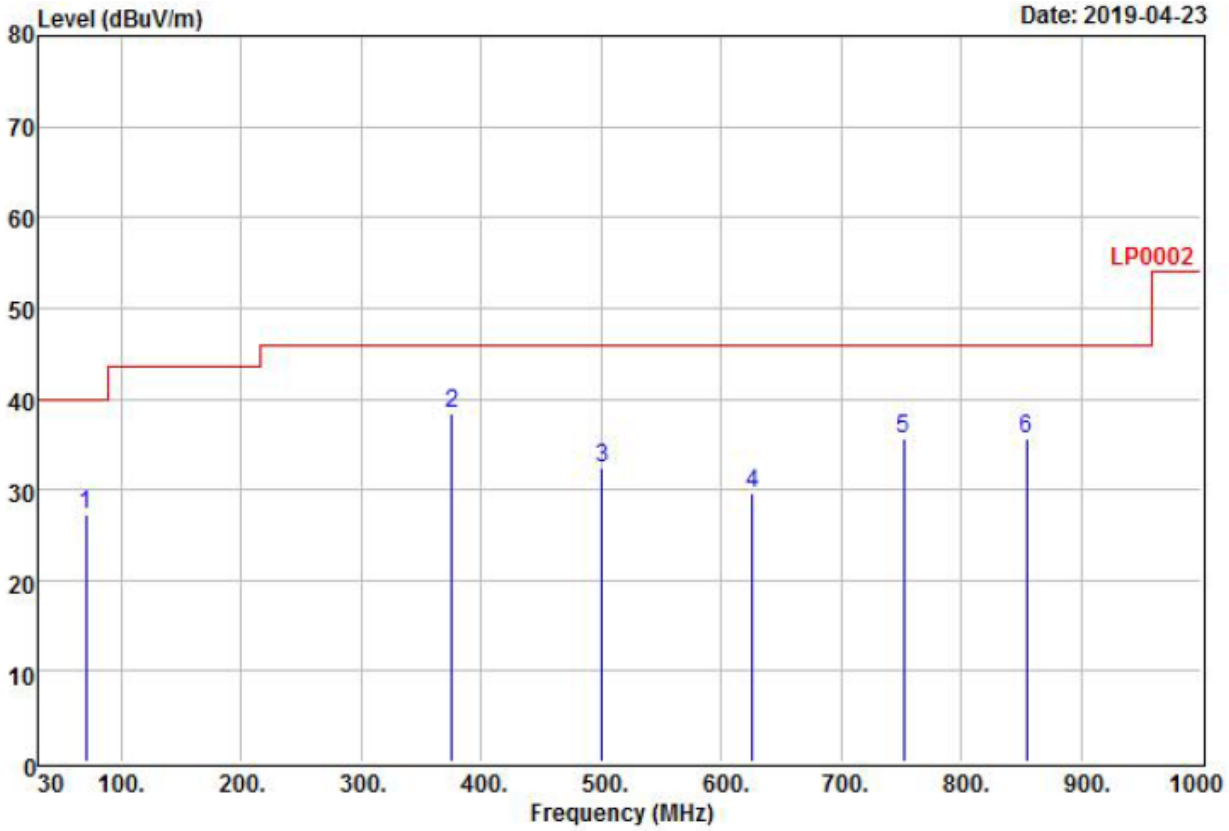
		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	@	70.46	53.72	-22.16	31.56	40.00	-8.44	QP
2		375.46	41.67	-11.44	30.23	46.00	-15.77	QP
3		500.01	38.36	-8.91	29.45	46.00	-16.55	QP
4		625.66	35.54	-7.96	27.58	46.00	-18.42	QP
5		756.90	40.09	-5.56	34.53	46.00	-11.47	QP
6		883.29	37.16	-3.56	33.60	46.00	-12.40	QP

Note:

All the modulation modes were tested, the data of the worst mode are recorded in the above pages and the others modulation methods do not exceed the limits.

JH-DPK185159

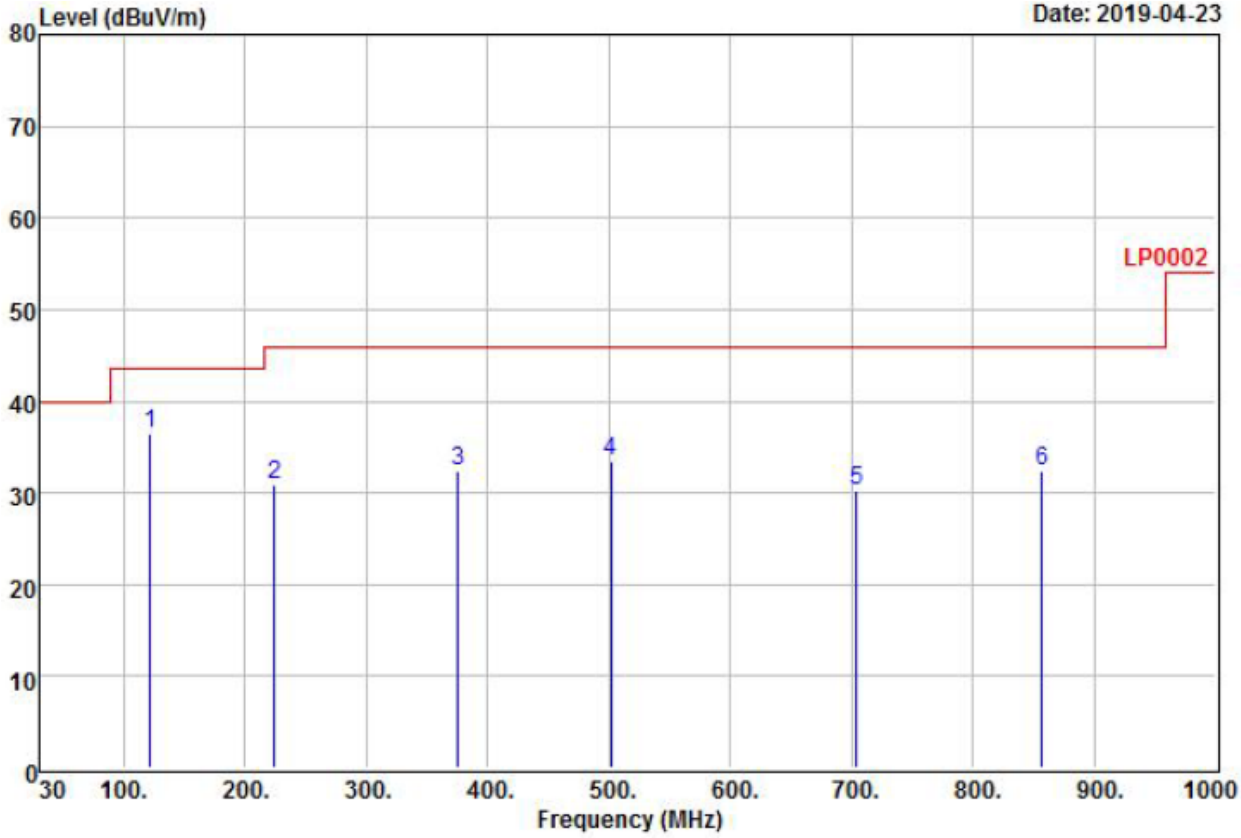
Power :	POE	Pol/Phase :	HORIZONTAL
Test Mode :	TX 5825MHz(worst-case)	Temperature :	30 °C
Humidity :	65%		



Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1		70.18	49.42	-22.13	27.29	40.00	-12.71	QP
2	@	375.80	49.75	-11.43	38.32	46.00	-7.68	QP
3		500.59	41.35	-8.90	32.45	46.00	-13.55	QP
4		625.98	37.52	-7.94	29.58	46.00	-16.42	QP
5		752.31	41.29	-5.64	35.65	46.00	-10.35	QP
6		854.97	39.10	-3.60	35.50	46.00	-10.50	QP

Power	:	POE	Pol/Phase	:	VERTICAL
Test Mode	:	TX 5825MHz(worst-case)	Temperature	:	30 °C
Humidity	:	65%			



Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

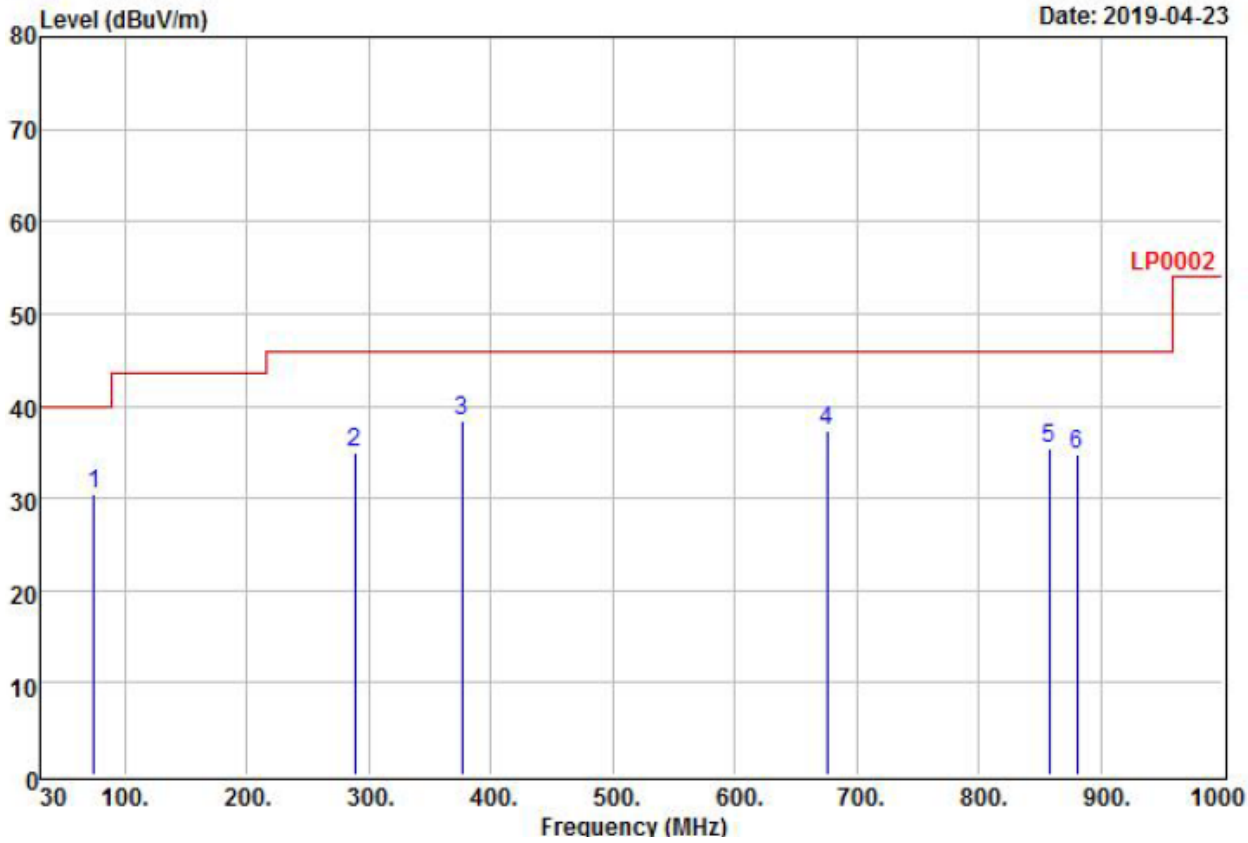
		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	@	121.84	51.63	-15.15	36.48	43.50	-7.02	QP
2		224.13	48.28	-17.31	30.97	46.00	-15.03	QP
3		375.54	43.75	-11.43	32.32	46.00	-13.68	QP
4		501.26	42.44	-8.90	33.54	46.00	-12.46	QP
5		704.31	36.93	-6.78	30.15	46.00	-15.85	QP
6		857.32	36.00	-3.59	32.41	46.00	-13.59	QP

Note:

All the modulation modes were tested, the data of the worst mode are recorded in the above pages and the others modulation methods do not exceed the limits.

JH-DPK145159

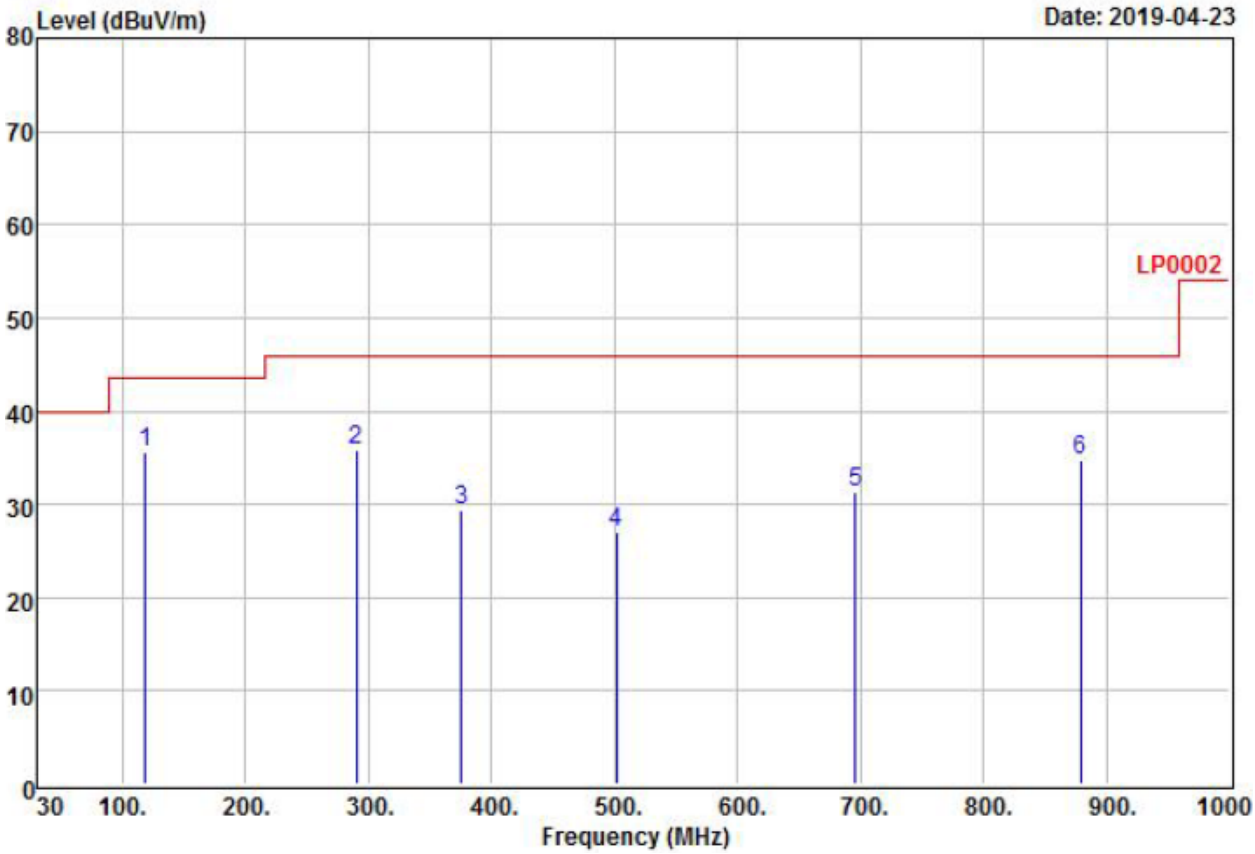
Power	:	POE	Pol/Phase	:	HORIZONTAL
Test Mode	:	TX 5825MHz(worst-case)	Temperature	:	30 °C
Humidity	:	65%			



Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1		74.29	53.13	-22.60	30.53	40.00	-9.47	QP
2		288.35	48.66	-13.64	35.02	46.00	-10.98	QP
3	@	375.97	49.75	-11.43	38.32	46.00	-7.68	QP
4		675.79	44.26	-6.94	37.32	46.00	-8.68	QP
5		857.93	39.01	-3.60	35.41	46.00	-10.59	QP
6		880.84	38.25	-3.56	34.69	46.00	-11.31	QP

Power :	POE	Pol/Phase :	VERTICAL
Test Mode :	TX 5825MHz(worst-case)	Temperature :	30 °C
Humidity :	65%		



Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1 @	118.61	50.89	-15.38	35.51	43.50	-7.99	QP
2	289.70	49.43	-13.59	35.84	46.00	-10.16	QP
3	375.46	40.76	-11.44	29.32	46.00	-16.68	QP
4	501.84	35.92	-8.89	27.03	46.00	-18.97	QP
5	696.44	38.28	-6.89	31.39	46.00	-14.61	QP
6	879.20	38.28	-3.56	34.72	46.00	-11.28	QP

Note:

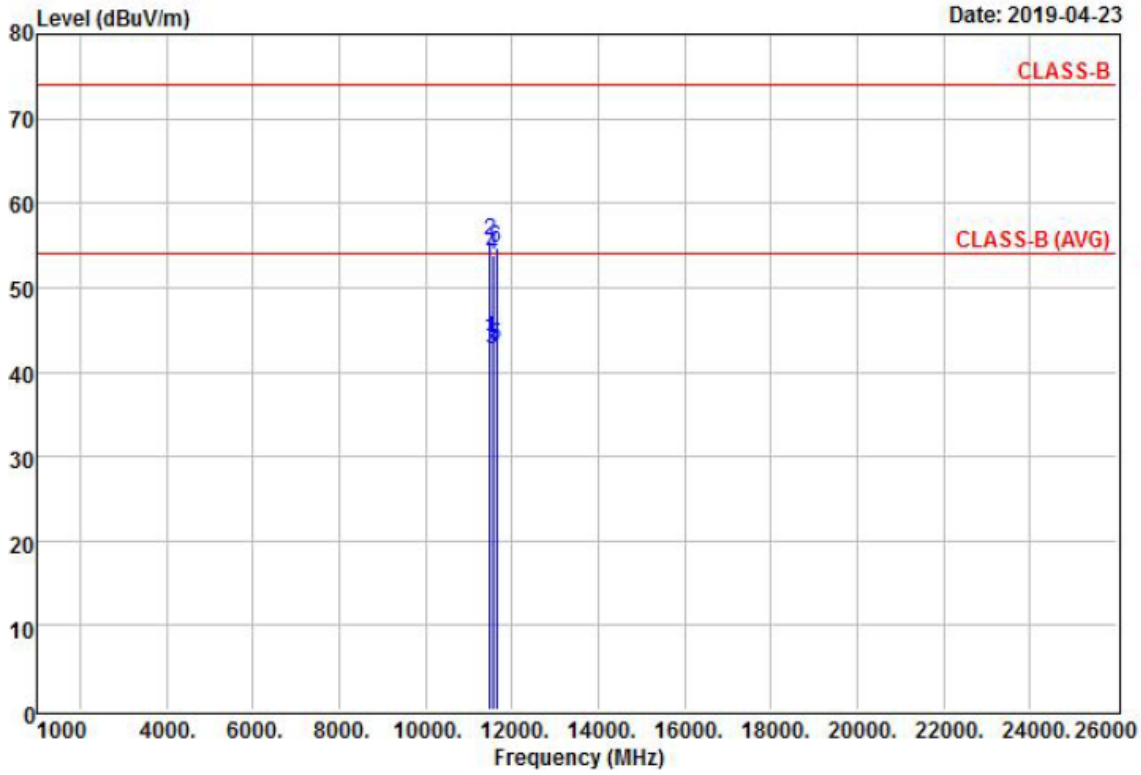
All the modulation modes were tested, the data of the worst mode are recorded in the above pages and the others modulation methods do not exceed the limits

7.6 Test Result and Data (Between 1~40 GHz)

Above 1GHz:

JH-DPK235159

Power	:	POE	Pol/Phase	:	HORIZONTAL
Test Mode	:	802.11a Channel 149-157-165	Temperature	:	30 °C
Humidity	:	65%			



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Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1 @	11490.00	35.52	8.39	43.91	54.00	-10.09	Average
2	11490.00	47.08	8.39	55.47	74.00	-18.53	Peak
3	11570.00	34.18	8.40	42.58	54.00	-11.42	Average
4	11570.00	45.51	8.40	53.91	74.00	-20.09	Peak
5	11650.00	34.64	8.51	43.15	54.00	-10.85	Average
6	11650.00	46.21	8.51	54.72	74.00	-19.28	Peak