

FCC TEST REPORT

FCC ID: 2AIWW-PD-V4

Product	:	Microwave Sensor
Model Name	:	PD-V4,PD-V4-UFL
Brand	:	N/A
Report No.	:	PT8004471605-FC01
Prepared for		
Ningbo Pdlux Electronic Technology CO.,LTD.		
17F, Commerce building of Ningbo, No 588, south Tiantong road,		
yinzhou district Ningbo, China		
Prepared by		
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TEST RESULT CERTIFICATION

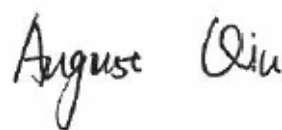
Applicant's name : Ningbo Pdlux Electronic Technology CO.,LTD.
Address : 17F, Commerce building of Ningbo, No 588, south Tiantong road,yinzhou district Ningbo, China
Manufacture's name : Ningbo Lexing Inductor Electronic Co., Ltd.
Address : No.35 Zhuquan Road, Science & Technology Area. Ninghai, Ningbo, China
Product name : Microwave Sensor
Model name : PD-V4,PD-V4-UFL
Standards : FCC CFR47 Part 15 Section 15.245
Test procedure : ANSI C63.10:2013
Test Date : June.24, 2016 ~ July.04, 2016
Date of Issue : July.04, 2016
Test Result : Pass

This device described above has been tested by PTS, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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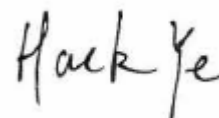
Testing Engineer

August Qiu



Technical Manager

Hack Ye



Authorized Signatory

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2 Test Summary

Test Items	Test Requirement	Result
Conducted Emissions	15.207	PASS
Radiated Spurious Emission	15.245(b) 15.209 15.205(a)	PASS
Field strength of fundamental	15.245(b)	PASS
Band Edge Emission	15.245(b3) 15.205 15.209	PASS
Antenna Requirement	15.203	PASS

Remark:

N/A: Not Applicable

3 General Information

3.1 General Description of E.U.T.

Product Name : Microwave Sensor

Model Name : PD-V4,PD-V4-UFL

Model Description : The antennas are different.

Operation Frequency: : 5785-5815MHz

Antenna installation: : PCB Printed Antenna

Antenna Gain: : For PD-V4:1.0dBi
For PD-V4-UFL:0.2dBi

Type of Modulation : Un-modulation

Power supply : DC 5V power by specific host

Remark : The Voltage range is 4.75 ~5.25V, Out of this range, The device cannot work normally

3.2 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Modulation	Test mode	Low channel	Middle channel	High channel
Un-modulation	continuously Transmitting	5812.25MHz	\	\

4 Equipment During Test

4.1 Equipments List

Radiated Emissions							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 15, 2015	July 14, 2016	1 year
2	EMC Analyzer (9k~26.5GHz)	Agilent	E4407B	MY45109572	Aug.04, 2015	Aug.03, 2016	1 year
3	Trilog Broadband Antenna	SCHWARZB ECK	VULB9160	9160-3355	July 15, 2015	July 14, 2016	1 year
4	Amplifier	EM	EM-30180	060538	July 15, 2015	July 14, 2016	1 year
5	Horn Antenna	SCHWARZB ECK	BBHA9120 D	9120D-1246	July 15, 2015	July 14, 2016	1 year
6	Coaxial Cable(below 1GHz)	LARGE	CALB1	-	July 15, 2015	July 14, 2016	1 year
7	Coaxial Cable(above 1GHz)	LARGE	CALB2	-	July 15, 2015	July 14, 2016	1 year

4.2 Measurement Uncertainty

Parameter	Uncertainty
RF output power, conducted	±1.0dB
Power Spectral Density, conducted	±2.2dB
Radio Frequency	± 1 x 10 ⁻⁶
Bandwidth	± 1.5 x 10 ⁻⁶
Time	±2%
Duty Cycle	±2%
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±3%
Conducted Emissions (150kHz~30MHz)	±3.64dB
Radiated Emission(30MHz~1GHz)	±5.03dB
Radiated Emission(1GHz~25GHz)	±4.74dB

5 Conducted Emission

Test Requirement:	: FCC CFR 47 Part 15 Section 15.207
Test Method:	: ANSI C63.10:2013
Frequency Range:	: 150kHz to 30MHz
Class/Severity:	: Class B
Limit:	: 66-56 dB μ V between 0.15MHz & 0.5MHz
	: 56 dB μ V between 0.5MHz & 5MHz
	: 60 dB μ V between 5MHz & 30MHz
Detector:	: Peak for pre-scan (9kHz Resolution Bandwidth)

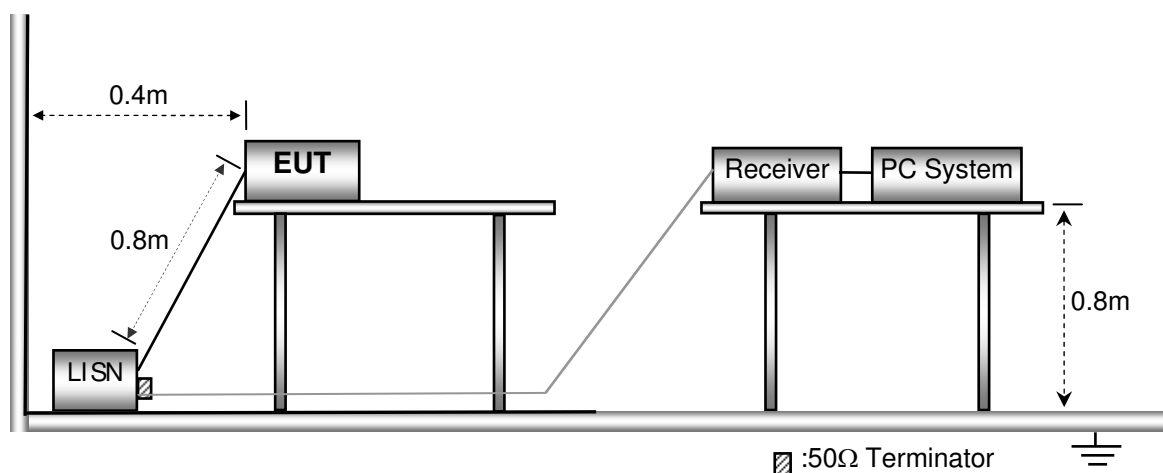
5.1 E.U.T. Operation

Operating Environment :

Temperature:	: 25.5 °C
Humidity:	: 51 % RH
Atmospheric Pressure:	: 101.2kPa
EUT Operation :	: Refer to section 3.3

5.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013.



5.3 Measurement Description

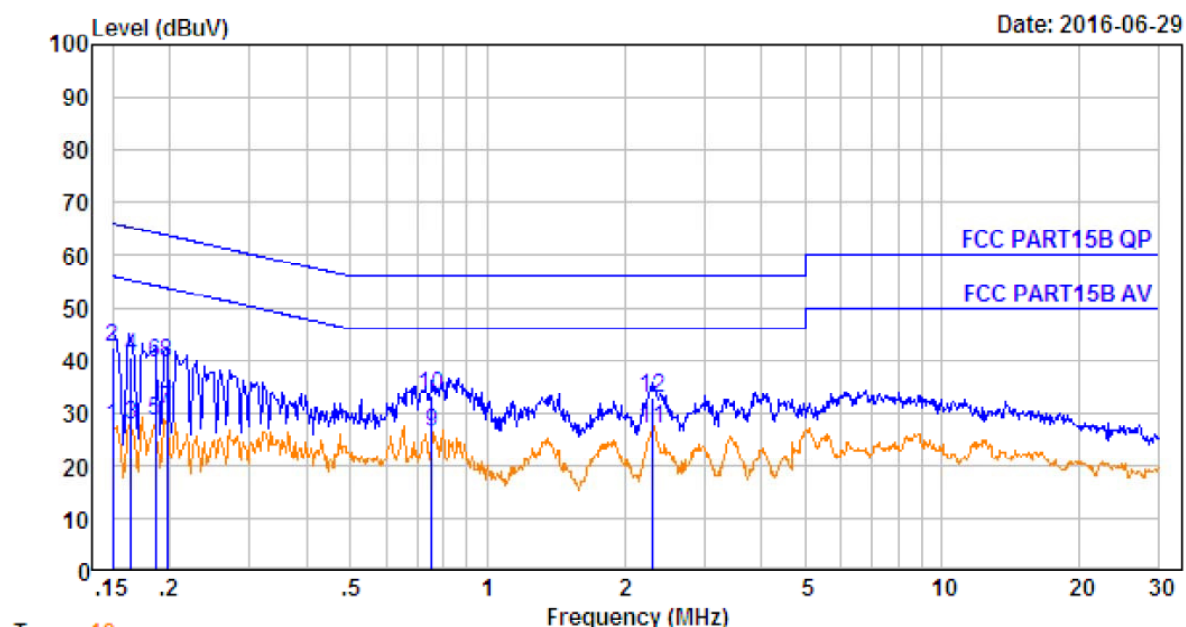
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.



5.4 Test Result

Scan with model PD-V4 & PD-V4-UFL, The worst case (model PD-V4) was recorded.

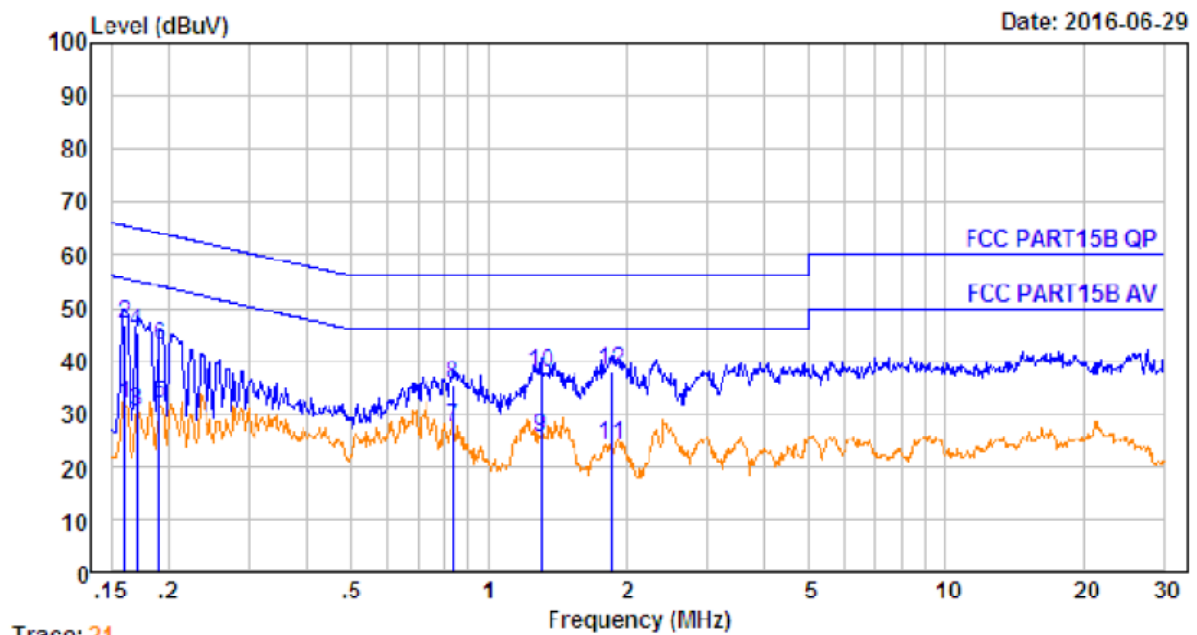
Live line:



No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBuV	Emission Level dBuV	Limit dBuV	Over Limit dB	Remark
1.	0.150	10.60	0.60	16.21	27.41	56.00	-28.59	Average
2.	0.150	10.60	0.60	31.21	42.41	66.00	-23.59	QP
3.	0.165	10.60	0.60	16.57	27.77	55.21	-27.44	Average
4.	0.165	10.60	0.60	29.57	40.77	65.21	-24.44	QP
5.	0.186	10.61	0.60	17.31	28.52	54.20	-25.68	Average
6.	0.186	10.61	0.60	28.31	39.52	64.20	-24.68	QP
7.	0.198	10.61	0.60	19.30	30.51	53.71	-23.20	Average
8.	0.198	10.61	0.60	28.30	39.51	63.71	-24.20	QP
9.	0.755	10.66	0.60	14.94	26.20	46.00	-19.80	Average
10.	0.755	10.66	0.60	21.94	33.20	56.00	-22.80	QP
11.	2.309	10.70	0.60	15.55	26.85	46.00	-19.15	Average
12.	2.309	10.70	0.60	21.55	32.85	56.00	-23.15	QP



Neutral line:



No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBuV	Emission Level dBuV	Limit dBuV	Over Limit dB	Remark
1.	0.160	10.60	0.60	20.67	31.87	55.47	-23.60	Average
2.	0.160	10.60	0.60	35.67	46.87	65.47	-18.60	QP
3.	0.170	10.60	0.60	19.24	30.44	54.94	-24.50	Average
4.	0.170	10.60	0.60	34.24	45.44	64.94	-19.50	QP
5.	0.190	10.61	0.60	20.61	31.82	54.02	-22.20	Average
6.	0.190	10.61	0.60	31.61	42.82	64.02	-21.20	QP
7.	0.835	10.66	0.60	16.16	27.42	46.00	-18.58	Average
8.	0.835	10.66	0.60	24.16	35.42	56.00	-20.58	QP
9.	1.303	10.68	0.60	14.31	25.59	46.00	-20.41	Average
10.	1.303	10.68	0.60	26.31	37.59	56.00	-18.41	QP
11.	1.858	10.70	0.60	12.70	24.00	46.00	-22.00	Average
12.	1.858	10.70	0.60	26.70	38.00	56.00	-18.00	QP



6 Radiated Spurious Emissions

Test Requirement: : FCC CFR47 Part 15 Section 15.245 & 15.207 & 15.205
Test Method: : ANSI C63.10:2013
Test Result: : PASS
Measurement Distance: : 3m
Limit: : See the follow table

Fundamental frequency (MHz)	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (millivolts/meter)
902-928	500	1.6
2435-2465	500	1.6
5785-5815	500	1.6
10500-10550	2500	25.0
24075-24175	2500	25.0

6.1 EUT Operation

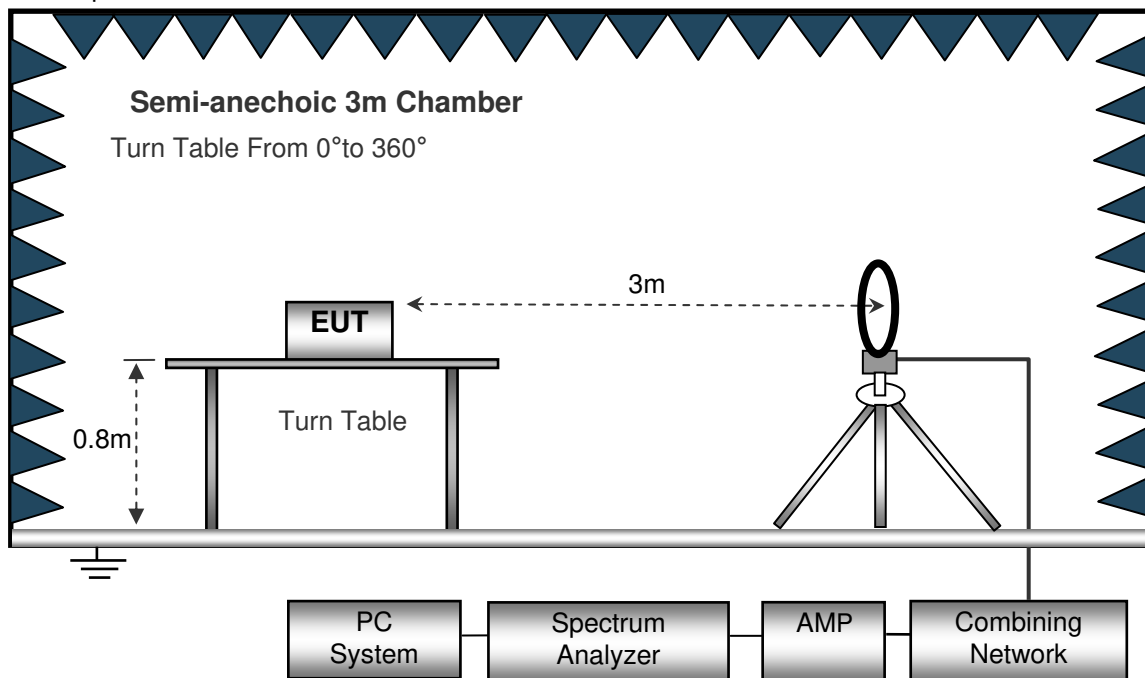
Operating Environment :

Temperature: : 23.5 °C
Humidity: : 51.1 % RH
Atmospheric Pressure: : 101.2kPa
EUT Operation : : Refer to section 3.3

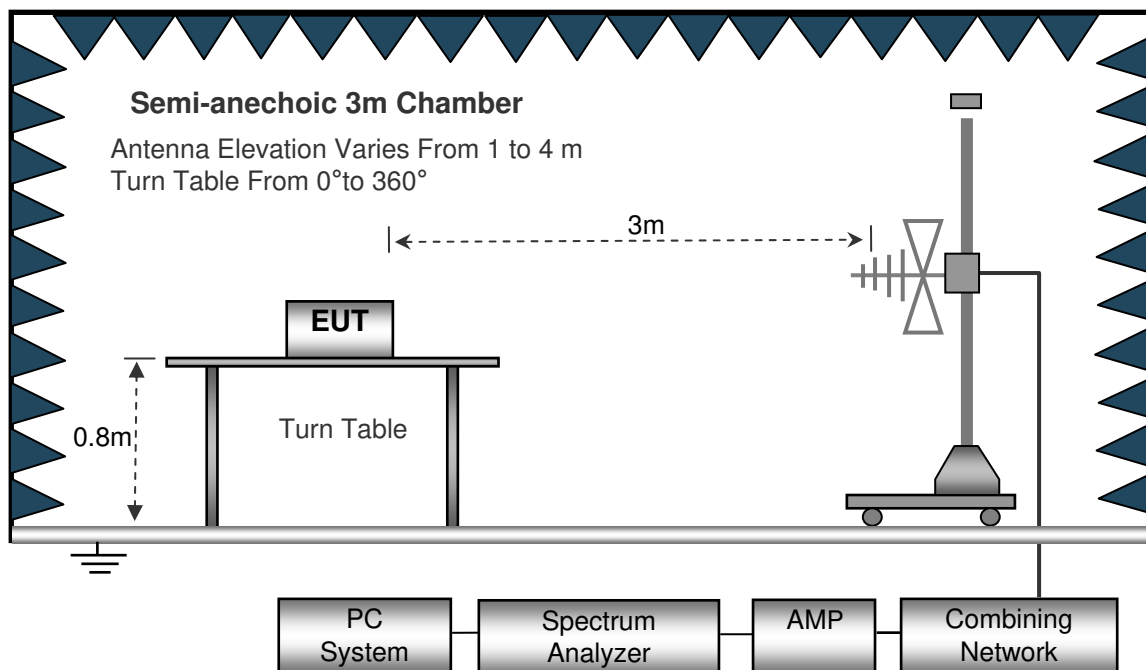
6.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site

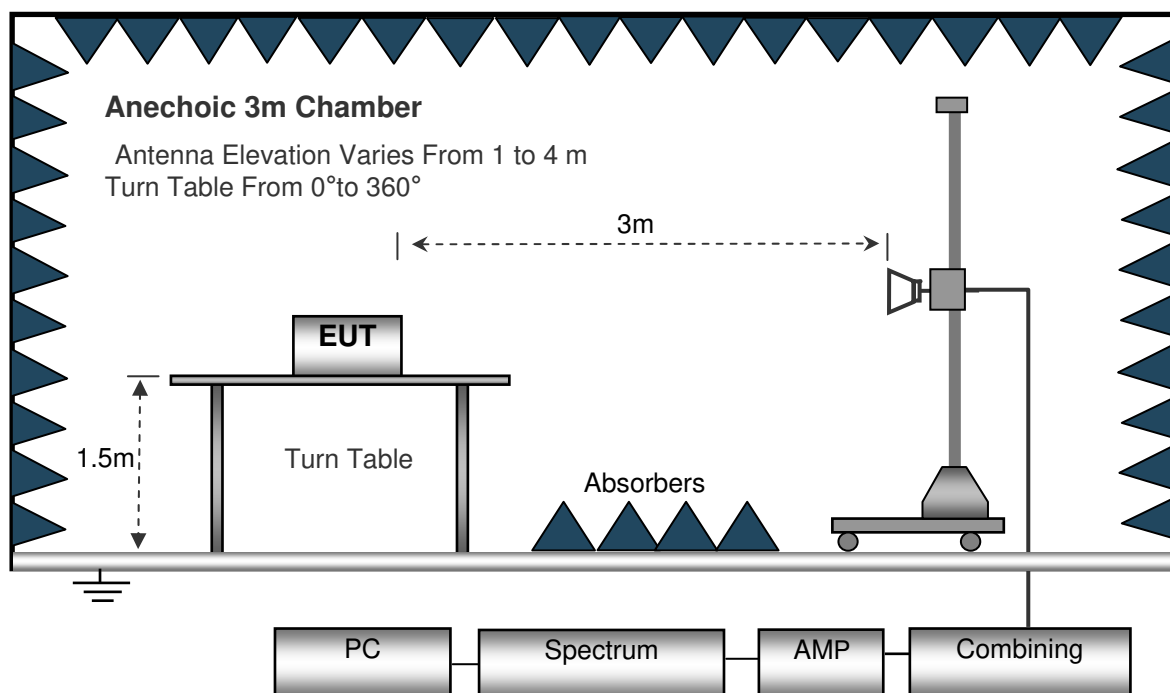
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



6.3 Spectrum Analyzer Setup

Below 30MHz

IF Bandwidth	10kHz
Resolution Bandwidth	10kHz
Video Bandwidth	10kHz

30MHz ~ 1GHz

Detector	: PK
Resolution Bandwidth	: 100kHz
Video Bandwidth	: 300kHz
Detector	: QP
Resolution Bandwidth	: 120kHz
Video Bandwidth	: 300kHz

Above 1GHz

Detector	: PK
Resolution Bandwidth	: 1MHz
Video Bandwidth	: 3MHz
Detector	: AV
Resolution Bandwidth	: 1MHz
Video Bandwidth	: 10Hz

6.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m or 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.



6.5 Summary of Test Results

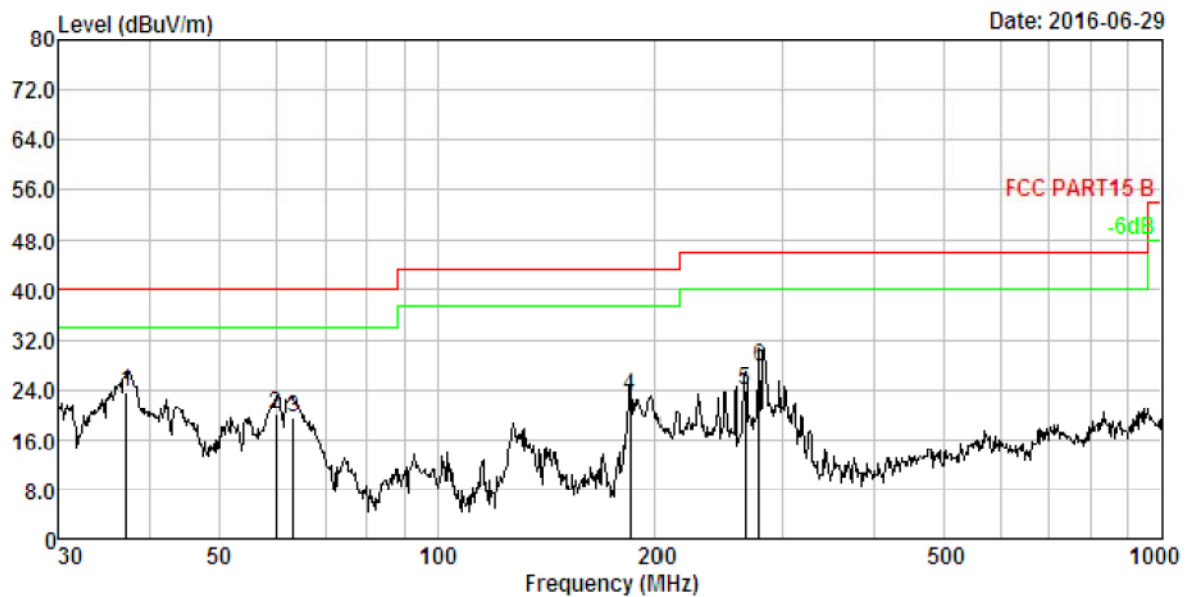
Test Frequency: Below 30MHz

The lowest oscillator is 32MHz, the test is not applicable

Test Frequency: 30MHz ~ 1GHz

Scan with model PD-V4 & PD-V4-UFL, The worst case (model PD-V4) was recorded.

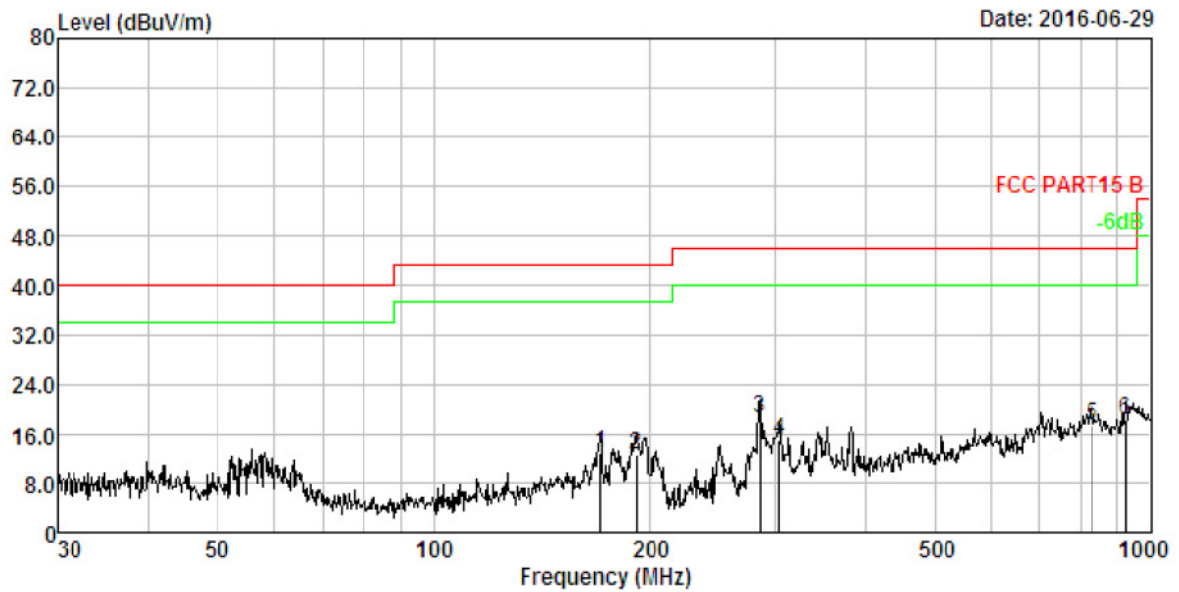
Antenna Polarization: Horizontal



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBUV	Preamp Factor dB	Emission Level dBUV/m	Limit dBUV/m	Over Limit dB	Remark
1.	37.155	1.25	13.50	39.05	30.04	23.76	40.00	-16.24	QP
2.	59.859	1.68	12.16	36.52	30.21	20.15	40.00	-19.85	QP
3.	63.313	1.73	11.95	36.00	30.23	19.45	40.00	-20.55	QP
4.	185.138	2.70	11.74	39.15	30.60	22.99	43.50	-20.51	QP
5.	265.676	3.03	12.33	39.32	30.73	23.95	46.00	-22.05	QP
6.	278.067	3.07	12.75	42.64	30.74	27.72	46.00	-18.28	QP



Antenna Polarization: Vertical



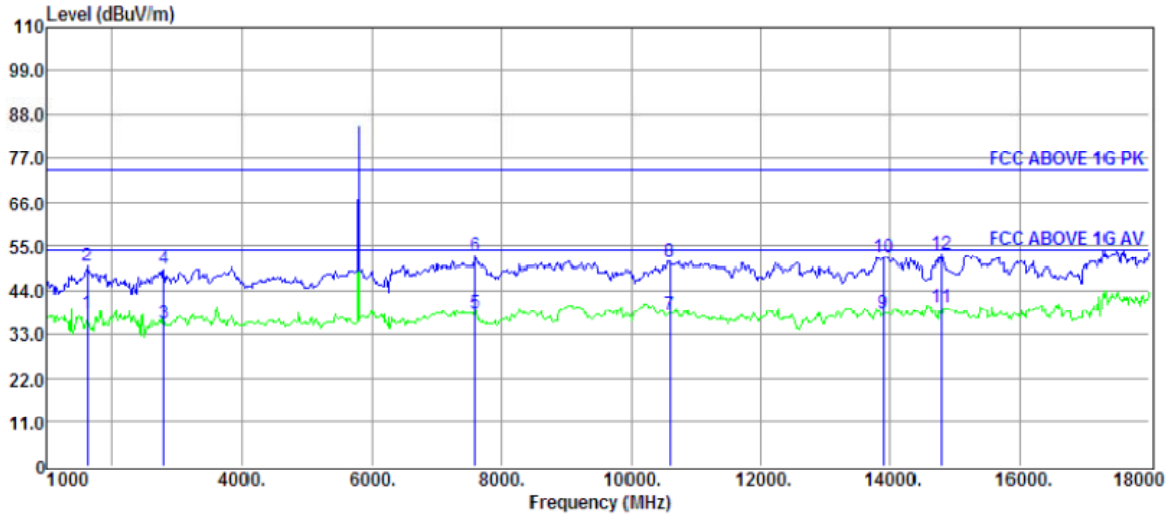
No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	170.793	2.63	13.26	27.59	30.58	12.90	43.50	-30.60	Peak
2.	191.745	2.73	10.97	29.75	30.62	12.83	43.50	-30.67	Peak
3.	284.977	3.09	12.91	33.41	30.75	18.66	46.00	-27.34	Peak
4.	303.544	3.15	13.27	29.35	30.78	14.99	46.00	-31.01	Peak
5.	827.493	4.06	21.94	22.42	31.12	17.30	46.00	-28.70	Peak
6.	922.516	4.16	22.91	22.42	31.16	18.33	46.00	-27.67	Peak



Test Frequency: 1GHz ~ 18GHz

For Model: PD-V4

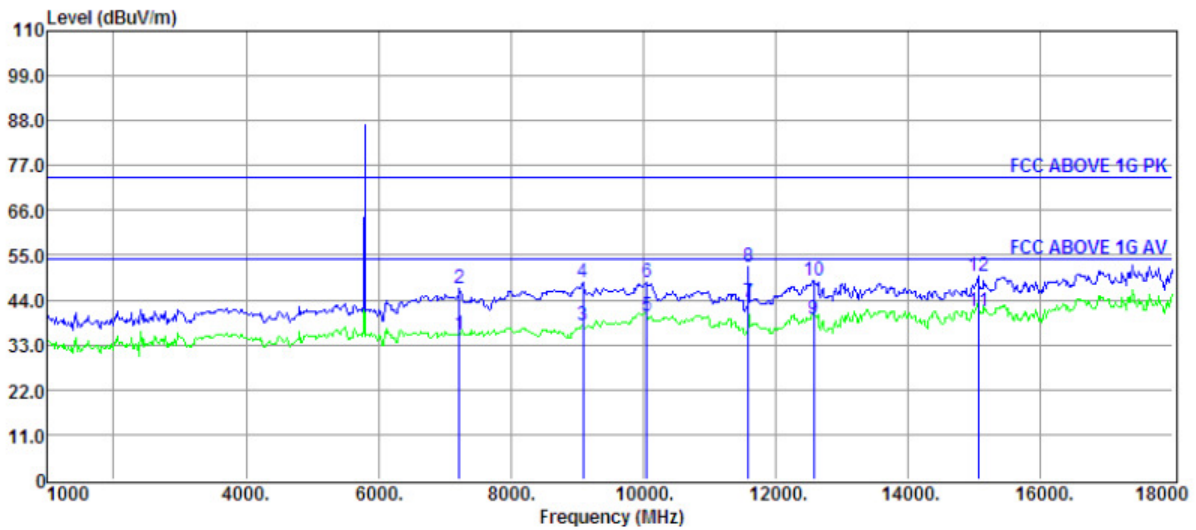
Antenna Polarization: Horizontal



No.	Freq	Cable Loss	Antenna Factor	Receiver Reading	Preamp Factor	Emission Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dBuV	dB	dBuV/m	dBuV/m	dB	
1.	1618.00	2.03	25.40	38.61	28.00	38.04	54.00	-15.96	Average
2.	1618.00	2.03	25.40	50.49	28.00	49.92	74.00	-24.08	Peak
3.	2764.39	3.09	28.36	32.30	28.00	35.75	54.00	-18.25	Average
4.	2764.00	3.09	28.36	45.80	28.00	49.25	74.00	-24.75	Peak
5.	7595.00	6.51	35.64	24.20	28.00	38.35	54.00	-15.65	Average
6.	7595.00	6.51	35.64	38.56	28.00	52.71	74.00	-21.29	Peak
7.	10607.00	8.38	38.88	18.50	28.00	37.76	54.00	-16.24	Average
8.	10607.00	8.38	38.88	31.92	28.00	51.18	74.00	-22.82	Peak
9.	13917.00	9.92	40.14	16.11	28.00	38.17	54.00	-15.83	Average
10.	13917.00	9.92	40.14	30.10	28.00	52.16	74.00	-21.84	Peak
11.	14796.00	10.31	40.43	16.90	28.00	39.64	54.00	-14.36	Average
12.	14796.00	10.31	40.43	30.14	28.00	52.88	74.00	-21.12	Peak



Antenna Polarization: Vertical

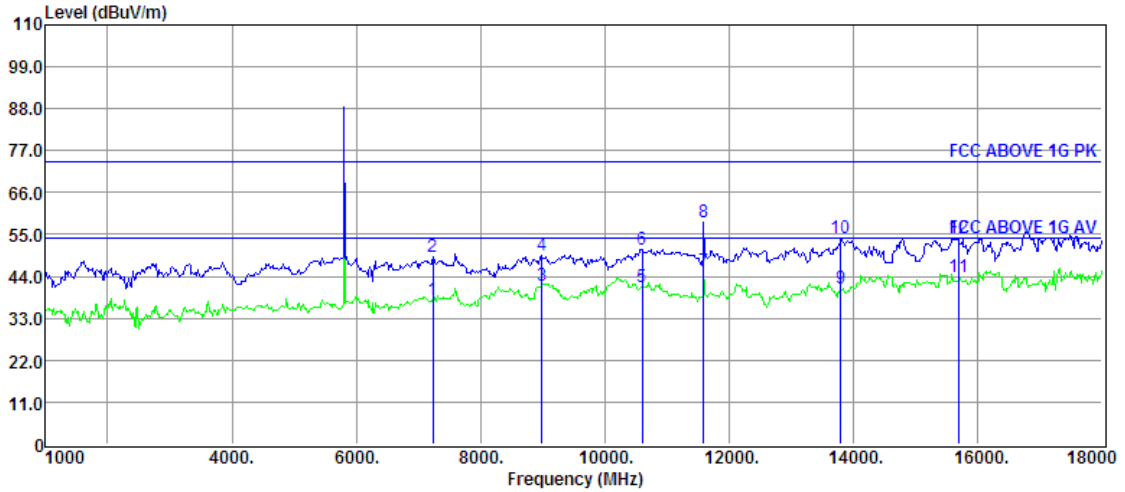


No.	Freq	Cable Loss	Antenna Factor	Receiver Reading	Preamp Factor	Emission Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dBuV	dB	dBuV/m	dBuV/m	dB	
1.	7226.00	6.25	35.10	22.30	28.00	35.65	54.00	-18.35	Average
2.	7226.00	6.25	35.10	33.68	28.00	47.03	74.00	-26.97	Peak
3.	9133.00	7.61	37.58	20.80	28.00	37.99	54.00	-16.01	Average
4.	9133.00	7.61	37.58	31.14	28.00	48.33	74.00	-25.67	Peak
5.	10059.00	8.07	38.63	21.40	28.00	40.10	54.00	-13.90	Average
6.	10059.00	8.07	38.63	29.73	28.00	48.43	74.00	-25.57	Peak
7.	11587.00	8.88	39.29	23.30	28.00	43.47	54.00	-10.53	Average
8.	11587.00	8.88	39.29	32.03	28.00	52.20	74.00	-21.80	Peak
9.	12584.00	9.37	39.67	18.20	28.00	39.24	54.00	-14.76	Average
10.	12584.00	9.37	39.67	27.78	28.00	48.82	74.00	-25.18	Peak
11.	15061.00	10.35	40.62	18.30	28.00	41.27	54.00	-12.73	Average
12.	15061.00	10.35	40.62	26.79	28.00	49.76	74.00	-24.24	Peak



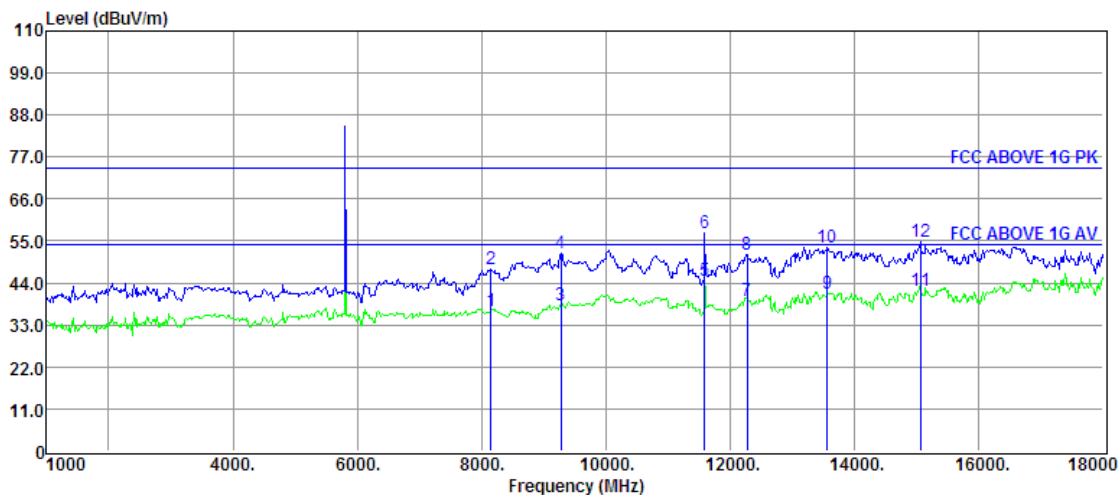
For Model: PD-V4-UFL

Antenna Polarization: Horizontal



No.	Freq	Cable Loss	Antenna Factor	Receiver Reading	Preamp Factor	Emission Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dBuV	dB	dBuV/m	dBuV/m	dB	
1.	7239.00	6.24	35.12	24.63	28.00	37.99	54.00	-16.01	Average
2.	7239.00	6.24	35.12	35.73	28.00	49.09	74.00	-24.91	Peak
3.	8990.00	7.46	37.45	24.83	28.00	41.74	54.00	-12.26	Average
4.	8990.00	7.46	37.45	32.79	28.00	49.70	74.00	-24.30	Peak
5.	10605.00	8.38	38.88	21.87	28.00	41.13	54.00	-12.87	Average
6.	10605.00	8.38	38.88	31.92	28.00	51.18	74.00	-22.82	Peak
7.	11591.00	8.88	39.29	25.00	28.00	45.17	54.00	-8.83	Average
8.	11591.00	8.88	39.29	38.13	28.00	58.30	74.00	-15.70	Peak
9.	13801.00	9.86	40.11	18.89	28.00	40.86	54.00	-13.14	Average
10.	13801.00	9.86	40.11	32.05	28.00	54.02	74.00	-19.98	Peak
11.	15688.00	10.58	41.83	19.52	28.00	43.93	54.00	-10.07	Average
12.	15688.00	10.58	41.83	29.60	28.00	54.01	74.00	-19.99	Peak

Antenna Polarization: Vertical



No.	Freq	Cable Loss	Antenna Factor	Receiver Reading	Preamp Factor	Emission Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dBuV	dB	dBuV/m	dBuV/m	dB	
1.	8157.00	6.91	36.41	21.43	28.00	36.75	54.00	-17.25	Average
2.	8157.00	6.91	36.41	32.40	28.00	47.72	74.00	-26.28	Peak
3.	9279.00	7.64	37.79	20.60	28.00	38.03	54.00	-15.97	Average
4.	9279.00	7.64	37.79	34.34	28.00	51.77	74.00	-22.23	Peak
5.	11591.00	8.88	39.29	24.30	28.00	44.47	54.00	-9.53	Average
6.	11591.00	8.88	39.29	37.03	28.00	57.20	74.00	-16.80	Peak
7.	12271.00	9.20	39.56	18.72	28.00	39.48	54.00	-14.52	Average
8.	12271.00	9.20	39.56	30.59	28.00	51.35	74.00	-22.65	Peak
9.	13563.00	9.76	40.03	19.53	28.00	41.32	54.00	-12.68	Average
10.	13563.00	9.76	40.03	31.38	28.00	53.17	74.00	-20.83	Peak
11.	15059.00	10.35	40.62	19.00	28.00	41.97	54.00	-12.03	Average
12.	15059.00	10.35	40.62	31.79	28.00	54.76	74.00	-19.24	Peak

Test Frequency: 18G-40GHz

The measurements were more than 20 dB below the limit and not reported



7 Field strength of fundamental

Test Requirement: : FCC CFR47 Part 15 Section 15.245
Test Method: : ANSI C63.10:2013
Test Result: : PASS
Measurement Distance: : 3m
Limit: : See the follow table

Fundamental frequency (MHz)	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (millivolts/meter)
902-928	500	1.6
2435-2465	500	1.6
5785-5815	500	1.6
10500-10550	2500	25.0
24075-24175	2500	25.0

7.1 EUT Operation

Operating Environment :

Temperature: : 23.5 °C
Humidity: : 51.1 % RH
Atmospheric Pressure: : 101.2kPa
EUT Operation : : Refer to section 3.3

7.2 Spectrum Analyzer Setup

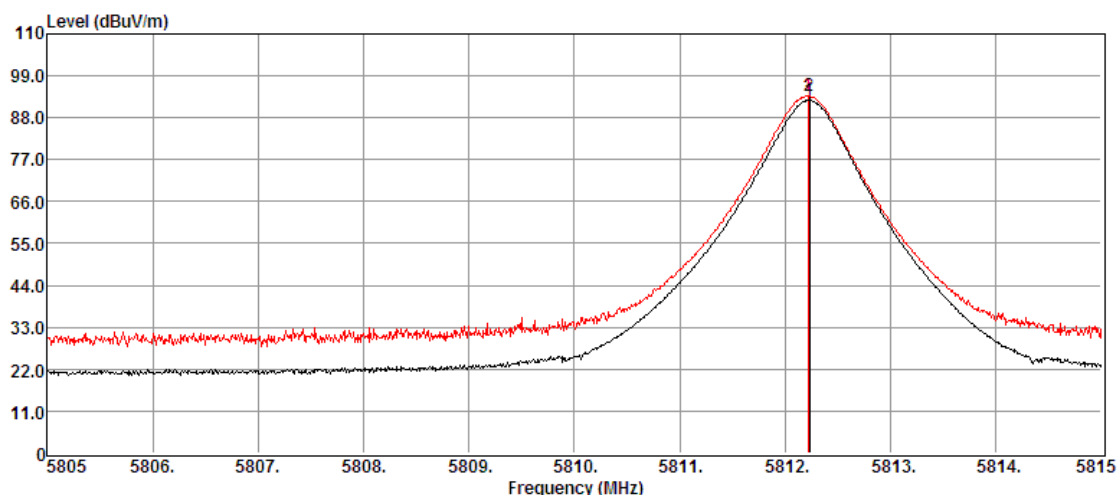
Detector : PK
Resolution Bandwidth : 1MHz
Video Bandwidth : 3MHz
Detector : AV
Resolution Bandwidth : 1MHz
Video Bandwidth : 10Hz

7.3 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m or 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.

7.4 Summary of Test Results

Antenna Polarization: Vertical



No.	Freq	Cable Loss	Antenna Factor	Receiver Reading	Preamplifier Factor	Emission Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dBuV	dB	dBuV/m	dBuV/m	dB	
1.	5812.250	5.01	32.89	82.67	28.00	91.57	94.00	-2.43	Average
2.	5812.250	5.01	32.89	83.80	28.00	93.70	114.00	20.30	Peak
Remark: The max fundamental level was recorded.									



8 Band Edge Emission

Test Requirement	: 15.245(b3): Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation..
Test Method	: ANSI C63.10:2013
Test Limit	: 50 dB below the level of the fundamental or to the general radiated emission limits
Test Mode	: Refer to section 3.3

8.1 Test Procedure

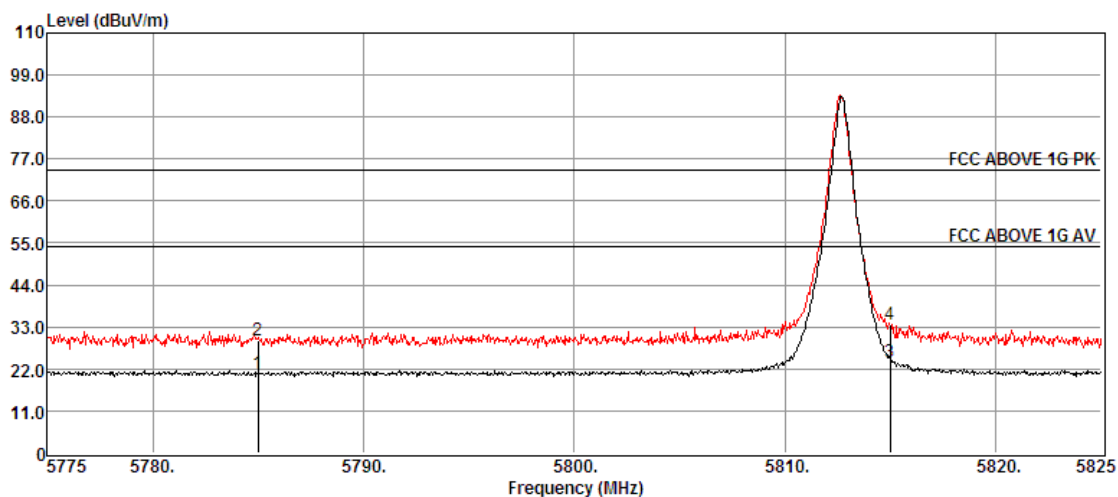
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz, Sweep = auto

Detector function = peak, Trace = max hold

8.2 Summary of Test Results

Antenna Polarization: Vertical



No.	Freq	Cable Loss	Antenna Factor	Receiver Reading	Preamplifier Factor	Emission Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dBuV	dB	dBuV/m	dBuV/m	dB	
1.	5785.000	4.99	32.86	10.99	28.00	20.84	54.00	-33.16	Average
2.	5785.000	4.99	32.86	19.69	28.00	29.54	74.00	-44.46	Peak
3.	5815.000	5.02	32.90	13.71	28.00	23.63	54.00	-30.37	Average
4.	5815.000	5.02	32.90	23.71	28.00	33.63	74.00	-40.37	Peak
Remark: The worst case was recorded.									

9 20dB Bandwidth Measurement

Test Requirement : FCC Part15.215
 Test Method : ANSI C63.10:2013
 Test Mode : Refer to section 3.3

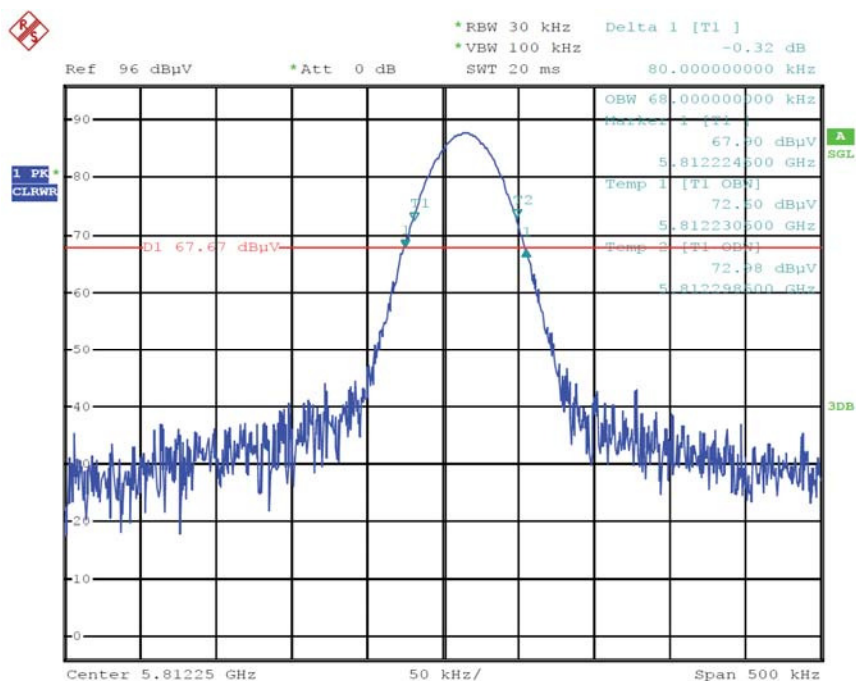
9.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: For BLE, RBW = 30 kHz, VBW = 100kHz,

9.2 Test Result

Test Frequency (MHz)	Bandwidth (kHz)
5812.25	80.00kHz

Test plots

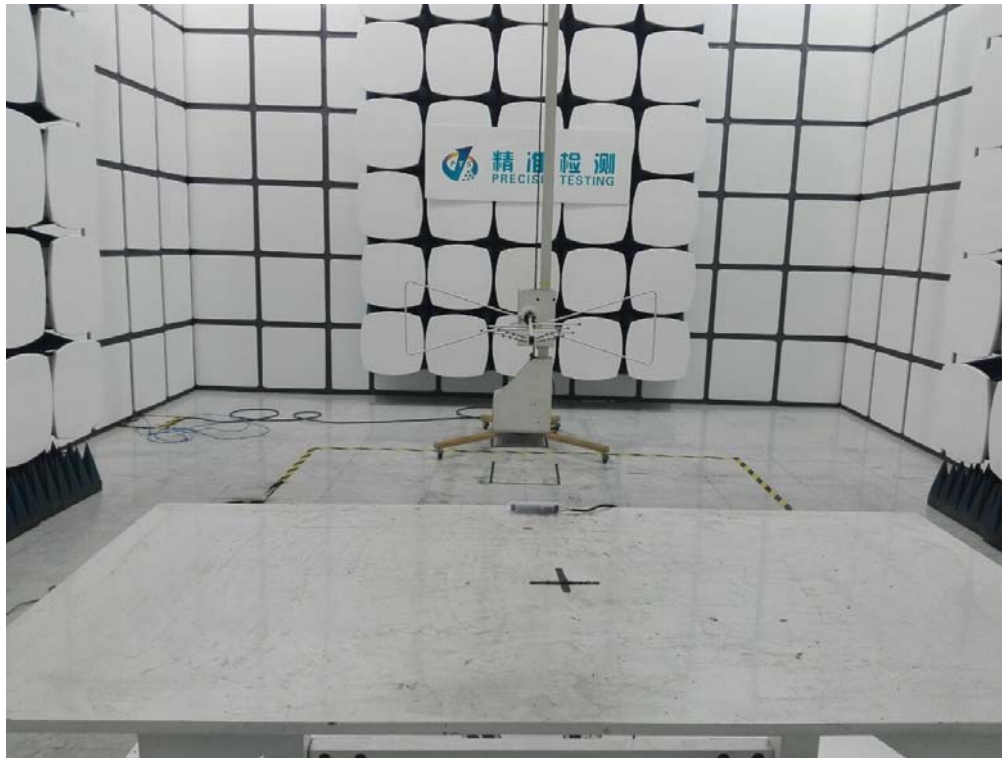


10 Antenna Requirement

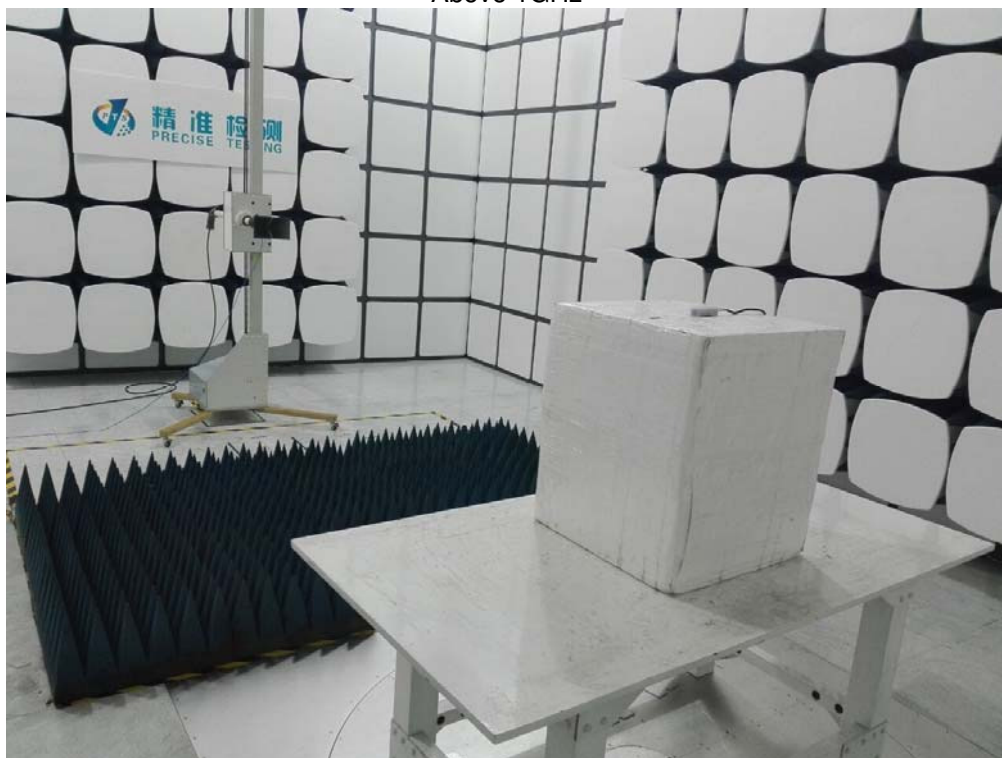
According to the FCC part15.203, a transmitter can only be sold or operated with antennas with which it was approved. This product has an internal permanent antenna which meet the requirement of this section.

11 Test Setup

Radiated Spurious Emissions
From 30MHz-1000MHz



Above 1GHz

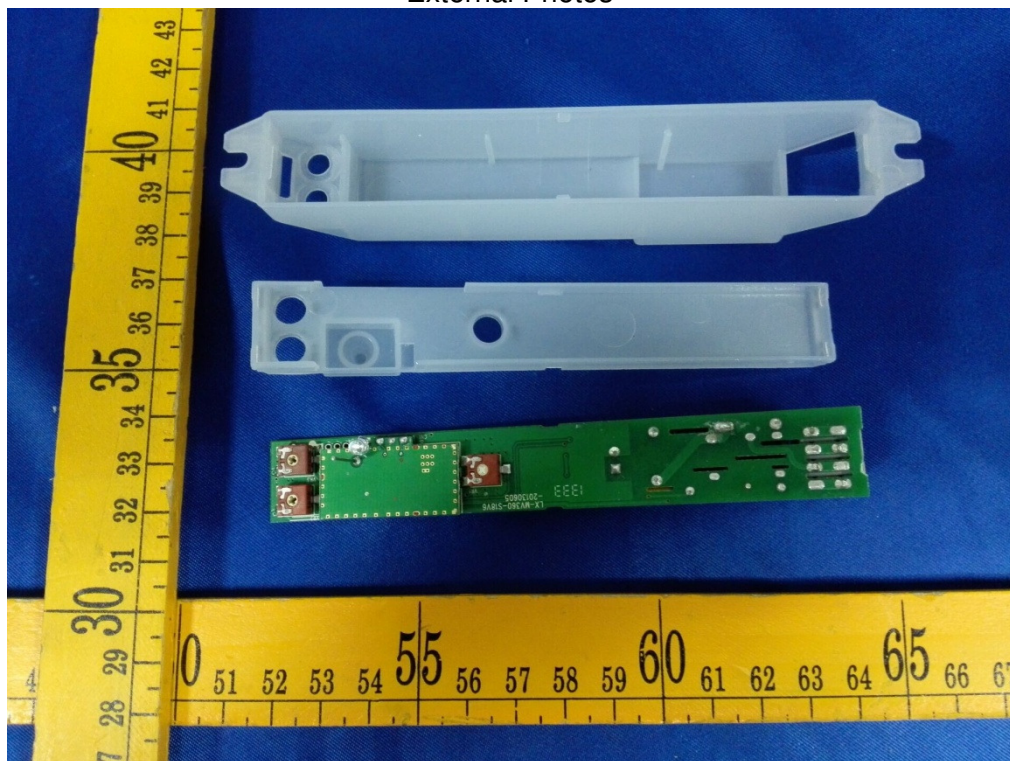


Conducted Emissions

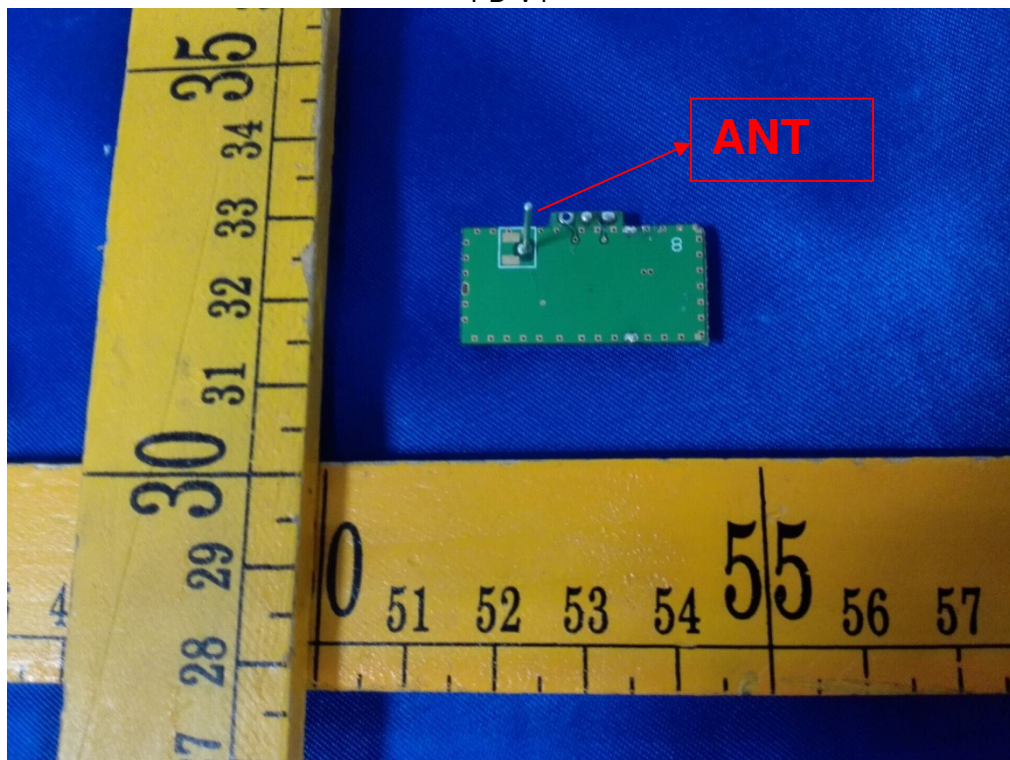


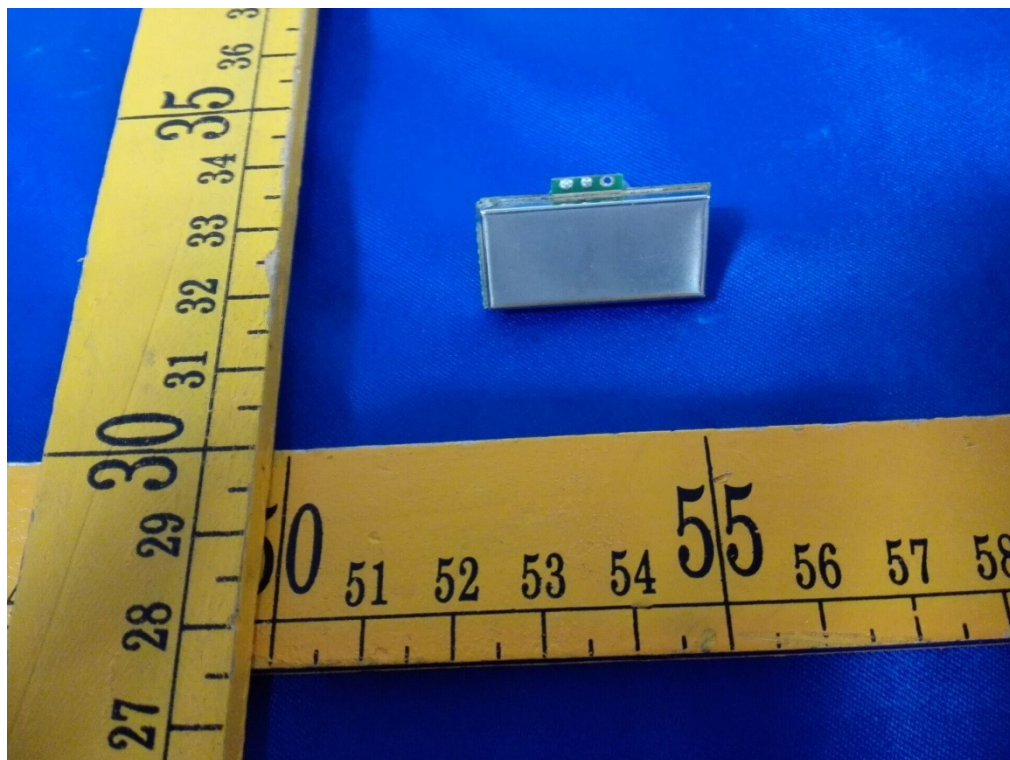
12 Module Photos

External Photos

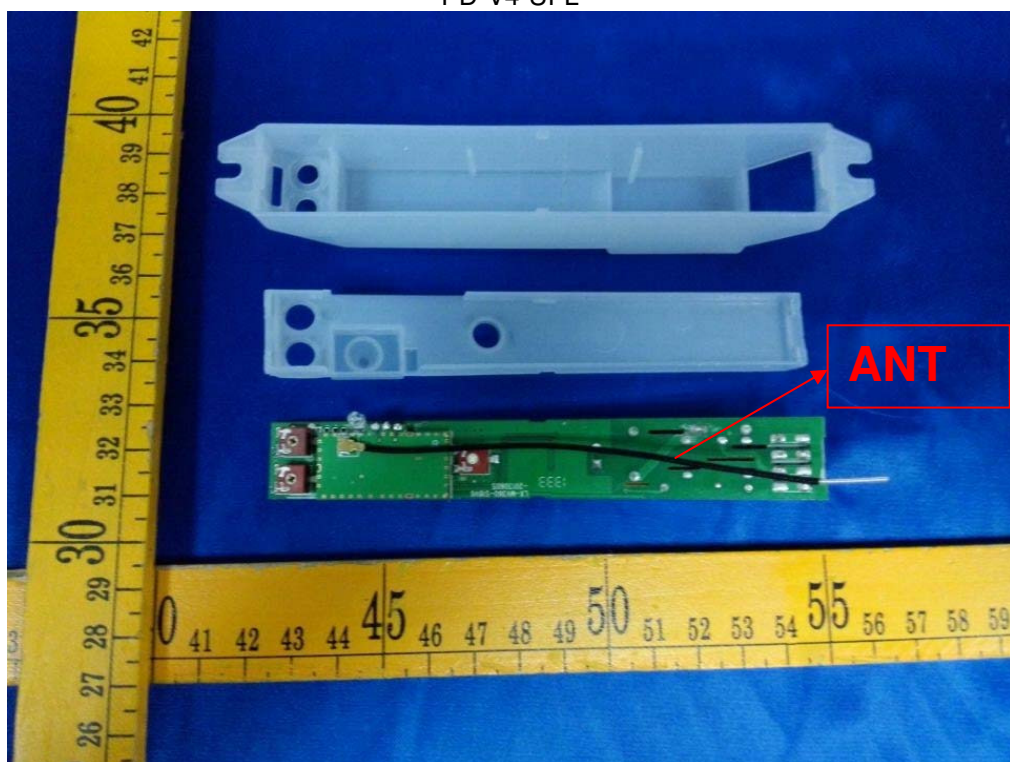


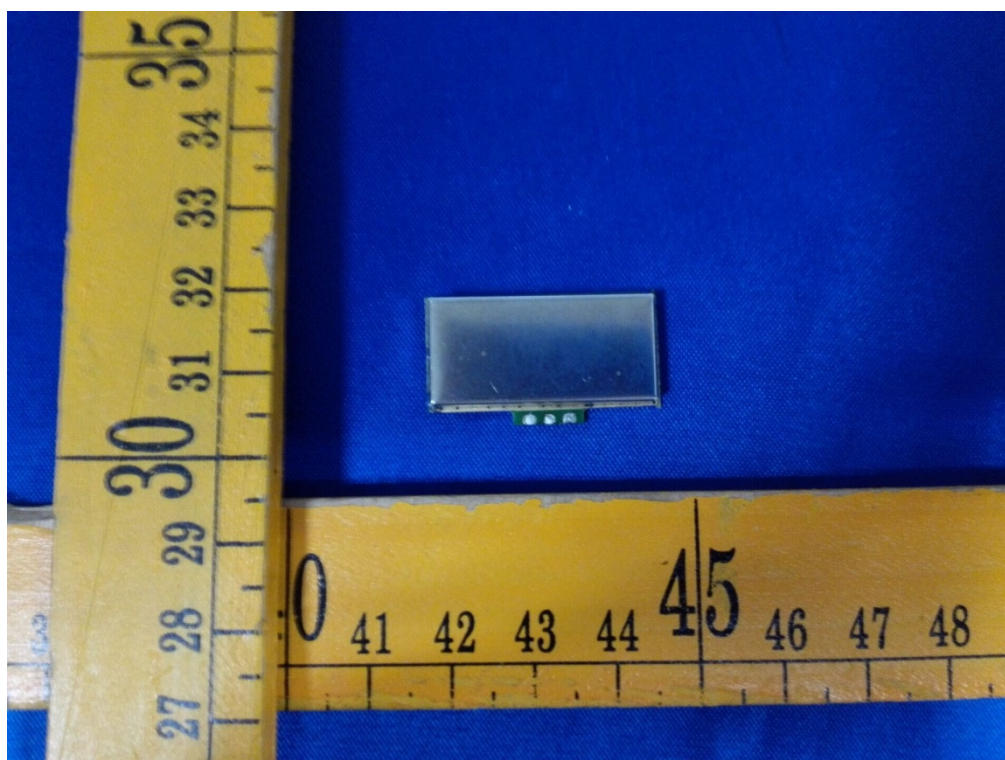
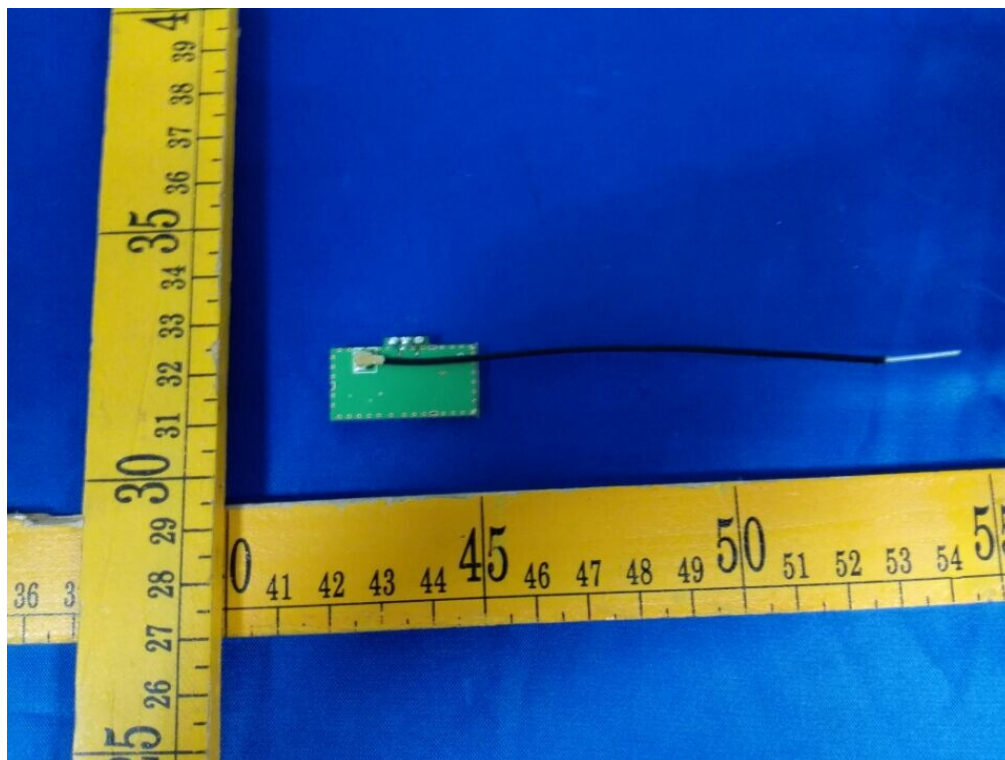
PD-V4



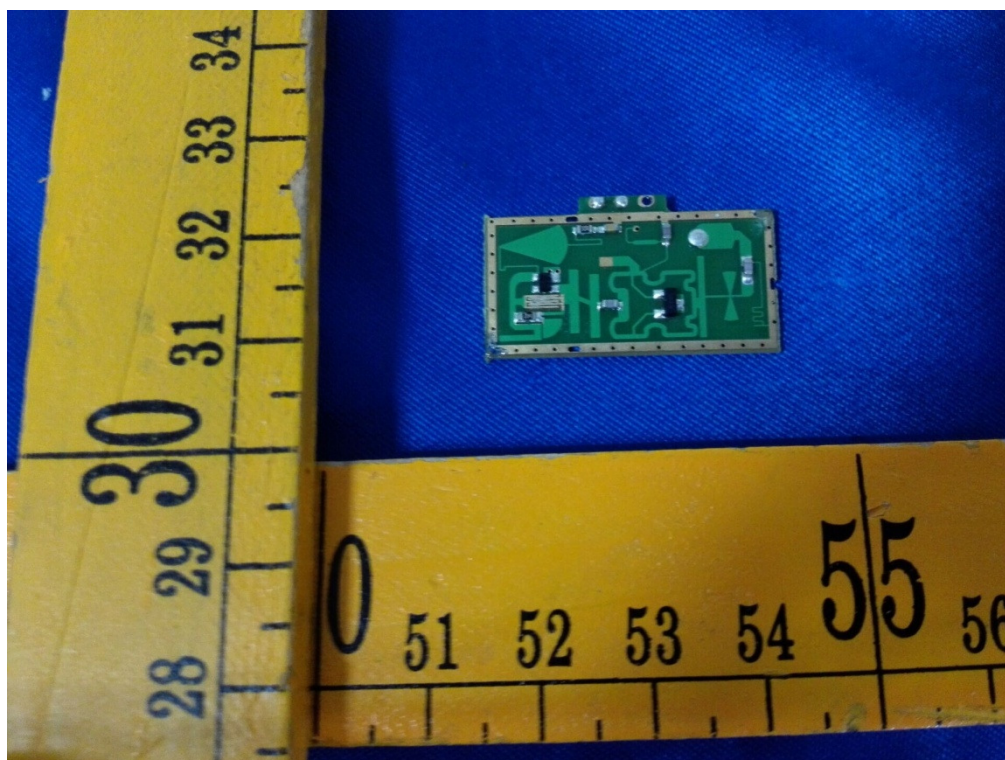
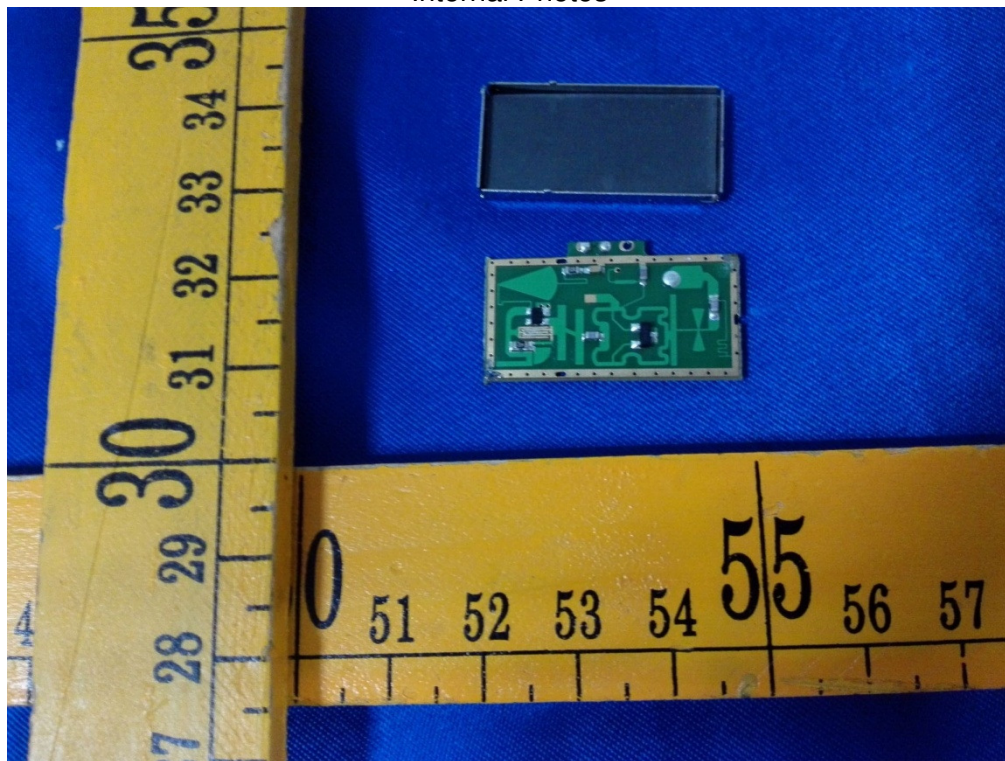


PD-V4-UFL





Internal Photos



***** THE END REPORT*****