

FCC TEST REPORT

FCC ID: 2AHFCF2516

Product : FM Transmitter

Model Name : F2516

Brand : N/A

Report No. : PT800153160119E-FC01

Prepared for

ESI CASES & ACCESSORIES

44 East 32 STREET 6 FLOOR NEW YORK, NEW YORK 10016

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name : ESI CASES & ACCESSORIES
 Address : 44 East 32 STREET 6 FLOOR NEW YORK, NEW YORK 10016
 Manufacture's name : ESI CASES & ACCESSORIES
 Address : 44 East 32 STREET 6 FLOOR NEW YORK, NEW YORK 10016
 Product name : FM Transmitter
 Model name : F2516
 Standards : FCC CFR47 Part 15 Section 15.239
 Test procedure : ANSI C63.10:2013
 Test Date : Jan. 20, 2016 ~ Jan.30, 2016
 Date of Issue : Feb. 01, 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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2 Test Summary

Test Items	Test Requirement	Result
Conducted Emissions	15.207	N/A
Radiated Spurious Emissions	15.239 15.205(a) 15.209 15.239	PASS
99% Bandwidth	15.239	PASS
Antenna Requirement	15.203	PASS

Remark:

N/A: Not Applicable



3 General Information

3.1 General Description of E.U.T.

Product Name : FM Transmitter

Model Name : F2516

Model Description : N/A

Operating frequency : 88.1-89.3MHz,4channels in total

Antenna installation: : Monopole Antenna

Antenna Gain: : -40dBi

Type of Modulation : FM

Power supply : DC 12V power by lead batteries or DC 1.5V*2 power by AAA batteries



3.2 Channel List

FM							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	88.1	2	88.5	3	88.9	4	89.3

3.3 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.

Test mode	Low channel	Middle channel	High channel
Transmitting	88.1MHz	/	89.3MHz



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	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3355	July 15, 2015	July 14, 2016	1 year
3	Amplifier	EM	EM-30180	060538	July 15, 2015	July 14, 2016	1 year
4	EMC Analyzer (9k~26.5GHz)	Agilent	E4407B	MY45109572	Aug.04, 2015	Aug.03, 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

Test Result: : N/A

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)

Remark : The device is powered by batteries; it is not applicable for this test.



6 Radiated Spurious Emissions

Test Requirement	:	FCC CFR47 Part 15 Section 15.209 & 15.239
Test Method	:	ANSI C63.10:2013
Test Result	:	PASS
Measurement Distance	:	3m
Limit	:	

The field strength of any emissions within the permitted 200 kHz band shall not exceed 250 microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emissions apply.

The field strength of any emissions radiated on any frequency outside of the specified 200 kHz band shall not exceed the general radiated emission limits in Section 15.209.

6.1 EUT Operation

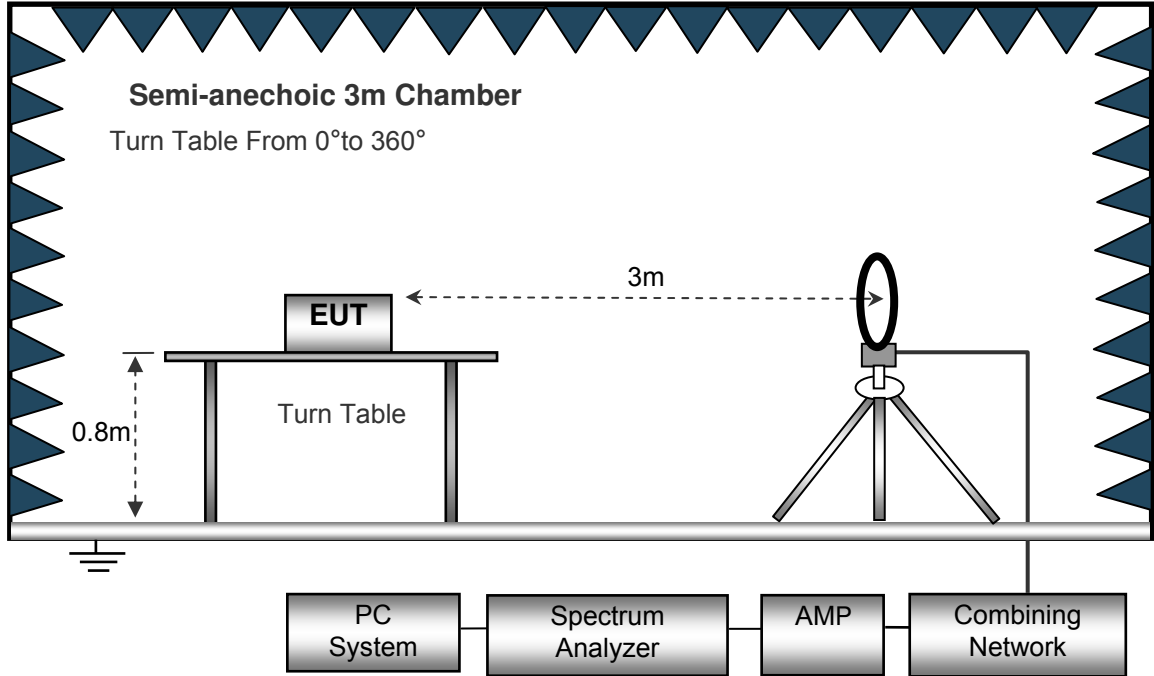
Operating Environment :

Temperature:	:	20.5 °C
Humidity:	:	51.1 % RH
Atmospheric Pressure:	:	101.2kPa
EUT Operation :	:	Refer to section 3.3

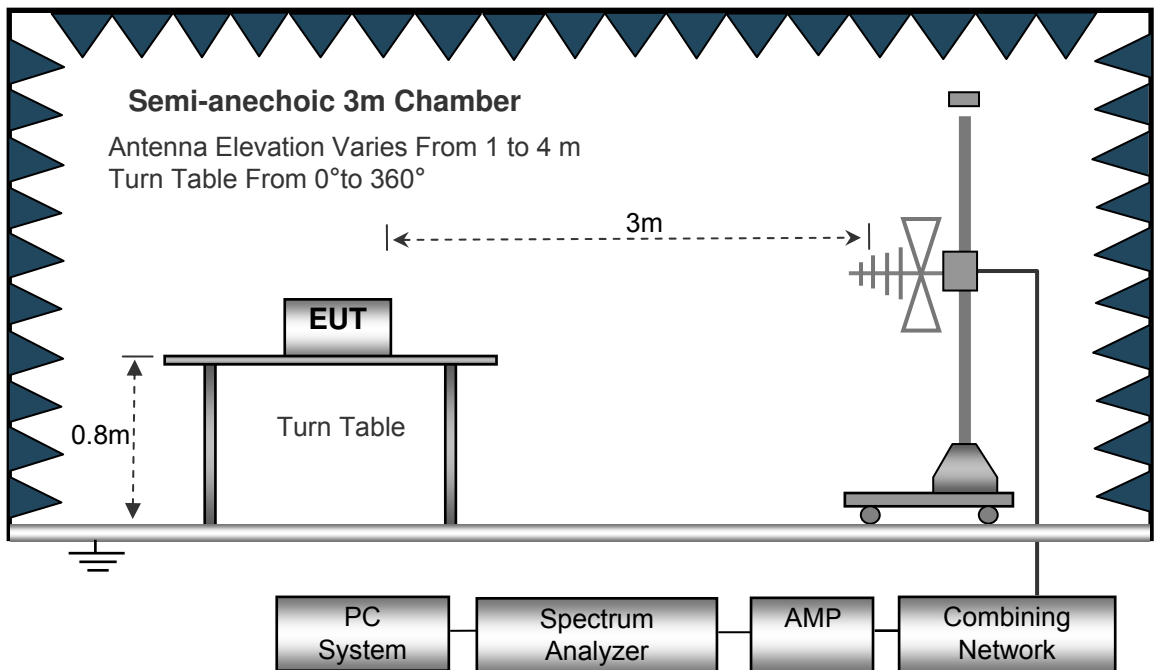
6.2 Test Setup

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

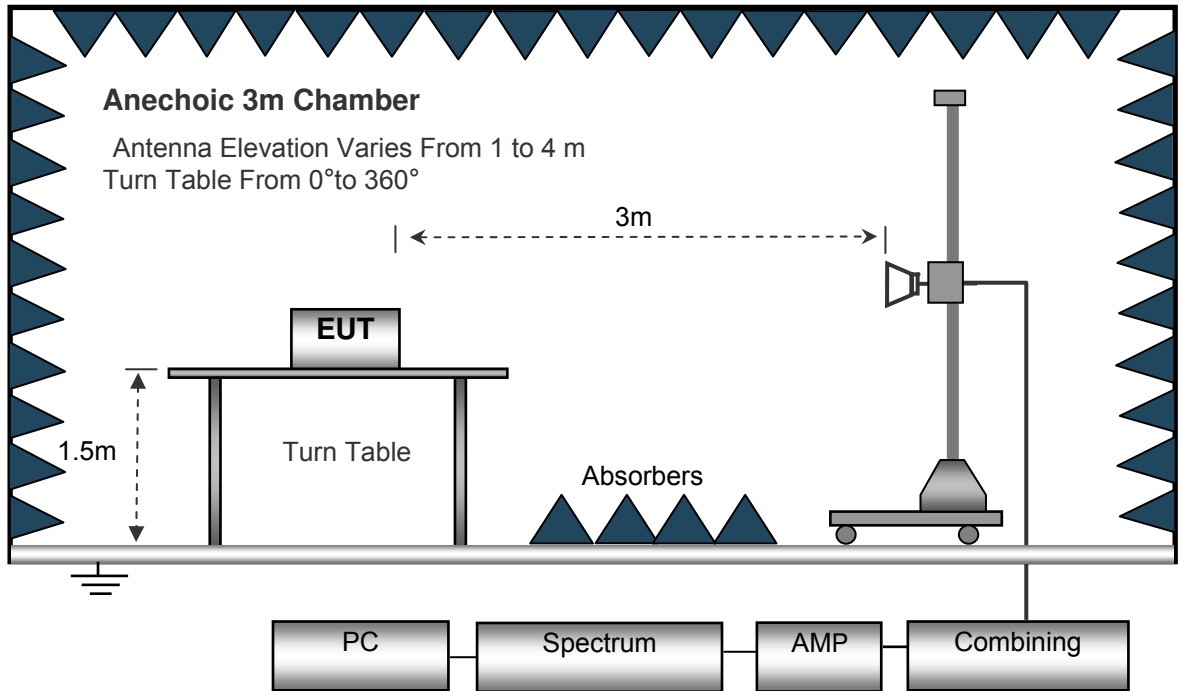
The test setup for emission measurement below 30MHz.



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

Sweep Speed..... Auto
 IF Bandwidth.....10kHz
 Video Bandwidth10kHz
 Resolution Bandwidth10kHz

30MHz ~ 1GHz

Sweep Speed..... Auto
 Detector.....PK
 Resolution Bandwidth100kHz
 Video Bandwidth300kHz



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.

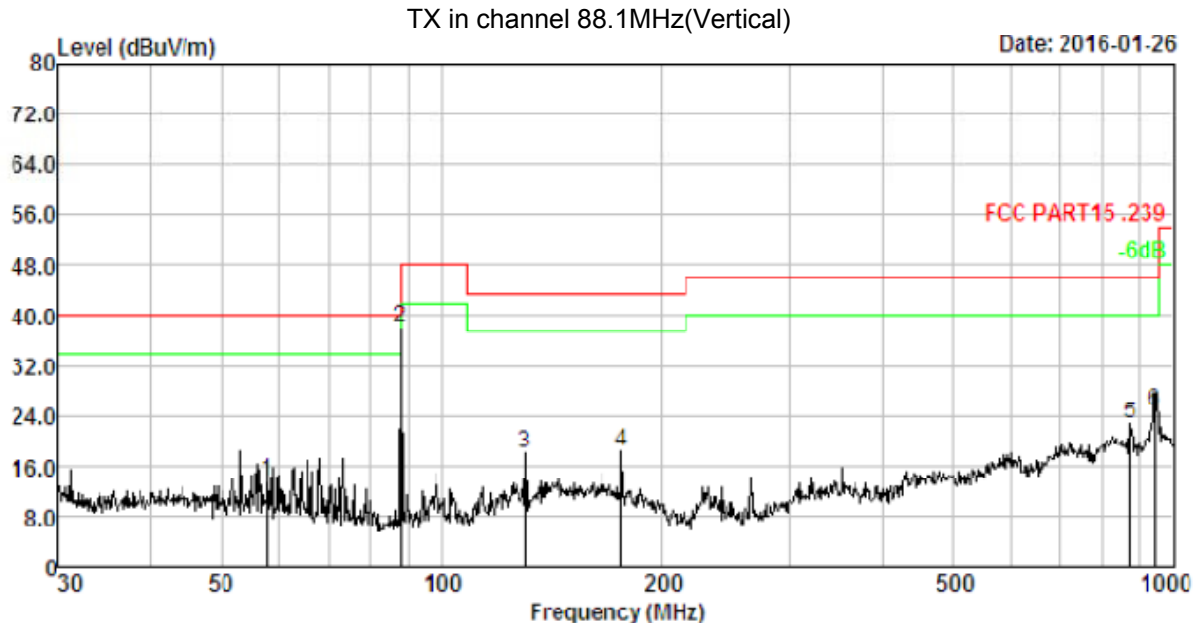


6.5 Summary of Test Results

Test Frequency: Below 30MHz

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

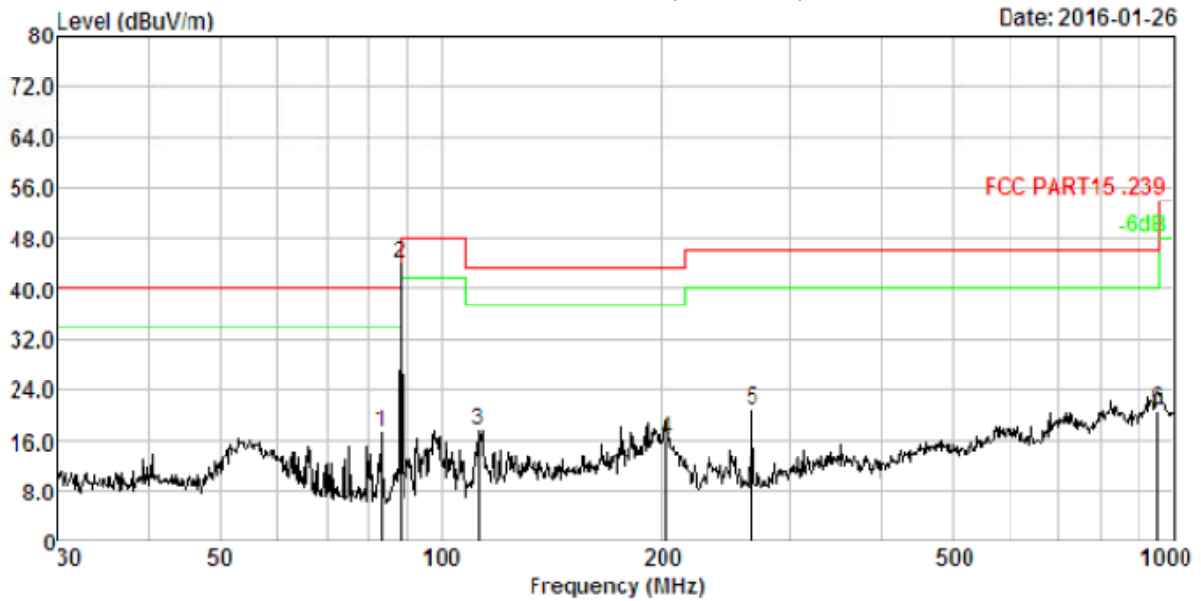
Test Frequency: 30MHz ~ 1GHz



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	57.796	1.65	12.05	29.96	30.20	13.46	40.00	-26.54	QP
2	88.033	2.03	9.06	57.36	30.34	38.11	48.00	-9.89	Average
3	130.379	2.39	12.66	33.46	30.48	18.03	43.50	-25.47	QP
4	176.269	2.66	12.77	33.46	30.59	18.30	43.50	-25.20	QP
5	872.183	4.11	22.05	27.63	31.14	22.65	46.00	-23.35	QP
6	945.440	4.18	23.34	28.54	31.17	24.89	46.00	-21.11	QP



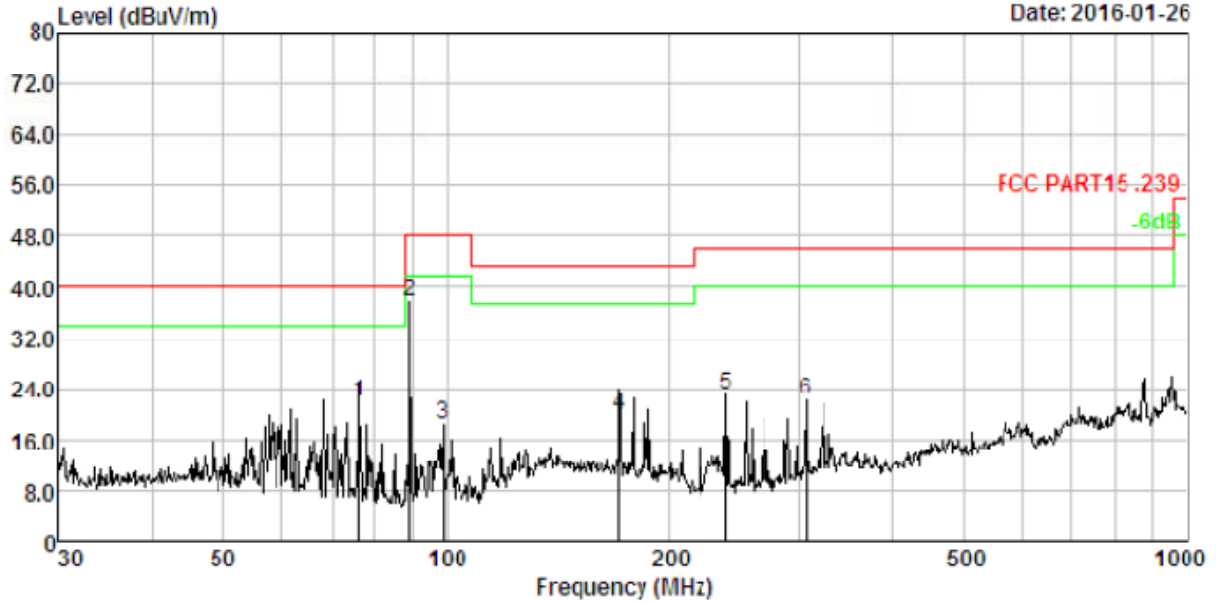
TX in channel 88.1MHz(Horizontal)



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading cBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	82.938	1.98	8.72	36.70	30.32	17.08	40.00	-22.92	QP
2.	88.033	2.03	9.06	63.10	30.34	43.85	48.00	-4.15	Average
3.	112.524	2.25	11.32	34.26	30.43	17.40	43.50	-26.10	QP
4.	203.523	2.79	10.45	33.40	30.64	16.00	43.50	-27.50	QP
5.	266.609	3.03	12.36	35.90	30.73	20.56	46.00	-25.44	QP
6.	952.094	4.19	23.43	24.28	31.17	20.73	46.00	-25.27	QP



TX in channel 89.3MHz(Vertical)

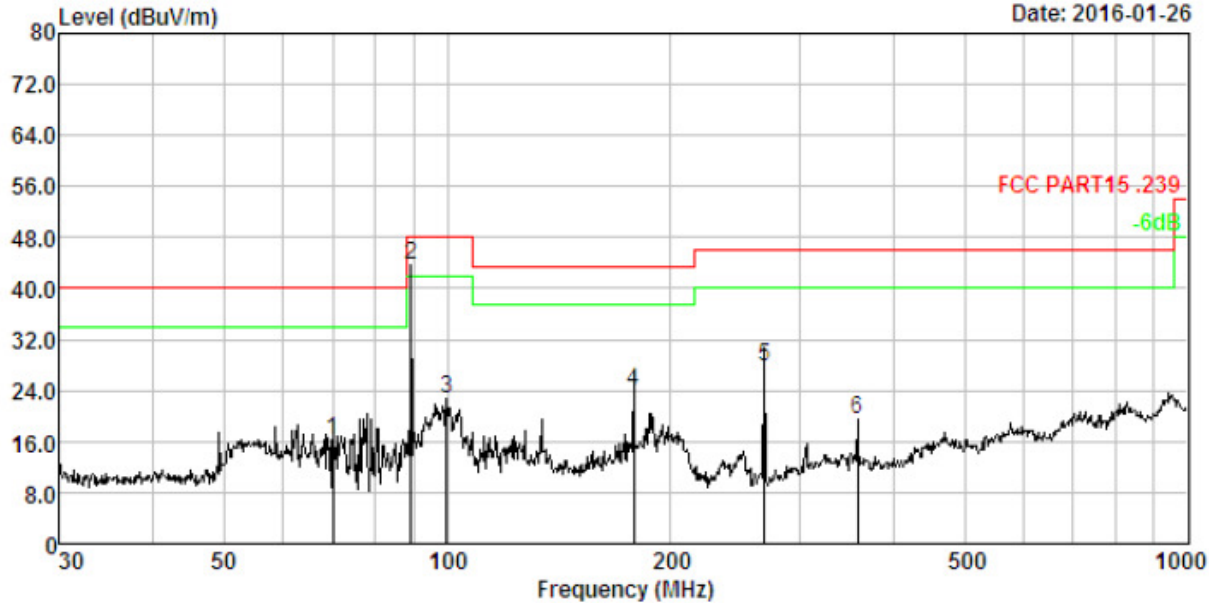


No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamplifier Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1	76.244	1.90	9.59	40.70	30.29	21.90	40.00	-18.10	QP
2	89.276	2.04	9.21	56.94	30.35	37.84	48.00	-10.16	Average
3	98.833	2.13	10.13	36.35	30.38	18.23	43.50	-25.27	QP
4	170.793	2.63	13.26	34.55	30.58	19.86	43.50	-23.64	QP
5	238.310	2.93	11.63	39.06	30.69	22.93	46.00	-23.07	QP
6	305.680	3.16	13.32	36.51	30.78	22.21	46.00	-23.79	QP



TX in channel 89.3MHz(Horizontal)

Date: 2016-01-26



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamplifier Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	70.090	1.82	9.99	34.63	30.27	16.17	40.00	-23.83	QP
2.	89.276	2.04	9.21	62.69	30.35	43.59	48.00	-4.41	QP
3.	99.878	2.14	10.23	40.86	30.39	22.84	43.50	-20.66	QP
4.	178.758	2.67	12.55	39.31	30.59	23.94	43.50	-19.56	QP
5.	268.485	3.04	12.42	42.92	30.73	27.65	46.00	-18.35	QP
6.	357.929	3.30	14.36	32.54	30.83	19.37	46.00	-26.63	QP



7 99%Bandwidth

Test Requirement : FCC Part15.239
Test Method : ANSI C63.10:2013
Test Limit : Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88-108 MHz.
Test Mode : Refer to section 3.3

7.1 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 = 10kHz, VBW = 30kHz, Sweep = auto

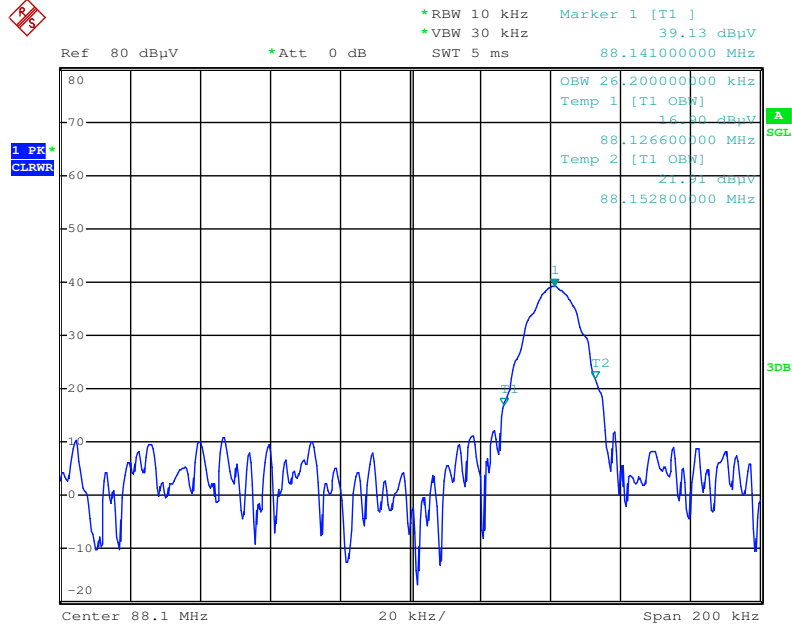
Detector function = peak, Trace = max hold



7.2 Test Result

99%Bandwidth	Limit	Result
26.2kHz	<200kHz	Pass

Test plot



Date: 1.FEB.2016 07:07:29



8 Band Edge Measurement

Test Requirement : FCC Part15.239 & 15.209 & 15.205
 Test Method : ANSI C63.10:2013
 Test Limit : Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88-108 MHz.
 Test Mode : Refer to section 3.3

8.1 Test Procedure

Set the receiver: RBW = 120kHz, Sweep = auto

Detector function = QP, Trace = max hold

8.2 Test Result

Frequency	Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.249/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Av e)	Degree	(m)	(H/V)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)
Left side for low channel 88.1MHz									
87.55	42.33	QP	205	1.7	H	-19.10	23.23	40.0	-16.77
Right side for high channel 89.3MHz									
108.64	39.57	QP	142	1.2	V	-17.94	21.63	43.5	-21.87
Remark: Only the worst case was recorded.									



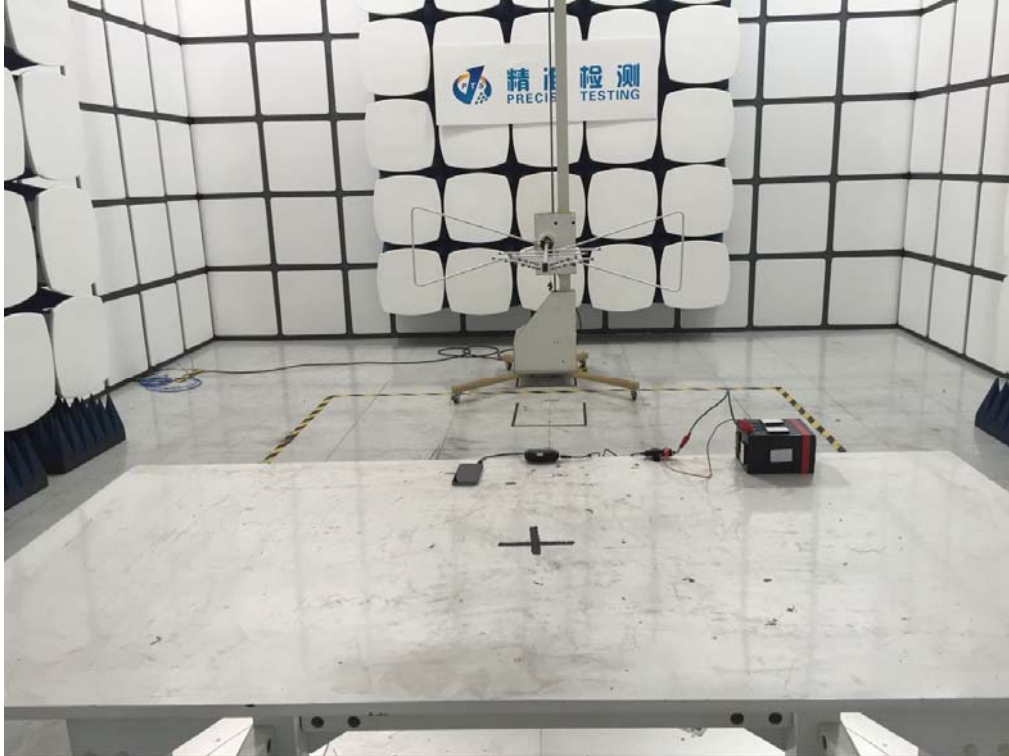
9 Antenna Requirement

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 PCB printed antenna, it meet the requirement of this section.



10 Test Setup

Spurious Emissions
From 30MHz-1000MHz





11 EUT Photos

External Photos

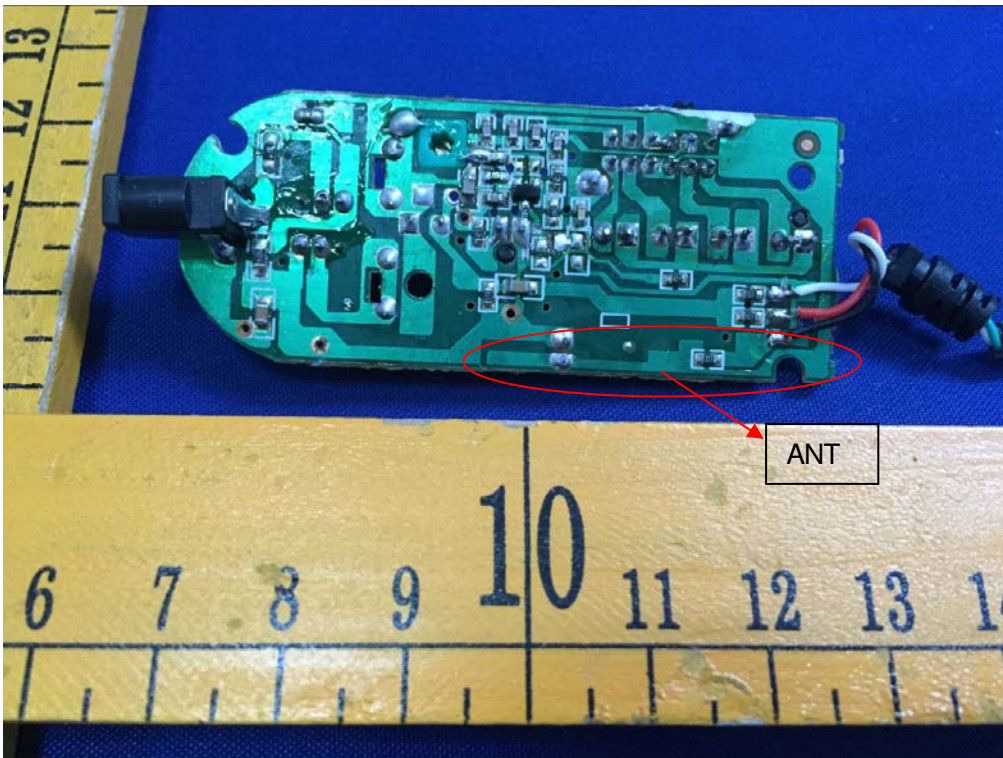








Internal Photos





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