FCC Radio Test Report

FCC ID: 2AFMD-FM23

Original Grant

Report No.	:	TB-FCC145003
Applicant	:	SHENZHEN SPRING TECHNOLOGY CO,.LIMITED
Equipment Under Test (EUT)		
EUT Name	:	FM Transmitter
Model No.	:	FM23
Brand Name	:	N/A
Receipt Date	:	2015-08-05
Test Date	:	2015-08-05 to 2015-08-18
Issue Date	:	2015-08-19
Standards	:	FCC Part 15, Subpart C (15.239:2014)
Test Method	:	ANSI C63.10:2013
Conclusions	:	**PASS**

In the configuration tested, the EUT complied with the standards specified above,
The EUT technically complies with the FCC requirements

Test/Witness Engineer : Lucky Su

Approved& Authorized :

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, China
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Contents

1. General Information about EUT

1.1 Client Information

Applicant	:	SHENZHEN SPRING TECHNOLOGY CO,.LIMITED
Address	:	5/Fablock, NO162 TongFuYu industry park KuKeng GuanLan LongHua new district, Shenzhen, China.
Manufacturer	:	SHENZHEN SPRING TECHNOLOGY CO,.LIMITED
Address	:	5/Fablock, NO162 TongFuYu industry park KuKeng GuanLan LongHua new district, Shenzhen, China.

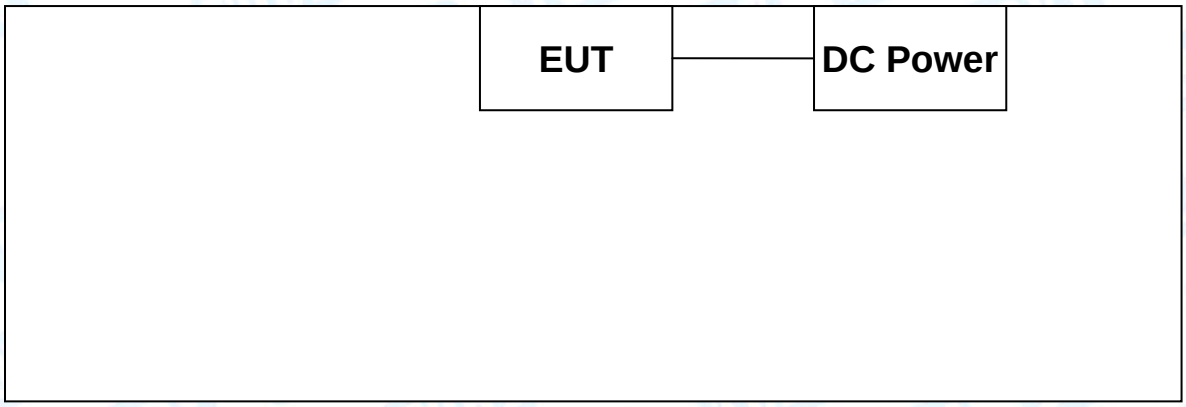
1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	FM Transmitter	
Models No.	:	FM23	
Model Difference	:	N/A	
Product Description	:	Operation Frequency:	88.1-107.9 MHz
		Out Power:	44.80 dBuV/m (PK Max.) 42.42 dBuV/m (AV Max.)
		Antenna Gain:	Integral Antenna(0 dBi)
		Modulation Type:	FM
Power Supply	:	DC Voltage supplied from Car Charger.	
Power Rating	:	Car Charger Input: DC 9~26V Output: 5V	
Connecting I/O Port(S)	:	Please refer to the User's Manual	

Note:

(1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

1.3 Block Diagram Showing the Configuration of System Tested



1.4 Description of Support Units

The EUT has been tested as an independent unit.

1.5 Description of Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned follow was evaluated respectively.

Pretest Mode	
Pretest Mode	**Description**
Mode 1	Continuously transmitting (88.1MHz/98.1MHz/107.9MHz)
Conducted Emission	
Test Mode	**Description**
Mode 1	Continuously transmitting (88.1MHz)
Radiated Emission	
Test Mode	**Description**
Mode 1	Continuously transmitting (88.1MHz/98.1MHz/107.9MHz)

Note:

(1) During the testing procedure, the continuously transmitting mode was programmed by the customer.

(2) The EUT is considered a portable unit, and it was pre-tested on the positioned of each 3 axis: X axis, Y axis and Z axis. The worst case was found positioned on Z-plane. There for only the test data of this Z-plane were used for radiated emission measurement test.

1.6 Description of Test Software Setting

During testing channel& Power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of transmitting mode.

1	**Product SW/HW Version :**	FM23
2	**Radio SW/HW Version:**	N/A
3	**Test SW Version:**	N/A
4	**RF Power Setting in Test SW:**	DEF

1.7 Measurement Uncertainty

The reported uncertainty of measurement y ± U，where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2，providing a level of confidence of approximately 95 %.

Test Item	**Parameters**	**Expanded Uncertainty (U_{Lab})**
Conducted Emission	Level Accuracy: 9kHz~150kHz 150kHz to 30MHz	 ±3.42 dB ±3.42 dB
Radiated Emission	Level Accuracy: 9kHz to 30 MHz	±4.60 dB
Radiated Emission	Level Accuracy: 30MHz to 1000 MHz	±4.40 dB
Radiated Emission	Level Accuracy: Above 1000MHz	±4.20 dB

1.8 Test Facility

The testing report were performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at 1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China. At the time of testing, the following bodies accredited the Laboratory:

CNAS (L5813)

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

FCC List No.: (811562)

The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number is 811562.

IC Registration No.: (11950A-1)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A-1.

May 22, 2014 certificated by TUV Rheinland(China) Co., Ltd. with TUV certificate No.: UA 50282953 0001 and report No.: 17026822 002. The certificate is valid until the next scheduled audit or up to 18 months, at the discretion of TUV Rhineland.

2. Test Summary

FCC Part 15 Subpart (15.239)			
Standard Section	**Test Item**	**Judgment**	**Remark**
15.203	Antenna Requirement	PASS	
15.207	Conducted Emission	PASS	
15.239 &15.209	Radiation Emission	PASS	
15.239	Occupied Bandwidth	PASS	
Note: N/A is an abbreviation for Not Applicable.			

3. Test Equipment

Conducted Emission Test					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Cal. Due Date**
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Aug. 07, 2015	Aug. 06, 2016
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Aug. 07, 2015	Aug. 06, 2016
AMN	SCHWARZBECK	NNBL 8226-2	8226-2/164	Aug. 07, 2015	Aug. 06, 2016
LISN	Rohde & Schwarz	ENV216	101131	Aug. 07, 2015	Aug. 06, 2016
Radiation Emission Test					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Cal. Due Date**
Spectrum Analyzer	Agilent	E4407B	MY45106456	Sep. 01, 2014	Aug. 31, 2015
EMI Test Receiver	Rohde & Schwarz	ESCI	100010/007	Aug. 07, 2015	Aug. 06, 2016
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 28, 2015	Mar. 27, 2016
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar. 28, 2015	Mar. 27, 2016
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 28, 2015	Mar. 27, 2016
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar. 28, 2015	Mar. 27, 2016
Pre-amplifier	Sonoma	310N	185903	Mar. 28, 2015	Mar. 27, 2016
Pre-amplifier	HP	8447B	3008A00849	Mar. 28, 2015	Mar. 27, 2016
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 28, 2015	Mar. 27, 2016
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A

4. Conducted Emission Test

4.1 Test Standard and Limit

4.1.1Test Standard

FCC Part 15.207

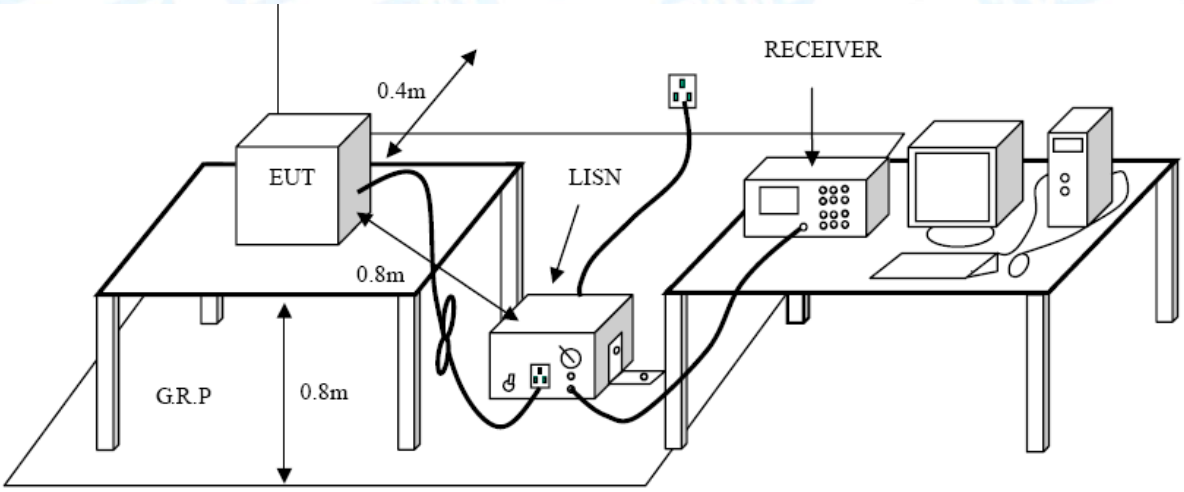
4.1.2 Test Limit

Conducted Emission Test Limit

Frequency	Maximum RF Line Voltage (dBμV)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Notes:
(1) *Decreasing linearly with logarithm of the frequency.
(2) The lower limit shall apply at the transition frequencies.
(3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2 Test Setup



4.3 Test Procedure

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

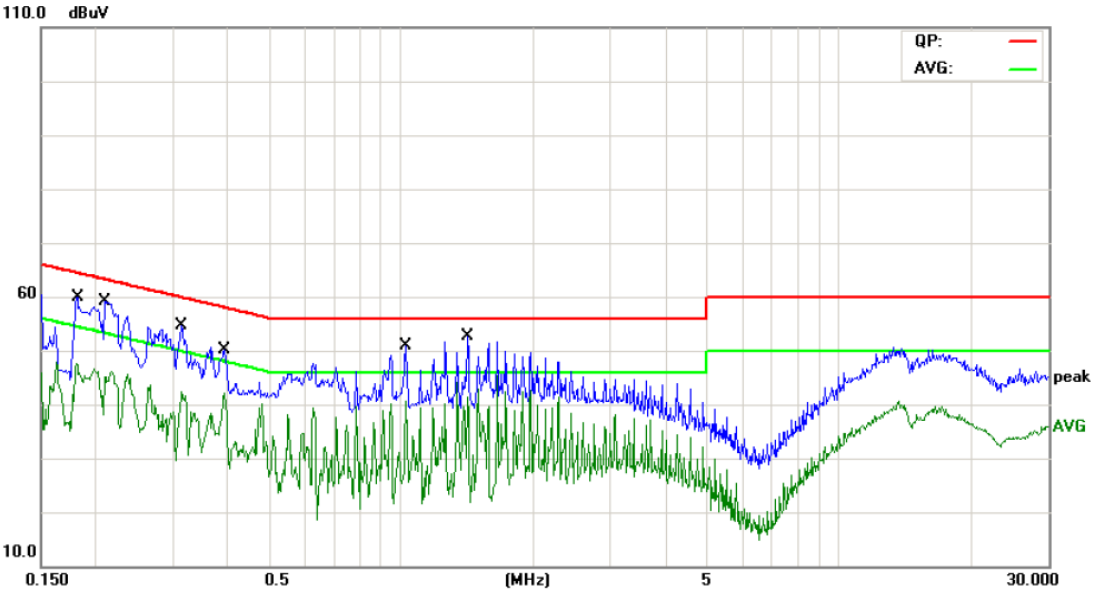
I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN at least 80 cm from the nearest part of EUT chassis.

The bandwidth of EMI test receiver is set at 9kHz, and the test frequency band is from 0.15MHz to 30MHz.

4.4 Test Data

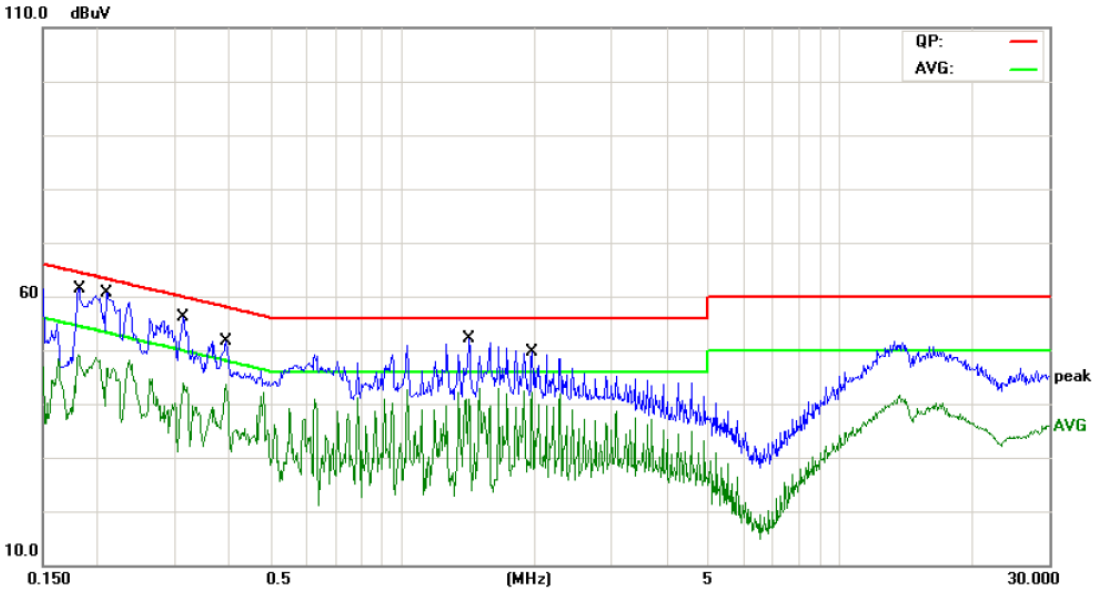
EUT:	FM Transmitter	Model Name :	FM23
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 9V		
Terminal:	Line		
Test Mode:	TX 88.1 MHz		
Remark:	Only worse case is reported		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1819	49.03	10.93	59.96	64.39	-4.43	QP
2		0.1819	34.76	10.93	45.69	54.39	-8.70	AVG
3		0.2100	48.41	10.67	59.08	63.20	-4.12	QP
4		0.2100	34.38	10.67	45.05	53.20	-8.15	AVG
5		0.3140	44.34	10.23	54.57	59.86	-5.29	QP
6		0.3140	32.03	10.23	42.26	49.86	-7.60	AVG
7		0.3940	40.01	10.15	50.16	57.98	-7.82	QP
8		0.3940	31.96	10.15	42.11	47.98	-5.87	AVG
9		1.0260	41.05	9.85	50.90	56.00	-5.10	QP
10		1.0260	30.71	9.85	40.56	46.00	-5.44	AVG
11	*	1.4180	42.81	9.88	52.69	56.00	-3.31	QP
12		1.4180	31.61	9.88	41.49	46.00	-4.51	AVG

Emission Level= Read Level+ Correct Factor

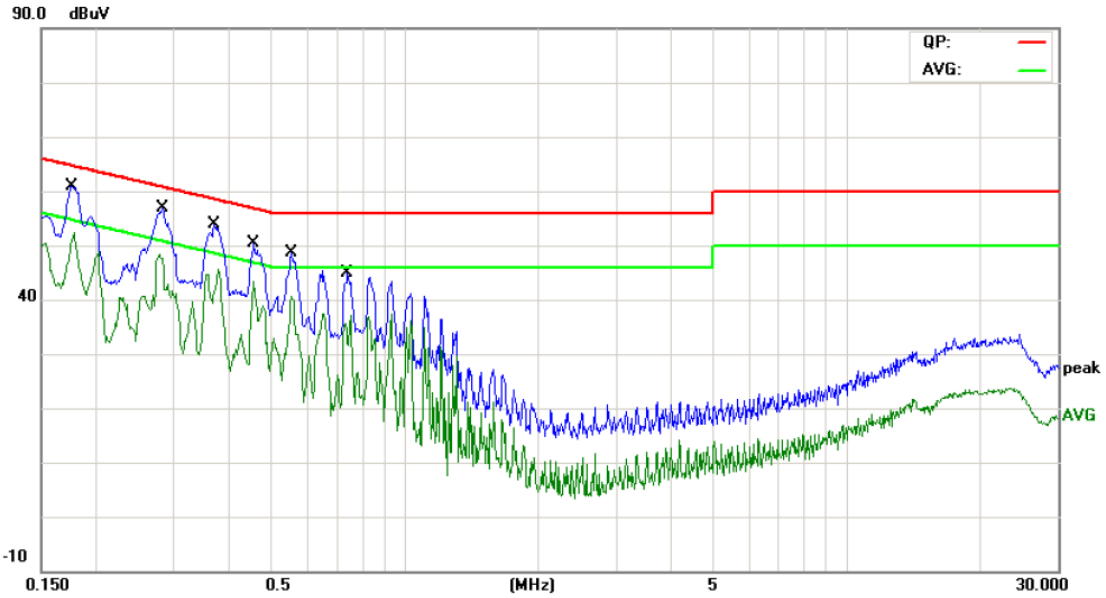
EUT:	FM Transmitter	Model Name :	FM23
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 9V		
Terminal:	Neutral		
Test Mode:	TX 88.1 MHz		
Remark:	Only worse case is reported		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1819	50.53	10.93	61.46	64.39	-2.93	QP
2		0.1819	36.26	10.93	47.19	54.39	-7.20	AVG
3	*	0.2099	49.91	10.67	60.58	63.21	-2.63	QP
4		0.2099	35.88	10.67	46.55	53.21	-6.66	AVG
5		0.3140	45.84	10.23	56.07	59.86	-3.79	QP
6		0.3140	33.53	10.23	43.76	49.86	-6.10	AVG
7		0.3940	41.51	10.15	51.66	57.98	-6.32	QP
8		0.3940	33.46	10.15	43.61	47.98	-4.37	AVG
9		1.4177	42.31	9.88	52.19	56.00	-3.81	QP
10		1.4177	31.11	9.88	40.99	46.00	-5.01	AVG
11		1.9697	39.77	9.88	49.65	56.00	-6.35	QP
12		1.9697	32.14	9.88	42.02	46.00	-3.98	AVG

Emission Level= Read Level+ Correct Factor

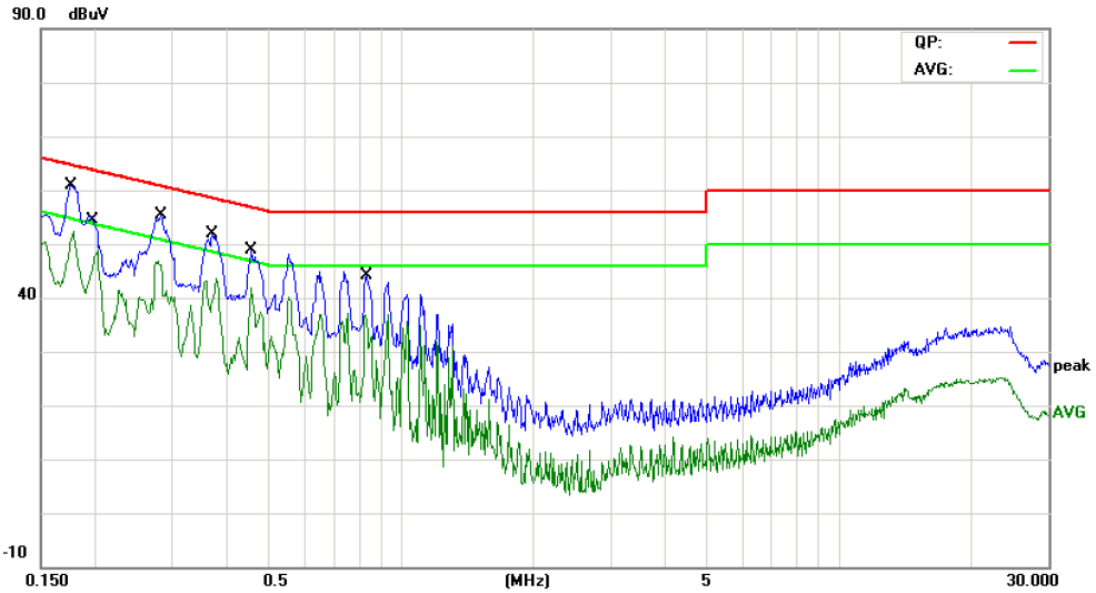
EUT:	FM Transmitter	Model Name :	FM23
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 12V		
Terminal:	Line		
Test Mode:	TX 88.1 MHz		
Remark:	Only worse case is reported		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1758	49.92	10.99	60.91	64.68	-3.77	QP
2		0.1758	39.96	10.99	50.95	54.68	-3.73	AVG
3		0.2819	46.67	10.31	56.98	60.76	-3.78	QP
4	*	0.2819	37.21	10.31	47.52	50.76	-3.24	AVG
5		0.3700	43.71	10.17	53.88	58.50	-4.62	QP
6		0.3700	31.54	10.17	41.71	48.50	-6.79	AVG
7		0.4540	40.33	10.05	50.38	56.80	-6.42	QP
8		0.4540	33.22	10.05	43.27	46.80	-3.53	AVG
9		0.5540	38.68	9.95	48.63	56.00	-7.37	QP
10		0.5540	30.76	9.95	40.71	46.00	-5.29	AVG
11		0.7420	34.99	9.97	44.96	56.00	-11.04	QP
12		0.7420	22.09	9.97	32.06	46.00	-13.94	AVG

Emission Level= Read Level+ Correct Factor

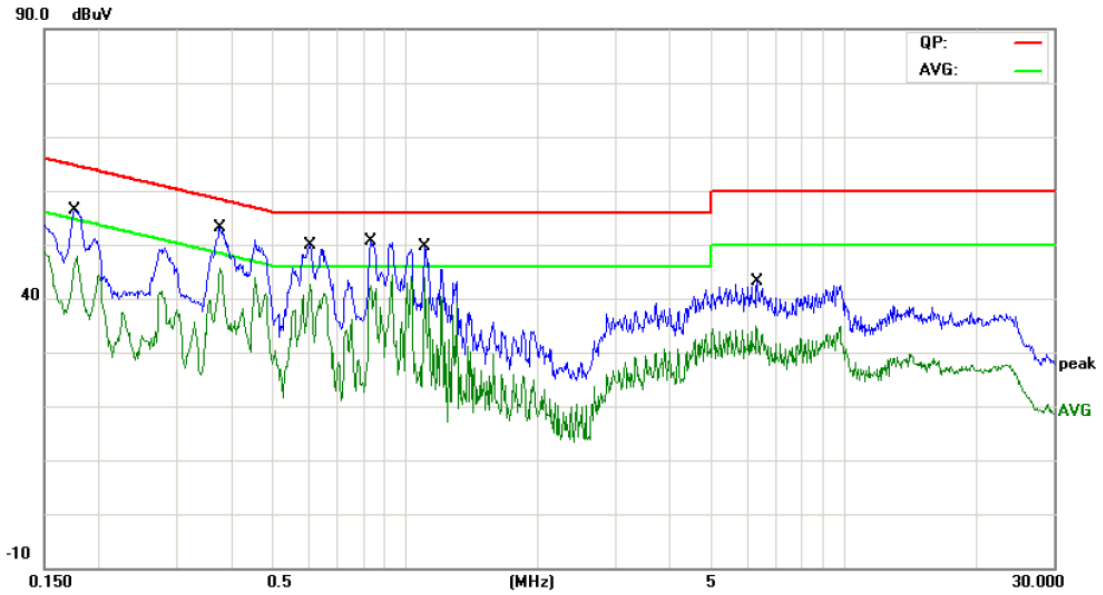
EUT:	FM Transmitter	Model Name :	FM23
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 12V		
Terminal:	Neutral		
Test Mode:	TX 88.1 MHz		
Remark:	Only worse case is reported		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1779	49.72	10.97	60.69	64.58	-3.89	QP
2	*	0.1779	40.35	10.97	51.32	54.58	-3.26	AVG
3		0.1985	43.02	10.76	53.78	63.67	-9.89	QP
4		0.1985	36.53	10.76	47.29	53.67	-6.38	AVG
5		0.2819	45.17	10.31	55.48	60.76	-5.28	QP
6		0.2819	35.71	10.31	46.02	50.76	-4.74	AVG
7		0.3699	41.71	10.17	51.88	58.50	-6.62	QP
8		0.3699	29.54	10.17	39.71	48.50	-8.79	AVG
9		0.4540	38.83	10.05	48.88	56.80	-7.92	QP
10		0.4540	31.72	10.05	41.77	46.80	-5.03	AVG
11		0.8339	34.11	9.95	44.06	56.00	-11.94	QP
12		0.8339	25.89	9.95	35.84	46.00	-10.16	AVG

Emission Level= Read Level+ Correct Factor

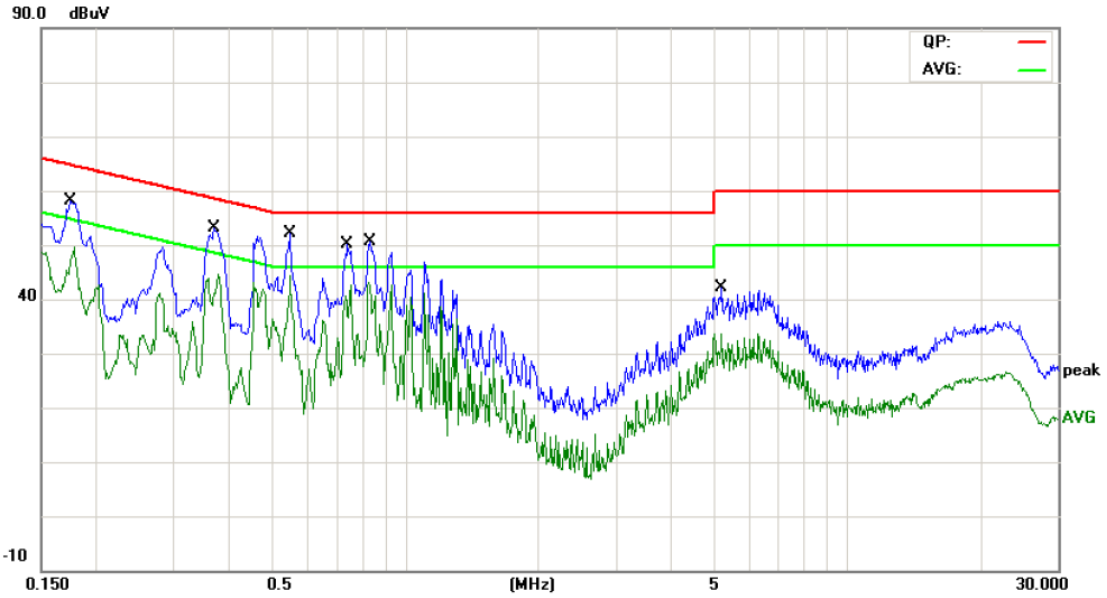
EUT:	FM Transmitter	Model Name :	FM23
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 26V		
Terminal:	Line		
Test Mode:	TX 88.1 MHz		
Remark:	Only worse case is reported		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1758	45.42	10.99	56.41	64.68	-8.27	QP
2		0.1758	35.46	10.99	46.45	54.68	-8.23	AVG
3		0.3780	43.00	10.16	53.16	58.32	-5.16	QP
4		0.3780	35.54	10.16	45.70	48.32	-2.62	AVG
5		0.6058	39.91	9.93	49.84	56.00	-6.16	QP
6		0.6058	32.61	9.93	42.54	46.00	-3.46	AVG
7		0.8336	40.61	9.95	50.56	56.00	-5.44	QP
8		0.8336	32.39	9.95	42.34	46.00	-3.66	AVG
9		1.1060	39.70	9.86	49.56	56.00	-6.44	QP
10	*	1.1060	34.13	9.86	43.99	46.00	-2.01	AVG
11		6.3219	32.66	10.37	43.03	60.00	-16.97	QP
12		6.3219	23.93	10.37	34.30	50.00	-15.70	AVG

Emission Level= Read Level+ Correct Factor

EUT:	FM Transmitter	Model Name :	FM23
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 26V		
Terminal:	Neutral		
Test Mode:	TX 88.1 MHz		
Remark:	Only worse case is reported		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1739	48.12	9.97	58.09	64.77	-6.68	QP
2		0.1739	37.06	9.97	47.03	54.77	-7.74	AVG
3		0.3691	43.21	10.02	53.23	58.52	-5.29	QP
4		0.3691	31.04	10.02	41.06	48.52	-7.46	AVG
5		0.5493	42.12	10.04	52.16	56.00	-3.84	QP
6	*	0.5493	34.31	10.04	44.35	46.00	-1.65	AVG
7		0.7390	39.99	10.11	50.10	56.00	-5.90	QP
8		0.7390	27.09	10.11	37.20	46.00	-8.80	AVG
9		0.8304	40.61	10.09	50.70	56.00	-5.30	QP
10		0.8304	32.39	10.09	42.48	46.00	-3.52	AVG
11		5.1937	32.13	9.97	42.10	60.00	-17.90	QP
12		5.1937	23.68	9.97	33.65	50.00	-16.35	AVG

Emission Level= Read Level+ Correct Factor

5. Radiated Emission Test

5.1 Test Standard and Limit

5.1.1 Test Standard

FCC Part 15.209 & 15.239

5.1.2 Test Limit

According to FCC 15.209 requirement:

In addition to the provisions of Section 15.209, the field strength of emissions from intentional radiators operated under this Section shall not exceed the following:

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

Radiated Emission Limit (Above 1000MHz)

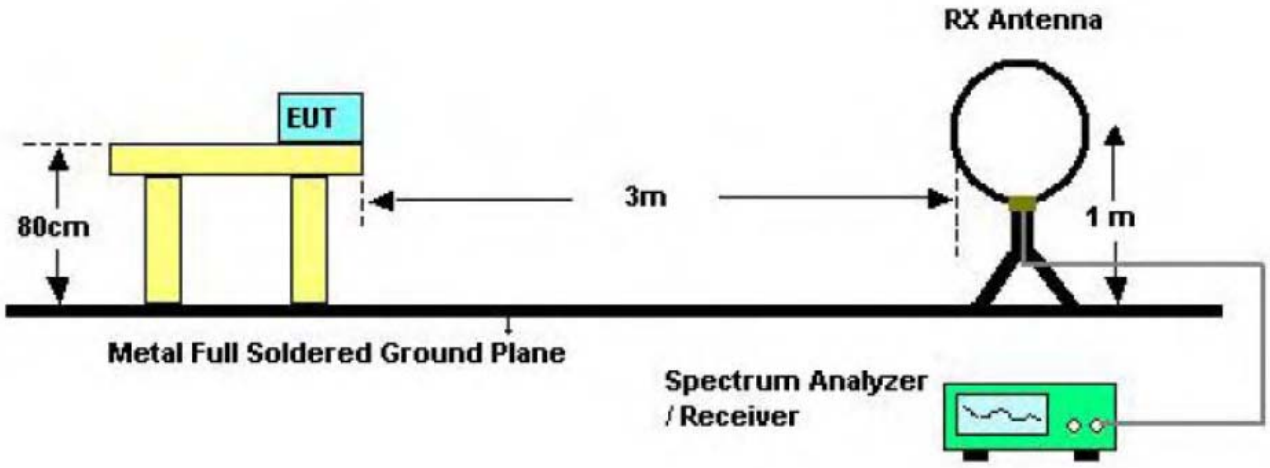
Frequency (MHz)	Class B (dBuV/m)(at 3m)	
	Peak	Average
Above 1000	74	54

Note:

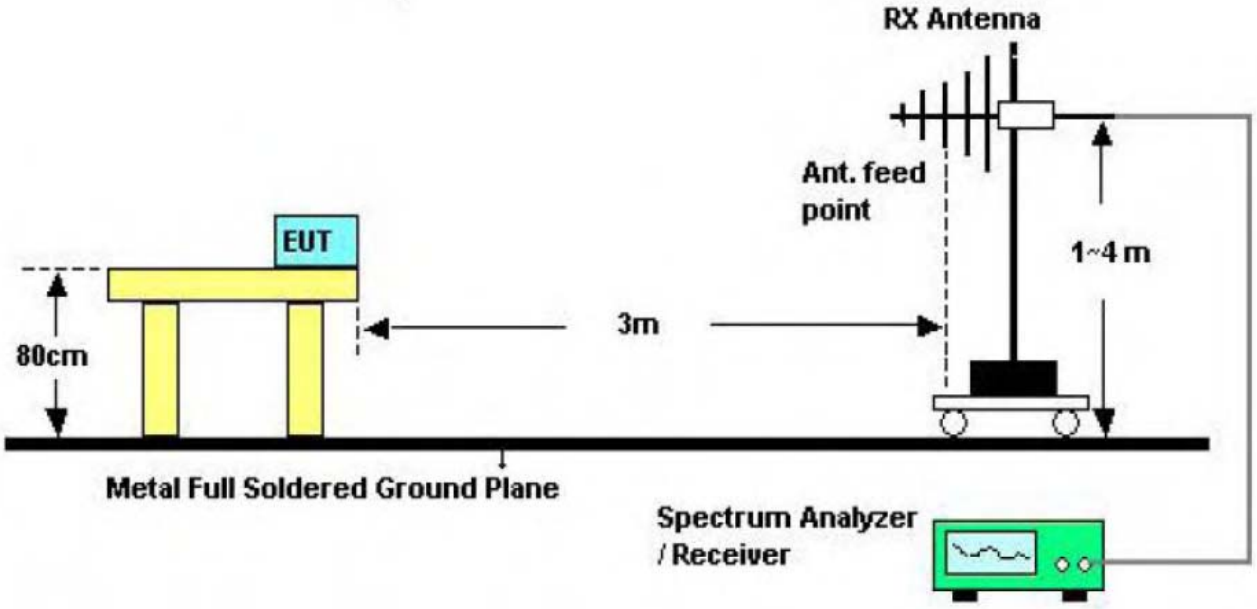
(1) The tighter limit applies at the band edges.

(2) Emission Level (dBuV/m)=20log Emission Level (uV/m)

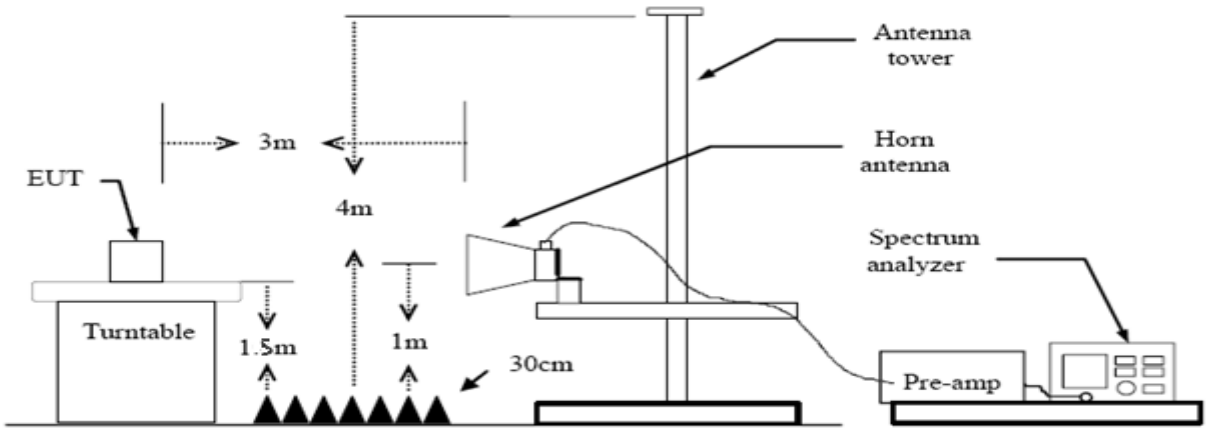
5.2 Test Setup



Bellow 30MHz Test Setup



Bellow 1000MHz Test Setup



Above 1GHz Test Setup

5.3 Test Procedure

(1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz. The EUT was placed on a rotating 0.8m high above the ground, the table was rotated 360 degrees to determine the position of the highest radiation.

(2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.

(3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.

(4) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

(5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.

(6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.

(7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

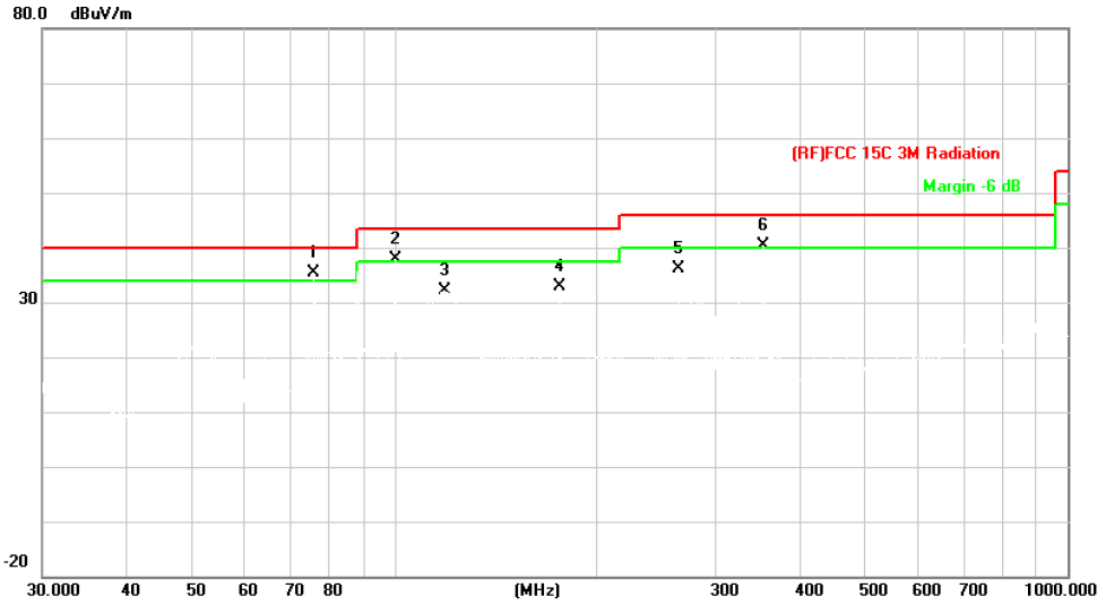
(8) For the actual test configuration, please see the test setup photo.

5.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

5.5 Test Data

EUT:	FM Transmitter	Model Name :	FM23
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Horizontal		
Test Mode:	88.1MHz		
Remark:			

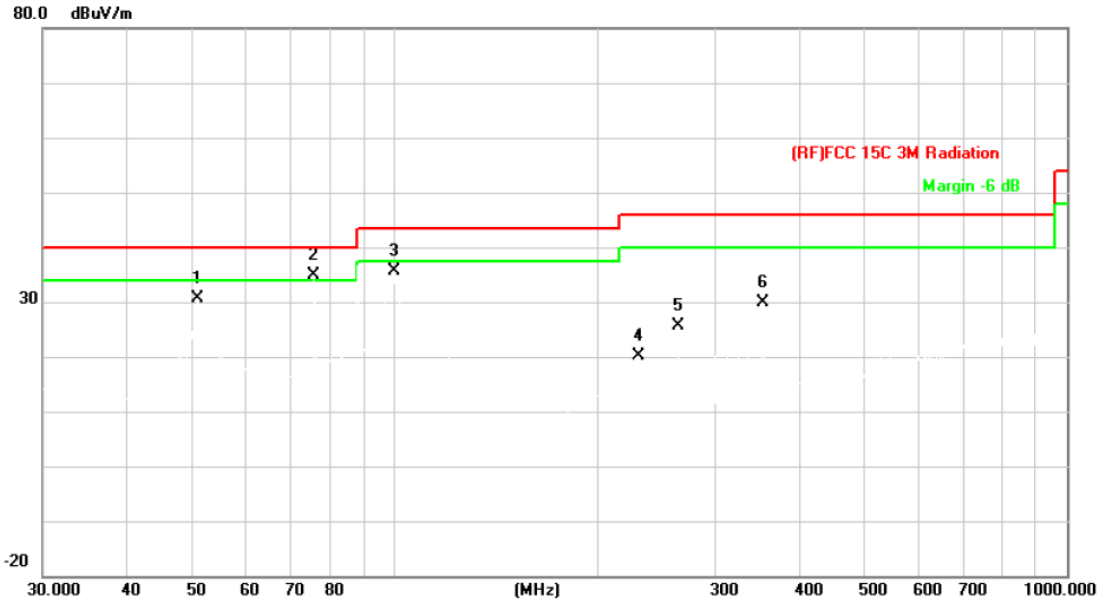


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	75.9772	58.71	-23.42	35.29	40.00	-4.71	peak
2	!	100.2286	59.69	-21.82	37.87	43.50	-5.63	peak
3		118.6013	54.44	-22.42	32.02	43.50	-11.48	peak
4		176.2685	53.67	-20.80	32.87	43.50	-10.63	peak
5		264.7456	54.01	-17.80	36.21	46.00	-9.79	peak
6	!	352.9433	55.02	-14.59	40.43	46.00	-5.57	peak

Emission Level= Read Level+ Correct Factor

EUT:	FM Transmitter	Model Name :	FM23

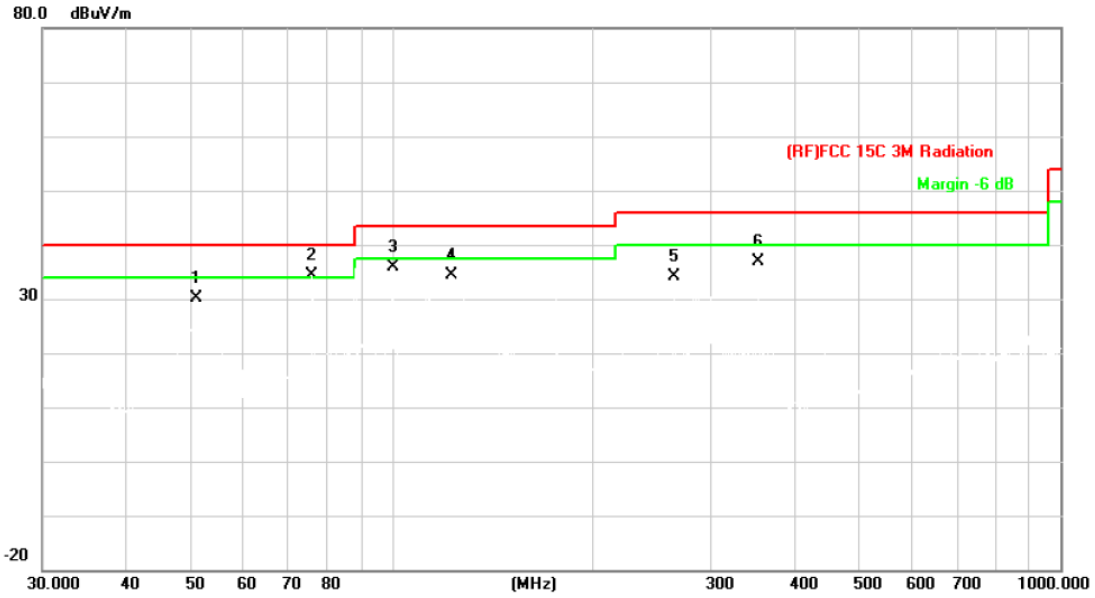
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Vertical		
Test Mode:	88.1MHz		
Remark:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		50.9420	54.97	-24.41	30.56	40.00	-9.44	peak
2	*	75.9772	58.26	-23.42	34.84	40.00	-5.16	peak
3		99.8777	57.51	-21.83	35.68	43.50	-7.82	peak
4		230.9068	39.11	-19.03	20.08	46.00	-25.92	peak
5		264.7456	43.54	-17.80	25.74	46.00	-20.26	peak
6		352.9433	44.48	-14.59	29.89	46.00	-16.11	peak

Emission Level= Read Level+ Correct Factor

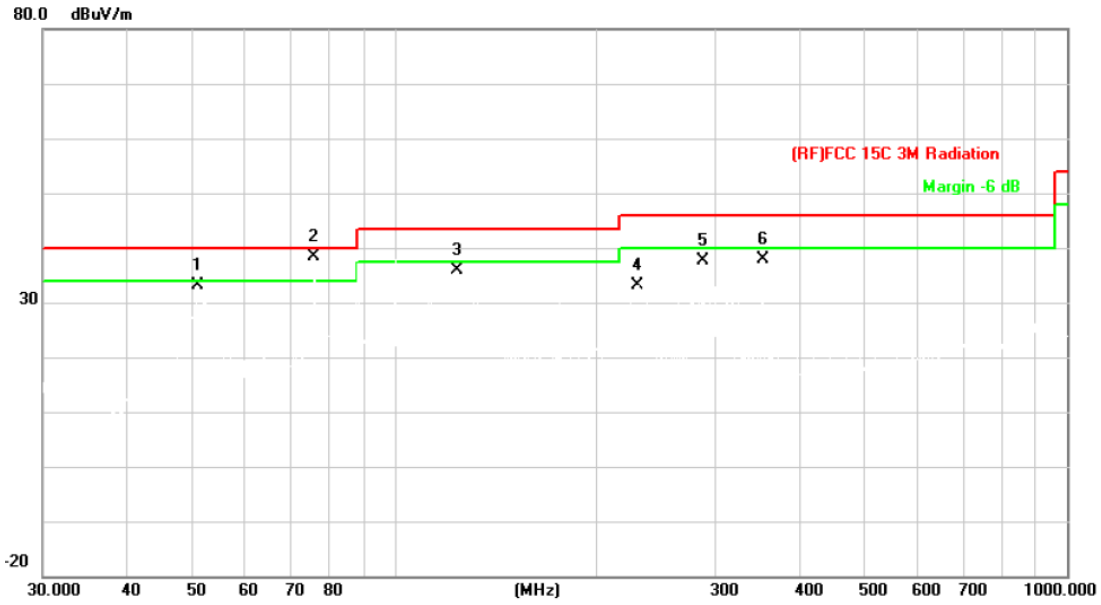
EUT:	FM Transmitter	Model Name :	FM23
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Horizontal		
Test Mode:	98.1MHz		
Remark:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		50.9420	54.45	-24.41	30.04	40.00	-9.96	peak
2	*	75.9770	57.71	-23.42	34.29	40.00	-5.71	peak
3		100.2286	57.69	-21.82	35.87	43.50	-7.63	peak
4		122.8340	56.73	-22.41	34.32	43.50	-9.18	peak
5		264.7456	52.01	-17.80	34.21	46.00	-11.79	peak
6		352.9433	51.52	-14.59	36.93	46.00	-9.07	peak

Emission Level= Read Level+ Correct Factor

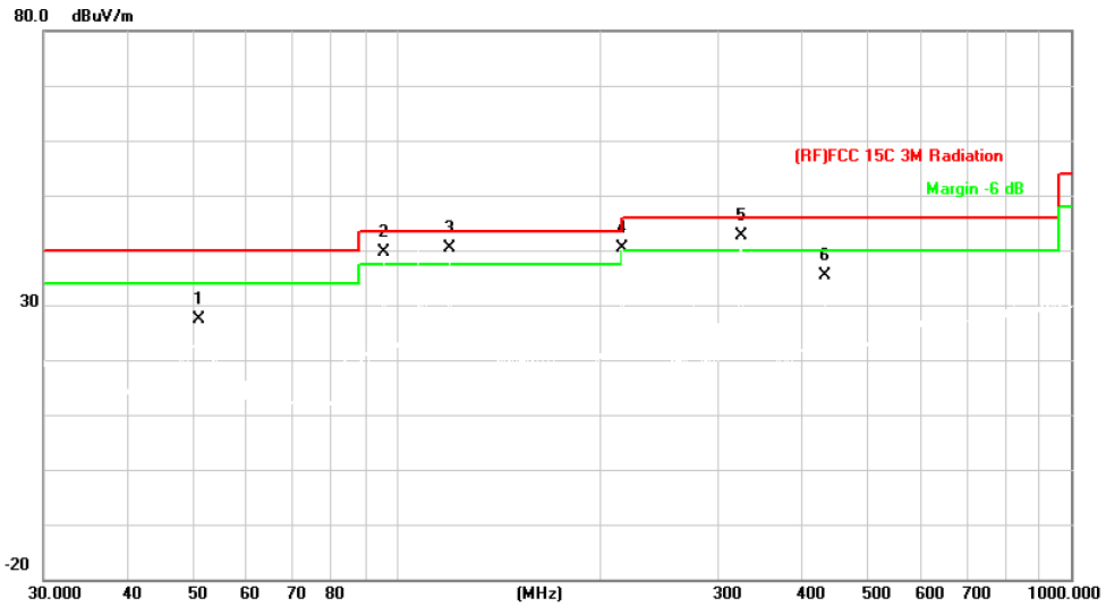
EUT:	FM Transmitter	**Model Name :**	FM23
Temperature:	25 ℃	**Relative Humidity:**	55%
Test Voltage:	DC 12V		
Ant. Pol.	Vertical		
Test Mode:	98.1MHz		
Remark:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		50.9420	57.45	-24.41	33.04	40.00	-6.96	peak
2	*	75.9771	61.71	-23.42	38.29	40.00	-1.71	peak
3		123.6984	58.38	-22.39	35.99	43.50	-7.51	peak
4		230.0985	52.21	-19.06	33.15	46.00	-12.85	peak
5		287.9904	55.06	-17.32	37.74	46.00	-8.26	peak
6		352.9433	52.52	-14.59	37.93	46.00	-8.07	peak

Emission Level= Read Level+ Correct Factor

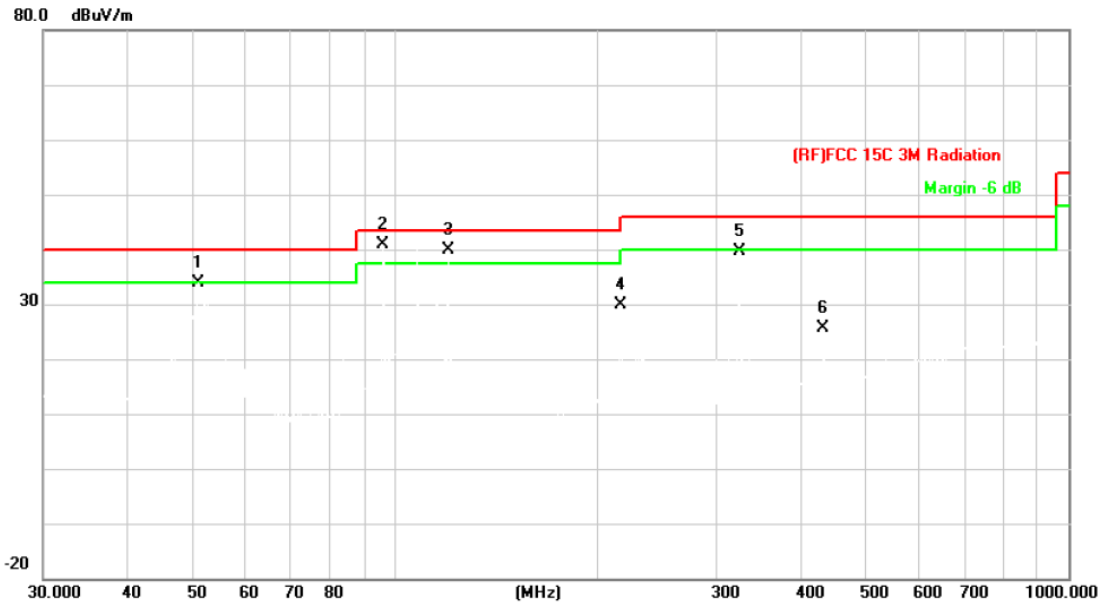
EUT:	FM Transmitter	**Model Name :**	FM23
Temperature:	25 ℃	**Relative Humidity:**	55%
Test Voltage:	DC 12V		
Ant. Pol.	Horizontal		
Test Mode:	107.9MHz		
Remark:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		50.9420	51.91	-24.41	27.50	40.00	-12.50	peak
2	!	95.7622	61.94	-22.19	39.75	43.50	-3.75	peak
3	*	119.8555	62.85	-22.50	40.35	43.50	-3.15	peak
4	!	216.0240	60.19	-19.70	40.49	46.00	-5.51	peak
5	!	324.4560	58.67	-16.16	42.51	46.00	-3.49	peak
6		432.5457	48.23	-12.78	35.45	46.00	-10.55	peak

Emission Level= Read Level+ Correct Factor

EUT:	FM Transmitter	**Model Name :**	FM23
Temperature:	25 ℃	**Relative Humidity:**	55%
Test Voltage:	DC 12V		
Ant. Pol.	Vertical		
Test Mode:	107.9MHz		
Remark:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		50.9420	58.38	-24.41	33.97	40.00	-6.03	peak
2	*	95.7622	62.97	-22.19	40.78	43.50	-2.72	peak
3	!	119.8555	62.31	-22.50	39.81	43.50	-3.69	peak
4		216.0240	49.56	-19.70	29.86	46.00	-16.14	peak
5		324.4560	55.79	-16.16	39.63	46.00	-6.37	peak
6		432.5457	38.31	-12.78	25.53	46.00	-20.47	peak

Emission Level= Read Level+ Correct Factor

Note: (1) All Readings are Peak Value.
(2) Emission Level= Reading Level+ Probe Factor +Cable Loss
(3) The QP measurement was not performed when the peak measured data under the limit of QP detection.

6. Fundamental and Band Edge Test

6.1 Test Standard and Limit

6.1.1 Test Standard

FCC Part 15.209 & 15.239

6.1.2 Test Limit

According to FCC 15.239(a)(b) and 15.209 requirement:

The field strength of emissions from the intentional radiators operated under these frequency bands shall not exceed the following:

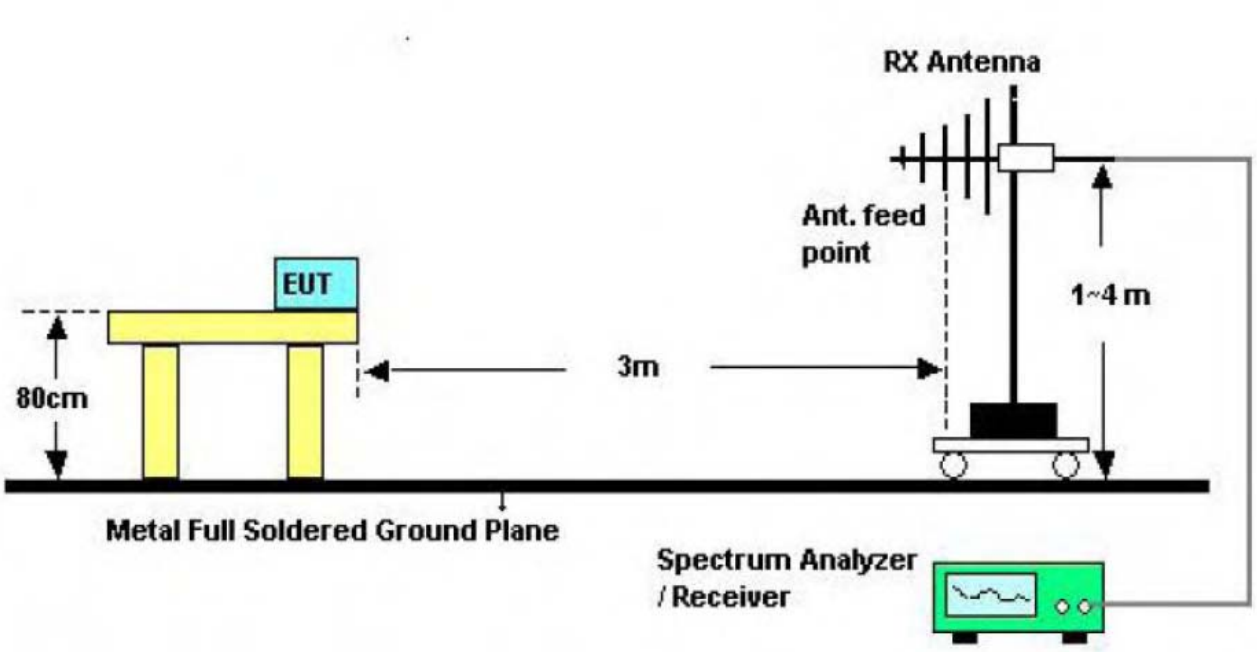
Fundamental Frequency (MHz)	Field Strength of Fundamental (dBuV/m)	
	Peak	Average
88 to 108	67.96	47.96

According to FCC 15.239(c) and 15.209 requirements:

Field strength of outside of the frequency bands limit show in below table.

Outside Frequency Band Edge	Limit (dBuV/m) at 3m
Below 88 MHz	40.0 (QP)
Above 108 MHz	43.5 (QP)

6.2 Test Setup



6.3 Test Procedure

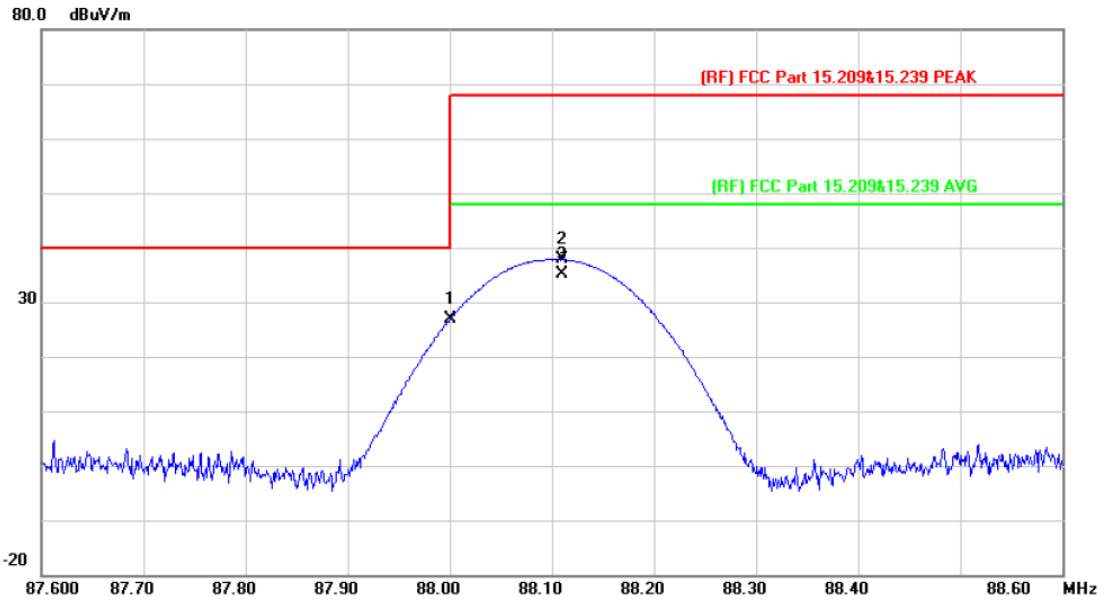
(1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz. The EUT was placed on a rotating 0.8m high above the ground, the table was rotated 360 degrees to determine the position of the highest radiation.
(2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
(3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
(4) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
(5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
(6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
(7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
(8) For the actual test configuration, please see the test setup photo.

6.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

6.5 Test Data

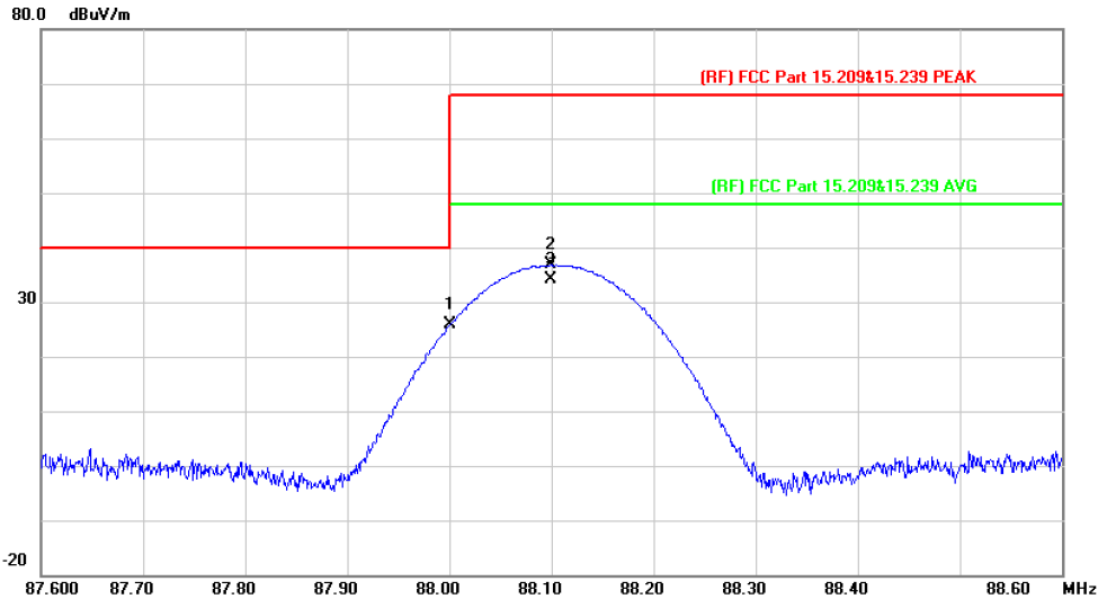
EUT:	FM Transmitter	Model Name :	FM23
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Horizontal		
Test Mode:	88.1MHz		
Remark:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		88.0000	49.69	-22.81	26.88	40.00	-13.12	peak
2		88.1100	60.61	-22.80	37.81	67.96	-30.15	peak
3	*	88.1100	58.01	-22.80	35.21	47.96	-12.75	AVG

Emission Level= Read Level+ Correct Factor

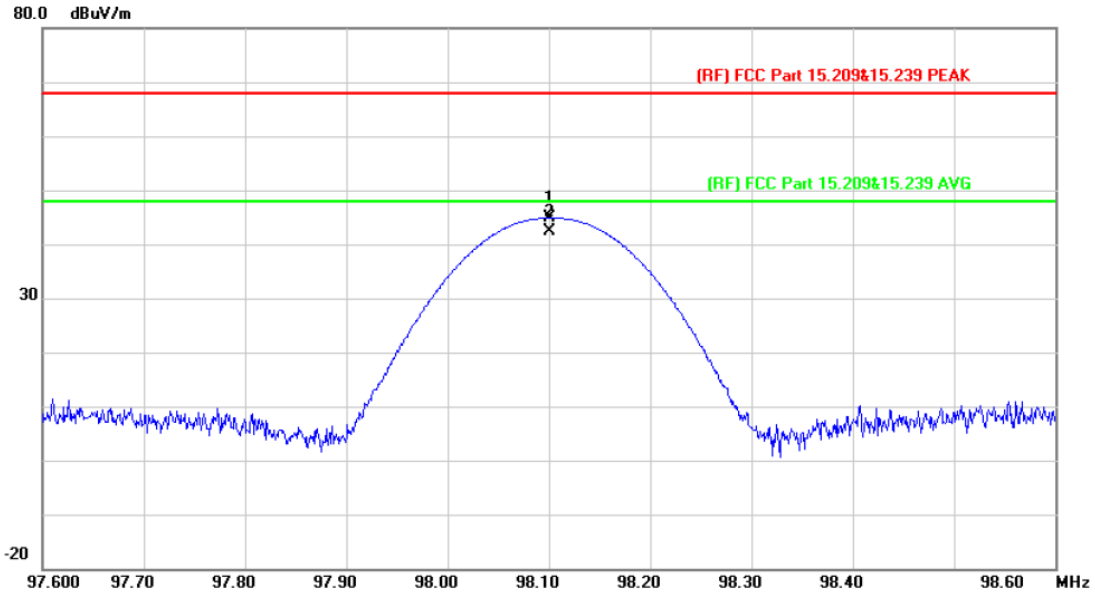
EUT:	FM Transmitter	Model Name :	FM23
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Vertical		
Test Mode:	88.1MHz		
Remark:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		88.0000	48.58	-22.81	25.77	40.00	-14.23	peak
2		88.0990	59.57	-22.81	36.76	67.96	-31.20	peak
3	*	88.0990	56.93	-22.81	34.12	47.96	-13.84	AVG

Emission Level= Read Level+ Correct Factor

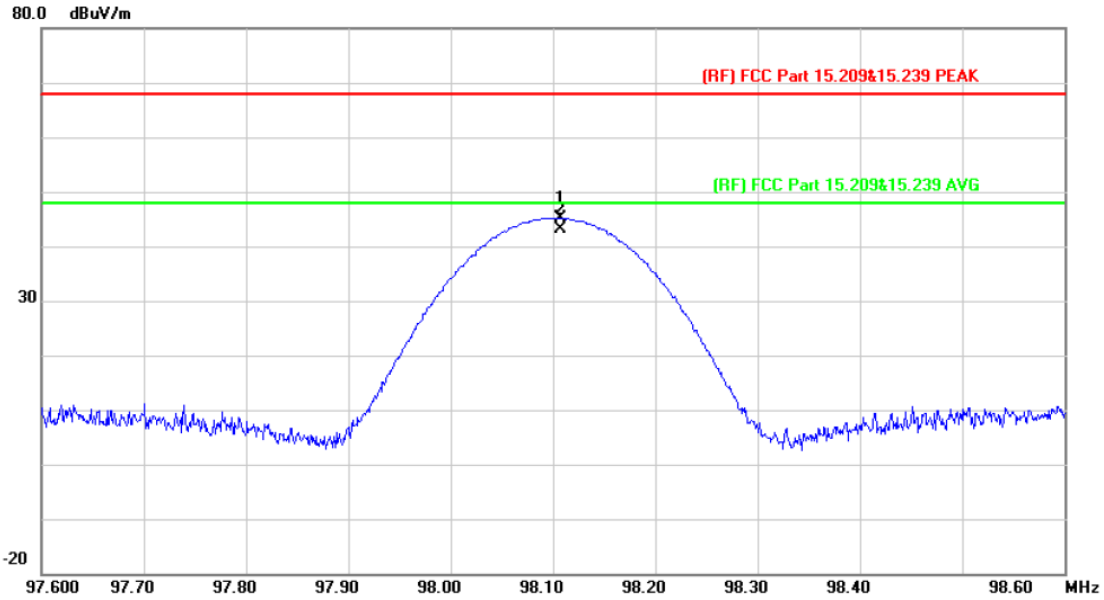
EUT:	FM Transmitter	Model Name :	FM23
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Horizontal		
Test Mode:	98.1MHz		
Remark:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		98.1000	66.79	-21.99	44.80	67.96	-23.16	peak
2	*	98.1000	64.41	-21.99	42.42	47.96	-5.54	AVG

Emission Level= Read Level+ Correct Factor

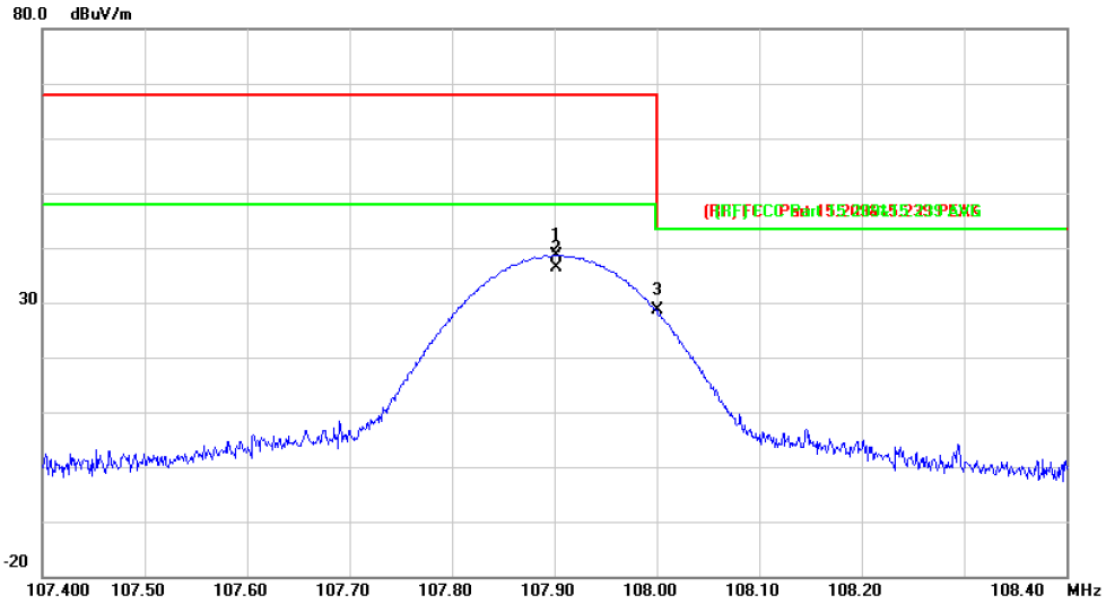
EUT:	FM Transmitter	Model Name :	FM23
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Vertical		
Test Mode:	98.1MHz		
Remark:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		98.1070	67.09	-21.99	45.10	67.96	-22.86	peak
2	*	98.1070	65.01	-21.99	43.02	47.96	-4.94	AVG

Emission Level= Read Level+ Correct Factor

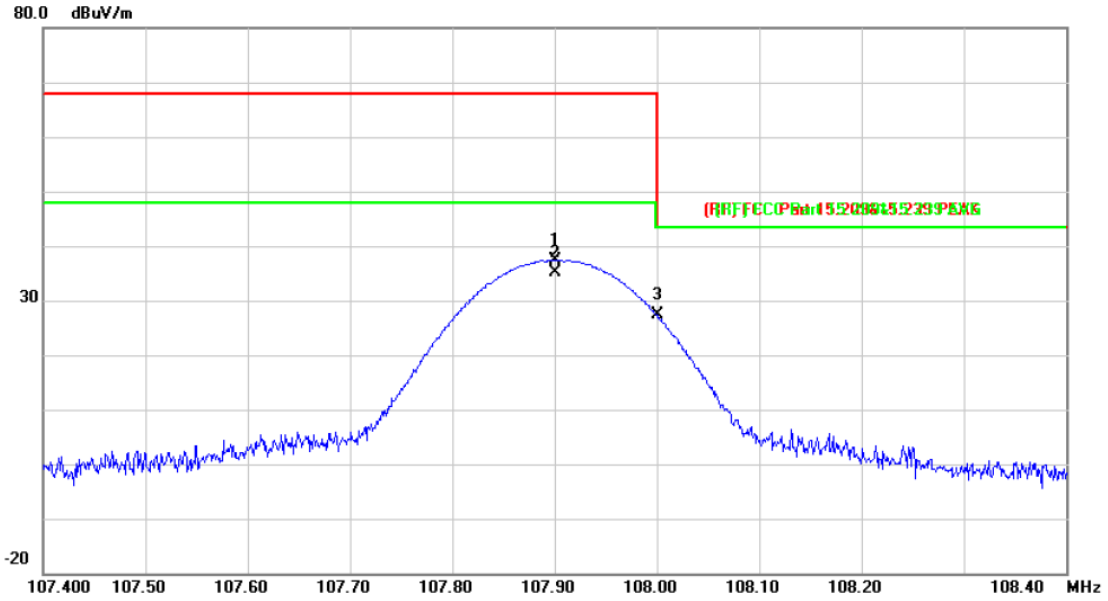
EUT:	FM Transmitter	Model Name :	FM23
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Horizontal		
Test Mode:	107.9MHz		
Remark:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		107.9020	60.40	-21.86	38.54	67.96	-29.42	peak
2	*	107.9020	58.31	-21.86	36.45	47.96	-11.51	AVG
3		108.0000	50.41	-21.85	28.56	43.50	-14.94	peak

Emission Level= Read Level+ Correct Factor

EUT:	FM Transmitter	Model Name :	FM23
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Vertical		
Test Mode:	107.9MHz		
Remark:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		107.9010	59.27	-21.86	37.41	67.96	-30.55	peak
2	*	107.9010	56.98	-21.86	35.12	47.96	-12.84	AVG
3		108.0000	49.12	-21.85	27.27	43.50	-16.23	peak

Emission Level= Read Level+ Correct Factor

7. Bandwidth

7.1 Test Standard and Limit

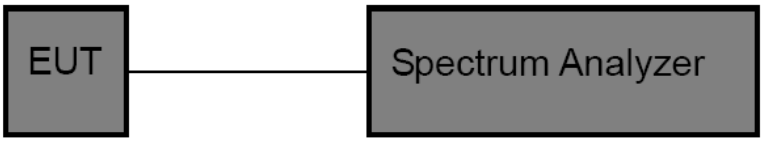
7.1.1 Test Standard

FCC Part 15.239

7.1.2 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.

7.2 Test Setup



7.3 Test Procedure

(1) Set Spectrum Analyzer Center Frequency= Fundamental Frequency, RBW=10 kHz, VBW= 30 kHz, Span= 1 MHz.
(2) Measured the spectrum width with power higher than 20 dB below carrier.

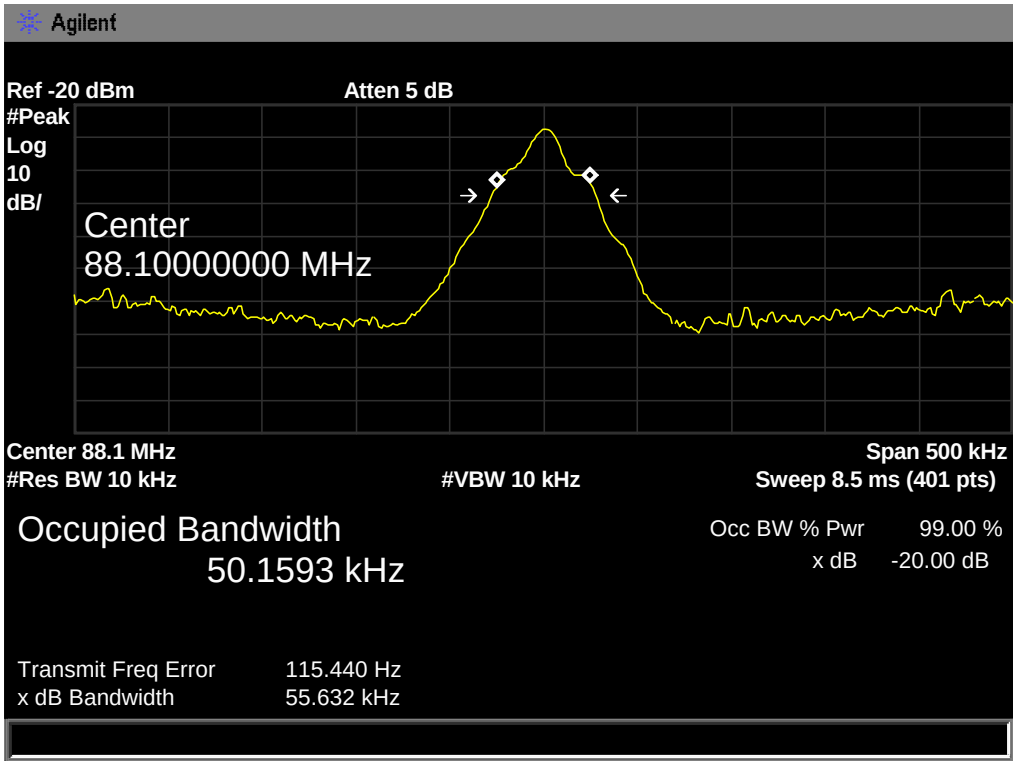
7.4 EUT Operating Condition

The Equipment Under Test was Programmed to be in continuously transmitting mode.

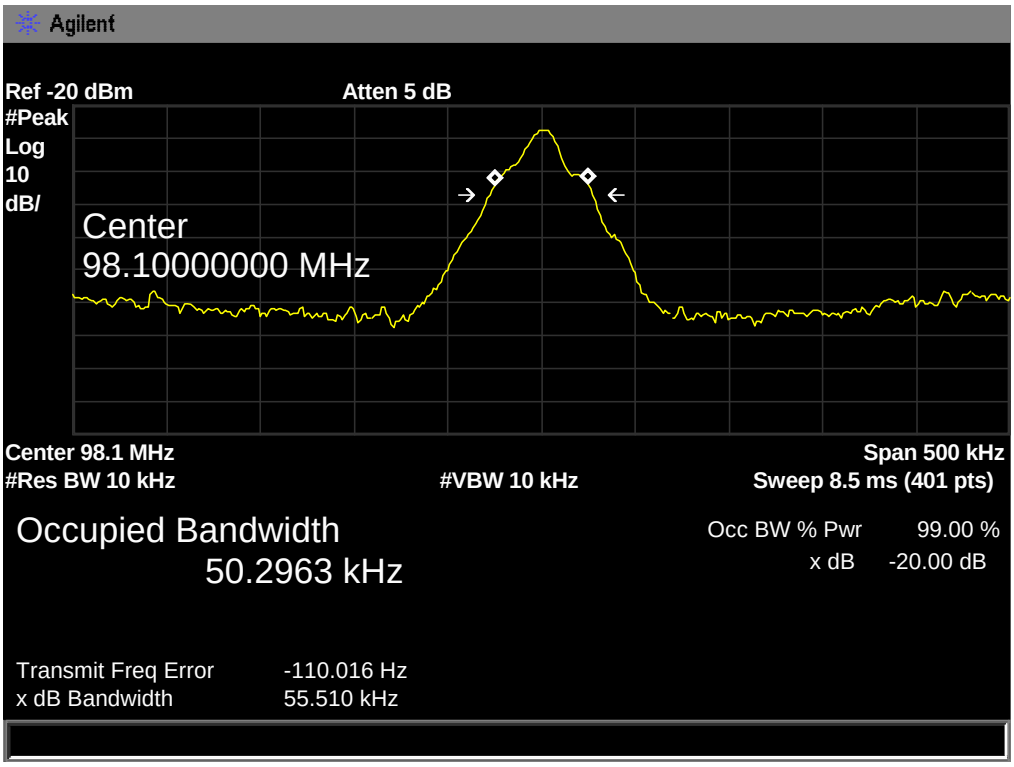
7.5 Test Data

Frequency (MHz)	20 dB Bandwidth (kHz)	Limits (kHz)	Result
88.1	55.632	200	PASS
98.1	55.510		PASS
107.9	54.562		PASS

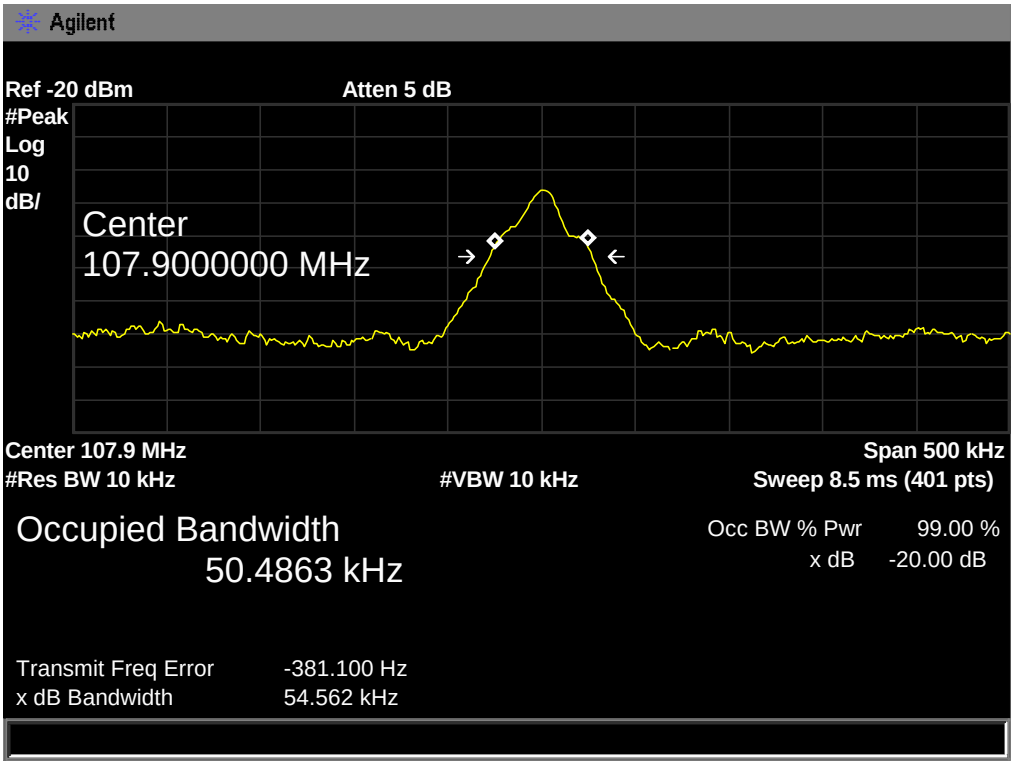
88.1 MHz



98.1 MHz



107.9 MHz



8. Antenna Requirement

8.1 Standard Requirement

8.1.1 Standard

FCC Part 15.203

8.1.2 Requirement

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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

8.2 Antenna Connected Construction

The directional gains of the antenna used for transmitting is 0 dBi, and the antenna connector is de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

8.3 Result

The EUT antenna is an Integral Antenna. It complies with the standard requirement.

Antenna Type
☑ Permanent attached antenna
☐ Unique connector antenna
☐ Professional installation antenna