EMC TEST Report

FCC ID: SE506HAC2115

This report concerns (check one) : ■ **Original Grant** □ **Class II Change**

Issued Date : Jun. 09, 2006
Report No. : 0605048
Equipment : FM transmitter
Model No. : AC-211X(X=0~9)

Applicant : IN WIN DEVELOPMENT INC.
Address : NO. 57, LANE 350, NANSHANG ROAD. GUEISHAN HSIANG, TAOYUAN HSIEN, TAIWAN R.O.C.

Tested by:
Neutron Engineering Inc. EMC Laboratory
Data of Test:
May 11, 2006 ~ Jun. 01, 2006

Testing Engineer : _____ for
(Eddy Cheng)

Technical Manager : _____
(Jeff Yang)

Authorized Signatory : _____
(Andy Chiu)

NEUTRON ENGINEERING INC.

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NVLAP Lab Code: 200145-0 ilac-MRA TAF Testing Laboratory 0659

Declaration

Neutron represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C**., or National Institute of Standards and Technology (**NIST**) of **U.S.A.**

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Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

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1. CERTIFICATION

Equipment : FM transmitter
Trade Name : digidock
Model No. : AC-211X(X=0~9)
Applicant : IN WIN DEVELOPMENT INC.
Data of Test : May 11, 2006 ~ Jun. 01, 2006
Test Item : ENGINEERING SAMPLE
Standards : FCC Part15, Subpart C / RSS-210: 2004/ ANCI C63.4 : 2003

The above equipment has been tested and found compliance with the requirement of the relative standards by Neutron Engineering Inc. EMC Laboratory.
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. NEI-FCCP-1-0605048) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of NVLAP and CNLA according to the ISO-17025 quality assessment standard and technical standard(s).

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards: (Antenna to EUT distance is **3** m)

FCC Part15, Subpart C		
Standard	Test Item	Judgment
15.207	Conducted Emission	N/A **Note(2)**
15.209 15.239(c)	Radiated Emission	PASS
15.239(a)	Occupied Bandwidth	PASS
15.239(b)	Radiated Output Power	PASS

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

(2)The EUT's power source from battery.

2.1 TEST FACILITY

The test facilities used to collect the test data in this report is **OS02** at the location of No.132-1, Lane 329, Sec. 2, Palain Road, Shijr City, Taipei, Taiwan.

2.2 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** %。

A. Conducted Measurement :

Test Site	Method	Measurement Frequency Range	U，(dB)	NOTE
C01	ANSI	150 KHz ~ 30MHz	1.94	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U，(dB)	NOTE
OS-01	ANSI	30MHz ~ 200MHz	V	3.82	
		30MHz ~ 200MHz	H	3.60	
		200MHz ~ 1,000MHz	V	3.86	
		200MHz ~ 1,000MHz	H	3.94	
OS-02	ANSI	30MHz ~ 200MHz	V	2.48	
		30MHz ~ 200MHz	H	2.16	
		200MHz ~ 1,000MHz	V	2.50	
		200MHz ~ 1,000MHz	H	2.66	

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	FM transmitter
Trade Name	digidock
Model No.	AC-211X(X=0~9)
OEM Brand/Model No.	N/A
Model Difference	Model AC-211X, X may be 0 to 9. Model difference between each other only the changes in which not effective the EMI performance.
Product Description	The EUT is a FM transmitter. Key features: ＊ All-in-one FM Transmitter / Charger. ＊ Compatible with any audio device. ＊ Charge USB-Powered device. ＊ High Fidelity, full stereo sound. ＊ Safety fuse protects against power spikes. ＊ 6 channels selection for better audio quality. ＊ LED indicator for power status. ＊ No batteries needed. Specifications: ＊ FM Channel: 6 channels (88.5/ 88.7/ 88.9/ 107.5/ 107.7/ 107.9 MHz) ＊ Operation temp: 0℃~60℃ ＊ Storage temp: -10℃~70℃ ＊ Power input: DC+12V (car cigar lighter socket) ＊ USB output: +5V / 700mA (MAX) ＊ Dimension: 40*147*26mm ＊ Net Weight: 70g
Power Supply	Input: DC+12V (car cigar lighter socket) USB output: +5V / 700mA (MAX)
Connecting I/O Port(s)	Please refer to the User's Manual
Products Covered	N/A

Note:

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

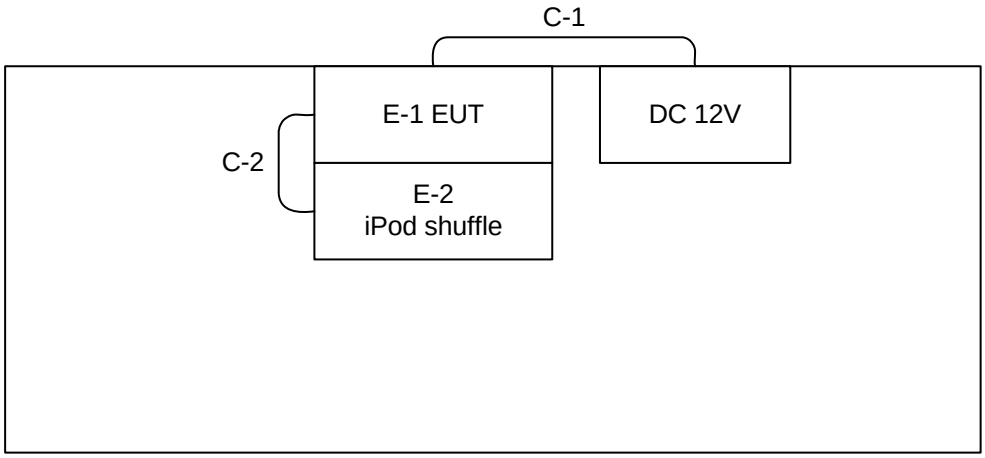
3.2 DESCRIPTION OF TEST MODES

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 above was evaluated respectively.

Pretest Test Mode	Description
Mode 1	88.5MHz (Lowest CH))
Mode 2	107.9MHz(Highest CH)

For Harmonics / Flicks Test	
Final Test Mode	Description
Mode 1	88.5MHz (Lowest CH))
Mode 2	107.9MHz(Highest CH)

3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



C-1 Power Cable
C-2 Audio Cable

3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
E-1	FM transmitter	digidock	AC-211X(X=0~9)	SE506HAC2115	N/A	EUT
E-2	iPod shuffle	Apple	A 1112	DOC	5H510V30RS9	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	1M	
C-2	NO	NO	0.5M	

Note:

(1) The support equipment was authorized by Declaration of Confirmation.
(2) For detachable type I/O cable should be specified the length in cm in『Length』column.

4. EMC EMISSION TEST

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 RADIATED EMISSION LIMITS

FCC Part 15.209				
Frequency (MHz)	Field Strength Limitation		Field Strength Limitation at 3m Measurement Dist	
	(uV/m)	Dist	(uV/m)	(dBuV/m)
0.009 – 0.490	2400 / F(KHz)	300m	10000 * 2400/F(KHz)	20log 2400/F(KHz) + 80
0.490 – 1.705	24000 / F(KHz)	30m	100 * 24000/F(KHz)	20log 24000/F(KHz) + 40
1.705 – 30.00	30	30m	100* 30	20log 30 + 40
30.0 – 88.0	100	3m	100	20log 100
88.0 – 216.0	150	3m	150	20log 150
216.0 – 960.0	200	3m	200	20log 200
Above 960.0	500	3m	500	20log 500

Notes:

(1) The tighter limit shall apply at the boundary between two frequency range.

(2) Limitation expressed in dBuV/m is calculated by 20log Emission Level (uV/m).

(3) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula of $L_{d1} = L_{d2} * (d_2/d_1)^2$.
Example:
F.S Limit at 30m distance is 30uV/m , then F.S Limitation at 3m distance is adjusted as $L_{d1} = L_1 = 30uV/m * (10)^2 = 100 * 30$ uV/m

FCC Part 15.239				
Frequency (MHz)	Field Strength Limitation		Field Strength Limitation at 3m Measurement Dist	
	(uV/m)	Dist	(dBuV/m)	(dBuV/m)
88.0 – 108.0	250	3m	20log 250	48

4.1.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Log-Bicon Antenna	MESS-ELEKTRONIK	VULB 9160	3058	Nov. 29, 2006
2	Test Cable	N/A	10M_OS02	N/A	Nov. 29, 2006
3	Test Cable	N/A	OS02-1/-2/-3	N/A	Nov. 29, 2006
4	Pre-Amplifier	Anritsu	MH648A	M09961	Nov. 29, 2006
5	EMI Test Receiver	R&S	ESCI	100082	Feb. 01, 2007
6	Antenna Mast	Chance Most	CMTB-1.5	N/A	N/A
7	Turn Table	Chance Most	CMTB-1.5	N/A	N/A

Remark: ” N/A” denotes No Model No. / Serial No. and No Calibration specified.

4.1.3 TEST PROCEDURE

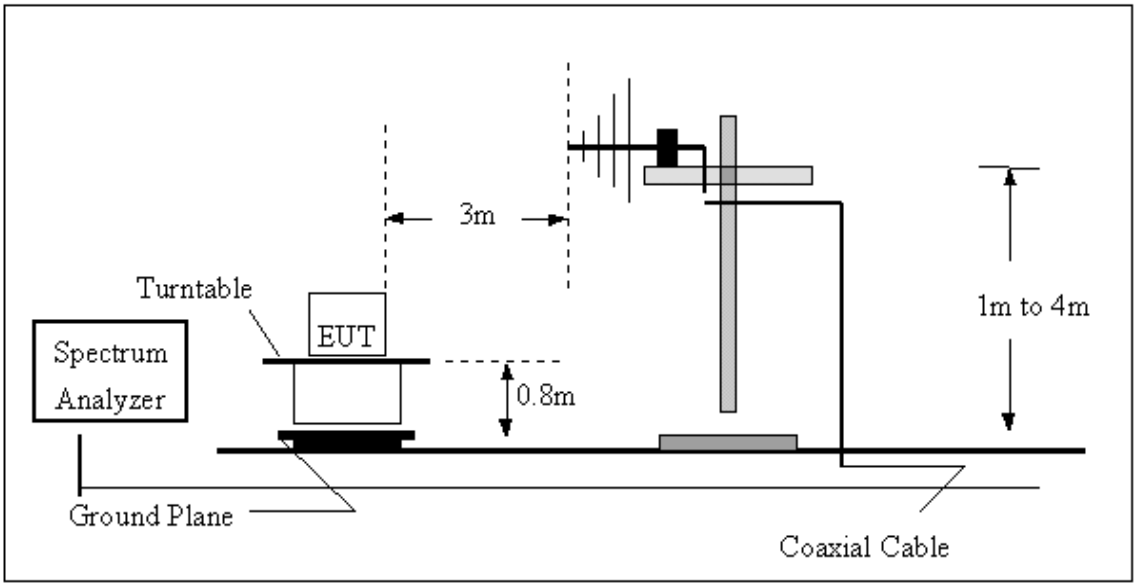
a. The measuring distance of at 10 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m or 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. 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.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.4 DEVIATION FROM TEST STANDARD

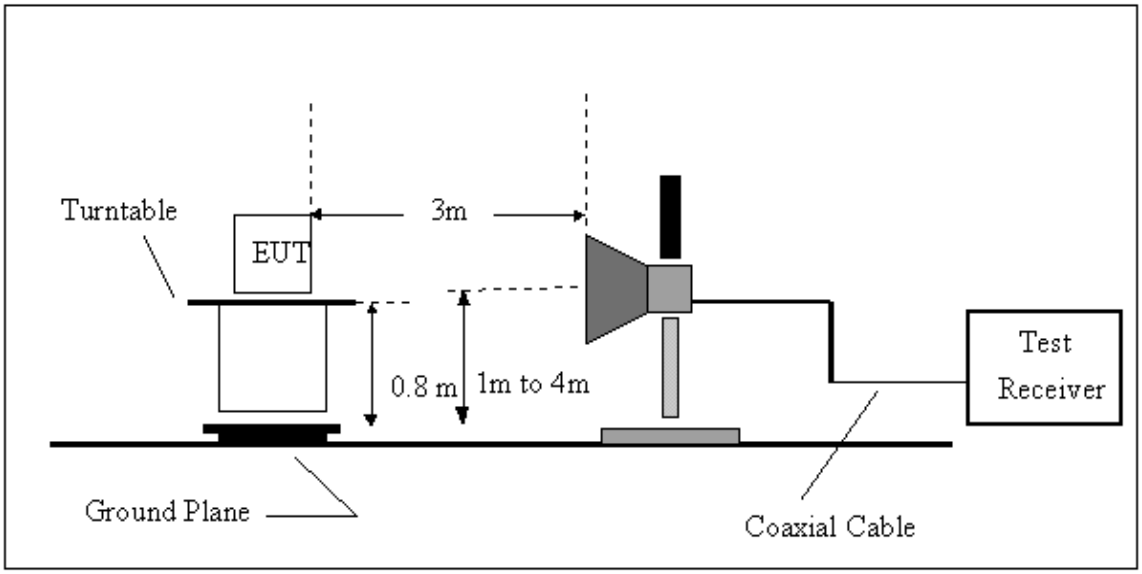
No deviation

4.1.5 TEST SETUP

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



4.1.6 **EUT OPERATING CONDITIONS**

The EUT tested system was configured as the statements of **4.1.6** Unless otherwise a special operating condition is specified in the follows during the testing.

4.1.7 **TEST RESULTS** (30 – 1000 MHz)

EUT：	FM transmitter	Model No. ：	AC-211X(X=0~9)
Temperature：	26 ℃	Relative Humidity：	79 %
Pressure：	1011 hPa	Test Power ：	AC 230V/50Hz
Test Mode ：	88.5 MHz		

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limits 3m (dBuV/m)	Margin (dB)	Note
88.51	**V**	**Peak**	**51.64**	**-10.02**	**41.62**	**48.00**	**- 6.38**	
177.01	V	Peak	32.19	-5.79	26.40	43.50	- 17.10	
265.54	V	Peak	34.81	-5.27	29.54	46.00	- 16.46	
354.00	V	Peak	36.65	-2.81	33.84	46.00	- 12.16	
442.51	V	Peak	36.16	-0.36	35.80	46.00	- 10.20	
531.07	V	Peak	35.06	1.04	36.10	46.00	- 9.90	

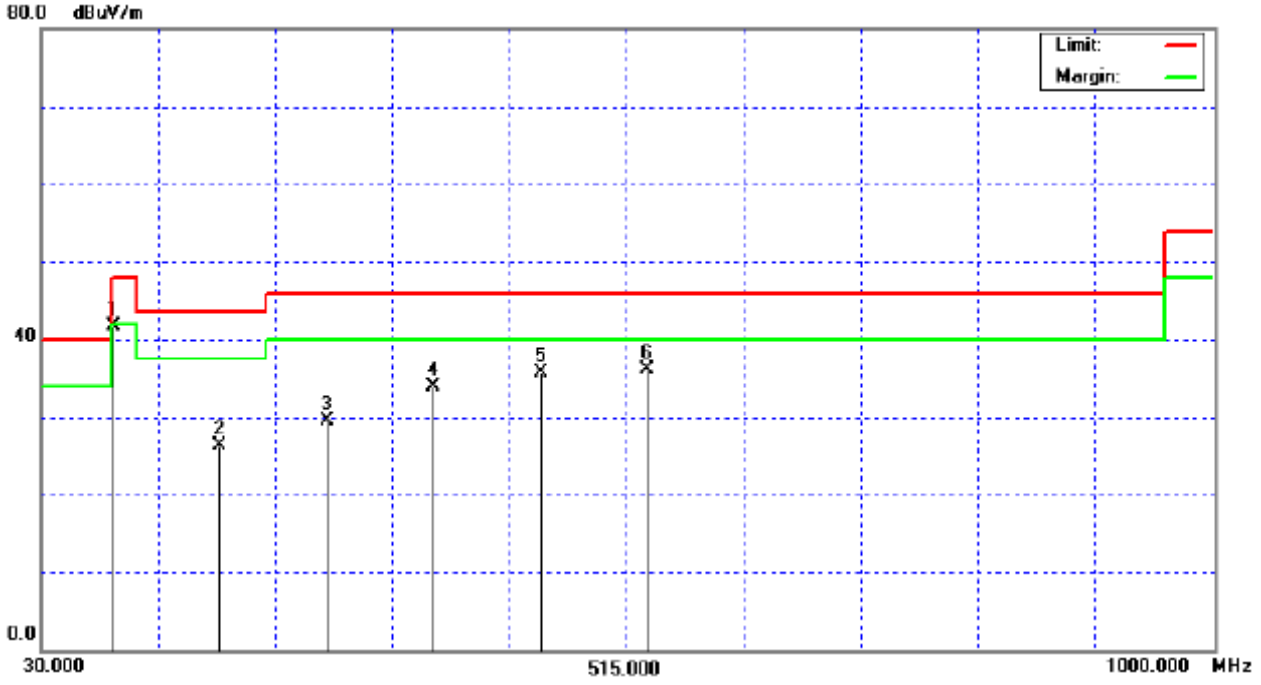
Remark：

(1) Spectrum Setting:
9 KHz – 150 KHz, RBW= 1 KHz, VBW=1 KHz, Sweep time = 200 ms.
150 K Hz – 30 MHz, RBW= 9 KHz, VBW=9 KHz, Sweep time = 200 ms.
30 MHz – 1000 MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.

(2) All readings are Peak unless otherwise stated QP in column of 『Note』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measure-ment didn't perform。

(3) The EUT was examined in 3 orthogonal planes and the worst case plane is as shown in the test photo.

(4) If the peak scan value lower limit more than 20dB, then this signal data does not how in table。



EUT：	FM transmitter	Model No. ：	AC-211X(X=0~9)
Temperature：	26 ℃	Relative Humidity：	79 %
Pressure：	1011 hPa	Test Power ：	AC 230V/50Hz
Test Mode ：	88.5 MHz		

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limits 3m (dBuV/m)	Margin (dB)	Note
88.50	**H**	**Peak**	**52.22**	**-10.02**	**42.20**	**48.00**	**- 5.80**	
177.01	H	Peak	31.81	-5.79	26.02	43.50	- 17.48	
265.45	H	Peak	35.06	-5.28	29.78	46.00	- 16.22	
353.96	H	Peak	33.62	-2.81	30.81	46.00	- 15.19	
442.51	H	Peak	29.07	-0.36	28.71	46.00	- 17.29	
531.07	H	Peak	36.80	1.04	37.84	46.00	- 8.16	

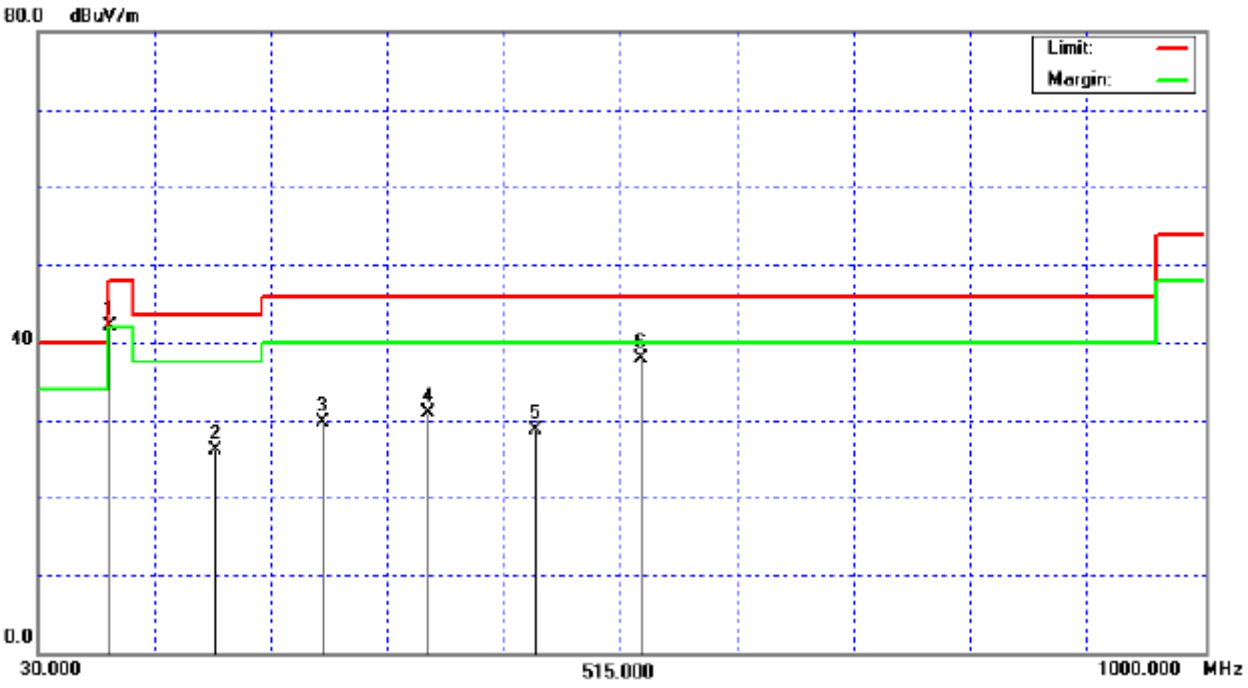
Remark：

(1) Spectrum Setting:
9 KHz – 150 KHz, RBW= 1 KHz, VBW=1 KHz, Sweep time = 200 ms.
150 K Hz – 30 MHz, RBW= 9 KHz, VBW=9 KHz, Sweep time = 200 ms.
30 MHz – 1000 MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.

(2) All readings are Peak unless otherwise stated QP in column of 『Note』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measure-ment didn't perform。

(3) The EUT was examined in 3 orthogonal planes and the worst case plane is as shown in the test photo.

(4) If the peak scan value lower limit more than 20dB, then this signal data does not how in table。



EUT：	FM transmitter	Model No. ：	AC-211X(X=0~9)
Temperature：	26 ℃	Relative Humidity：	79 %
Pressure：	1011 hPa	Test Power ：	AC 230V/50Hz
Test Mode ：	107.9 MHz		

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limits 3m (dBuV/m)	Margin (dB)	Note
107.91	**V**	**Peak**	**48.74**	**-7.67**	**41.07**	**48.00**	**- 6.93**	
215.72	V	Peak	31.11	-6.80	24.31	43.50	- 19.19	
323.63	V	Peak	35.85	-3.51	32.34	46.00	- 13.66	
431.50	V	Peak	36.78	-0.72	36.06	46.00	- 9.94	
647.35	V	Peak	37.40	3.47	40.87	46.00	- 5.13	
755.20	V	Peak	27.87	5.68	33.55	46.00	- 12.45	

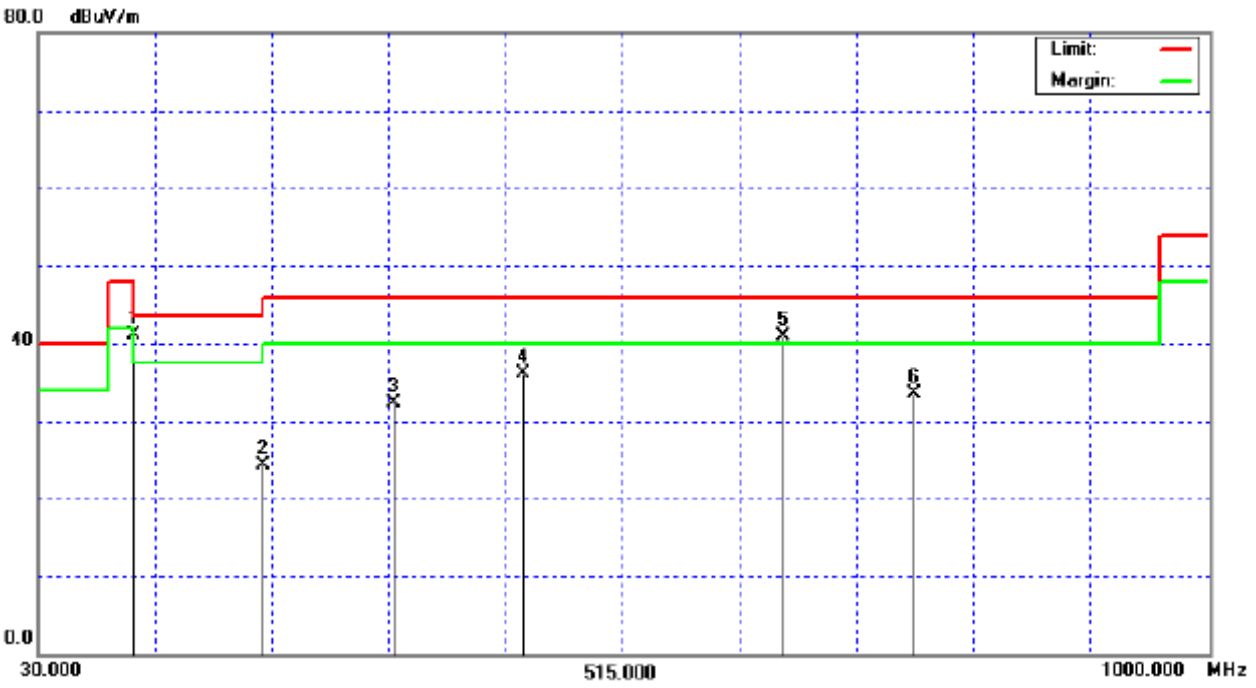
Remark：

(1) Spectrum Setting:
9 KHz – 150 KHz, RBW= 1 KHz, VBW=1 KHz, Sweep time = 200 ms.
150 K Hz – 30 MHz, RBW= 9 KHz, VBW=9 KHz, Sweep time = 200 ms.
30 MHz – 1000 MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.

(2) All readings are Peak unless otherwise stated QP in column of『Note』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measure-ment didn't perform。

(3) The EUT was examined in 3 orthogonal planes and the worst case plane is as shown in the test photo.

(4) If the peak scan value lower limit more than 20dB, then this signal data does not how in table。



EUT：	FM transmitter	Model No. ：	AC-211X(X=0~9)
Temperature：	26 ℃	Relative Humidity：	79 %
Pressure：	1011 hPa	Test Power ：	AC 230V/50Hz
Test Mode ：	107.9 MHz		

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limits 3m (dBuV/m)	Margin (dB)	Note
107.90	**H**	**Peak**	**50.45**	**-7.67**	**42.78**	**48.00**	**- 5.22**	
215.71	H	Peak	32.53	-6.80	25.73	43.50	- 17.77	
323.61	H	Peak	39.65	-3.51	36.14	46.00	- 9.86	
431.51	H	Peak	36.14	-0.72	35.42	46.00	- 10.58	
647.33	H	Peak	37.10	3.47	40.57	46.00	- 5.43	
971.15	H	Peak	23.56	8.85	32.41	54.00	- 21.59	

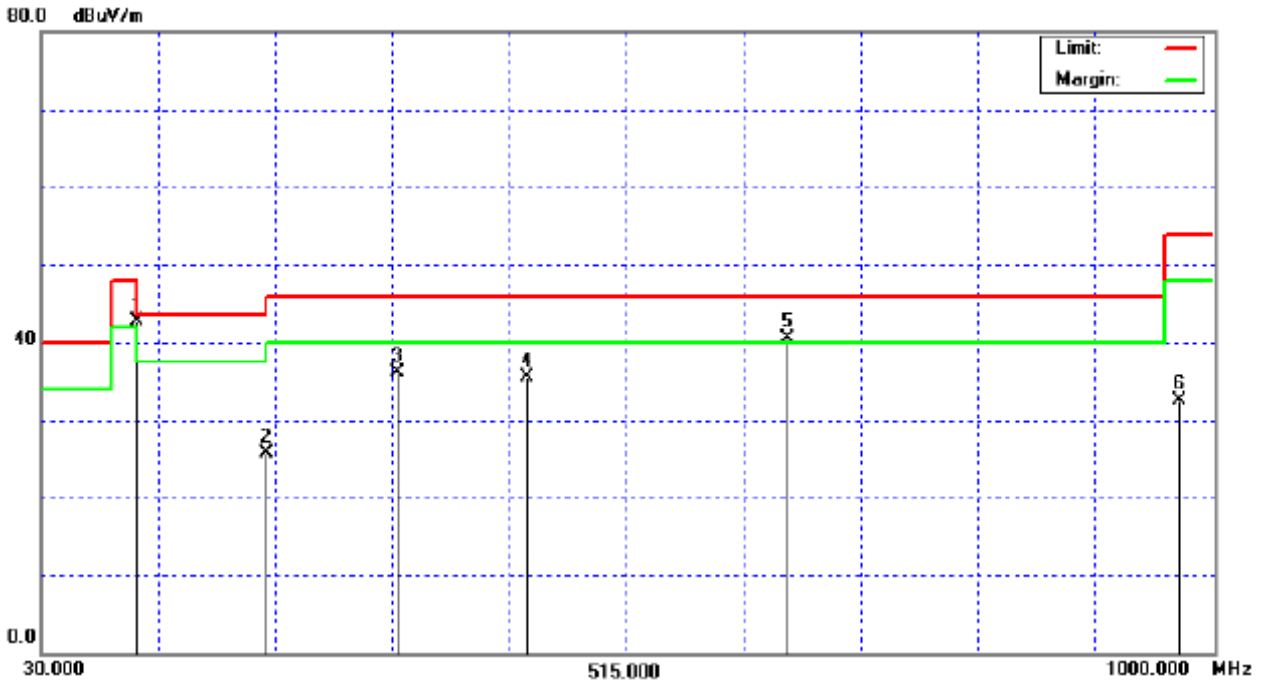
Remark：

(1) Spectrum Setting:
9 KHz – 150 KHz, RBW= 1 KHz, VBW=1 KHz, Sweep time = 200 ms.
150 K Hz – 30 MHz, RBW= 9 KHz, VBW=9 KHz, Sweep time = 200 ms.
30 MHz – 1000 MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.

(2) All readings are Peak unless otherwise stated QP in column of『Note』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measure-ment didn‘t perform。

(3) The EUT was examined in 3 orthogonal planes and the worst case plane is as shown in the test photo.

(4) If the peak scan value lower limit more than 20dB, then this signal data does not how in table。



Occupied Bandwidth

EUT：	FM transmitter	Model No. ：	AC-211X(X=0~9)
Temperature：	26 ℃	Relative Humidity：	79 %
Pressure：	1011 hPa	Test Power ：	AC 230V/50Hz
Test Mode ：	Lowest CH: 88.5MHz & Highest CH:107.9 MHz		

Marker 3	Marker 2 - 4	Marker 1 - 5
Center Frequency	Marker Delta shows bandwidth 26 dB down from the peak measured amplitude.	Marker Delta shows 200 KHz wide from the operating frequency