



# FCC Radio TEST Report

## FCC ID: Y36F2516

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

**Report No. :** ATS-2010NT1219002E  
**Product :** 4 Channel FM Transmitter  
**Model No. :** F2516  
**Applicant :** China Etech Groups Ltd.  
**Address :** 3/f, Block A, Wenle Ind. Zone, Xixiang, Bao'an,  
Shenzhen, Guangdong, China

**Issued by :** Asia Technology Service Limited  
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**Date of Test:**  
Dec.08, 2010 ~ Dec.10, 2010  
**Date of Issue:**  
Dec.10, 2010  
**Test Result :** Pass  
**Standards:** FCC Part 15 subpart C(15.239)

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(Jake Wang)  
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(Ada Li)  
Authorized Signatory :           *Can Liu*            
(Can Liu)

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### 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15, Subpart C (15.239)			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	N/A	Note(1)
15.203	Antenna Requirement	Pass	
15.239	Radiated Spurious Emission	Pass	
15.239	Occupied Bandwidth	Pass	

NOTE:

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



## 1.1 TEST FACILITY

Asia Institute Technology (Dongguan) Limited

Add. : No.6 Binhe Road, Tianxin Village, Huangjiang, Dongguan, Guangdong, China.

FCC Registered No.: 248337

## 1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expanded 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)
C01	ANSI C63.4-2003	150 KHz ~ 30MHz	1.94

### B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U , (dB)
OS-01	ANSI C63.4-2003	30MHz ~ 200MHz	V	2.93
		30MHz ~ 200MHz	H	2.86
		200MHz ~ 1,000MHz	V	3.86
		200MHz ~ 1,000MHz	H	3.94



## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

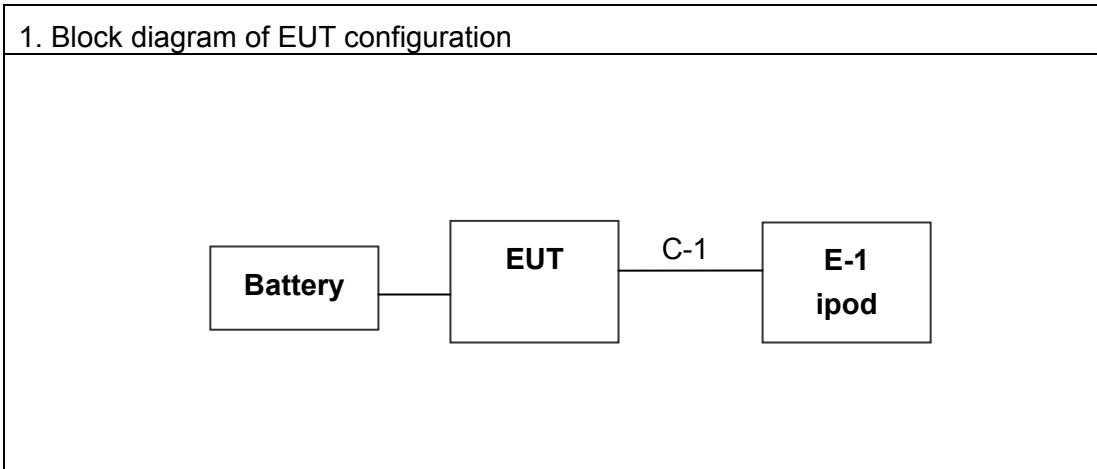
Equipment	4 Channel FM Transmitter	
Brand Name	N/A	
Model Name.	F2516	
OEM Brand/Model Name	N/A	
Model Difference	N/A	
Manufacturer	China Etech Groups Ltd.	
Manufacturer Address	3/f, Block A, Wenle Ind. Zone, Xixiang, Bao'an, Shenzhen, Guangdong, China	
Product Description	The EUT is a 4 Channel FM Transmitter	
	Product Type	Low Power Communication Device Transmitter
	Operation Frequency:	88.1,88.3,88.5,89.3MHz
	Modulation Type:	FM
	Number Of Channel	4CH.
	Antenna Designation:	Printed antenna
	Antenna Gain(Peak)	2.32 dBi
	Output Power:	43.5 dBuV/m (AV Max.)
	Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an Control Device. More details of EUT technical specification, please refer to the User's Manual.	
Channel List	N/A	
Power Source	DC Voltage supplied from Car Battery or 2 AAA batteries	
Power Rating	DC 12V	
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.

2.2 DESCRIPTION OF TEST CONDITIONS

(1) EUT was tested in normal configuration (Please See following Block diagram)



(2) E.U.T. test conditions:

15.31(e) :For intentional radiators, measurements of the variation of the input power or the adiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% ofthe nominal rated supply voltage. For battery operated equipment, theequipment tests shall be performed using a new battery.

(3) Test frequencies:

According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and. if required. reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

(4) Frequency range of radiated measurements:

According to the 15.33,The test range will be upto the tenth harmonic of the highest fundamental frequency, During testing, the Ipod was actively playing music set to its maximum audio volume in order to generate the worst case emissions (e.g. to generate the maximum bandwidth during bandwidth test). No test tones were used for testing. The tuning range of the EUT was manually verified and the conclusion is that it only works at selected channels within 88.1,88.3,88.5,89.3MHz, not below and not above this range.



### 2.3 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	ipod	N/A	A1285	VOC	YM838NYL3QS	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	15cm	

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.



## 2.4 EQUIPMENTS LIST FOR ALL TEST ITEMS

No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Due Date
1	Spectrum Analyzer	ADVANTEST	R3182	150900201	2011.04.16
2	EMI Measuring Receiver	Schaffner	SCR3501	235	2011.04.06
3	Low Noise Pre Amplifier	Tsj	MLA-10K01-B01-27	1205323	2011.09.06
4	Low Noise Pre Amplifier	Tsj	MLA-0120-A02-34	2648A04738	2011.04.07
5	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9160	9160-3206	2011.07.01
6	Broadband Horn Antenna	SCHWARZBECK	BBHA9120D	451	2011.07.14
7	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2011.09.06
8	EMI Test Receiver	R&S	ESCI	100124	2010.12.27
9	LISN	Kyoritsu	KNW-242	8-837-4	2011.04.06
10	LISN	Kyoritsu	KNW-407	8-1789-3	2011.04.06
11	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2011.09.06
12	Loop Antenna	ARA	PLA-1030/B	1029	2011.03.19





### 3. TEST RESULT

#### 3.1 ANTENNA REQUIREMENT

##### 3.1.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 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.

##### 3.1.2 EUT ANTENNA

The EUT antenna is integral Antenna. It comply with the standard requirement.



## 3.2 CONDUCTED EMISSION MEASUREMENT

### 3.2.1 POWER LINE CONDUCTED EMISSION LIMITS (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	73.00	60.00	56.00	46.00	CISPR
5.0 -30.0	73.00	60.00	60.00	50.00	CISPR

0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	73.00	60.00	56.00	46.00	FCC
5.0 -30.0	73.00	60.00	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

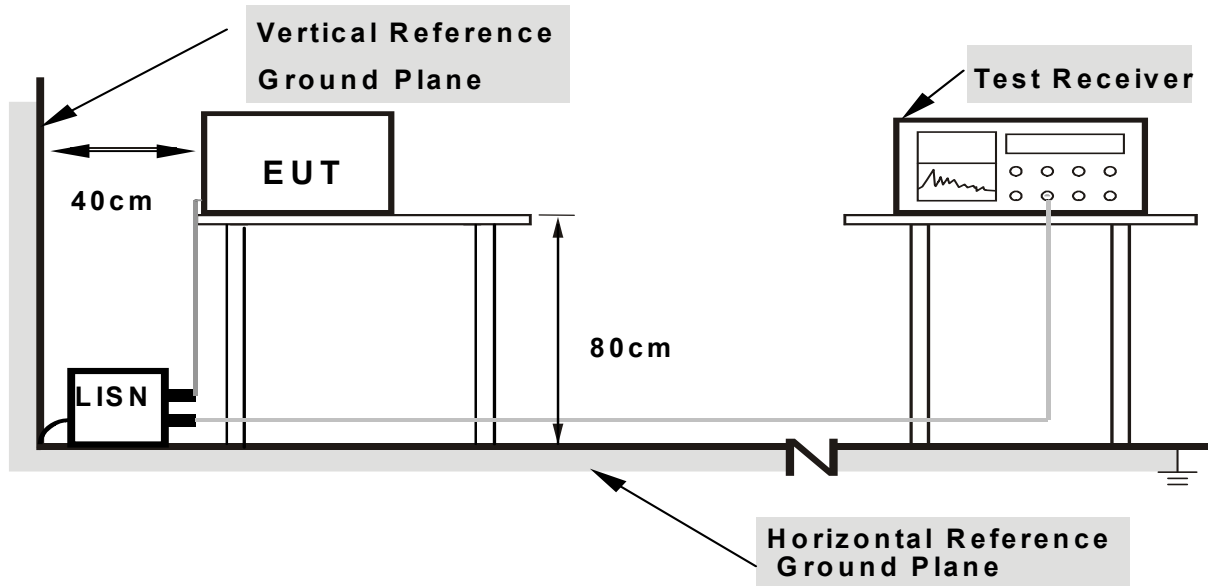
**3.2.2 TEST PROCEDURE**

- a. The EUT was placed 0.4 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.
- b. 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.
- c. 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.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

**3.2.3 DEVIATION FROM TEST STANDARD**

No deviation

**3.2.4 TEST SETUP**



**Note: 1.Support units were connected to second LISN.**

**2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes**



### 3.2.5 TEST RESULTS

EUT :	4 Channel FM Transmitter	Model Name :	F2516
Temperature :	26 °C	Relative Humidity :	53%
Pressure :	1010 hPa	Test Power :	DC 12V
Test Mode :	N/A - denotes test is not applicable in this test report		

#### Remark

- (1) All readings are QP Mode value unless otherwise stated AVG in column of Note. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform. In this case, a " \* " marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150KHz to 30MHz.
- (3) N/A - denotes test is not applicable in this test report



3.3 RADIATED EMISSION MEASUREMENT

3.3.1 RADIATED EMISSION LIMITS ( FCC 15.209 )

Frequencies (MHz)	Field Strength (microrvolts/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

Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission level (dBuV/m)=20log Emission level (uV/m).

LIMITS OF RADIATED EMISSION MEASUREMENT ( FCC 15.239)

Frequency of Emission (MHz)	Field Strength of fundamental (dBµV/m)	
	Peak	Average
88-108	68	48

Notes:

- (1) Fcc part15.239 (b) 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.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1MHz / 1MHz for Peak

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP



### 3.3.2 TEST PROCEDURE

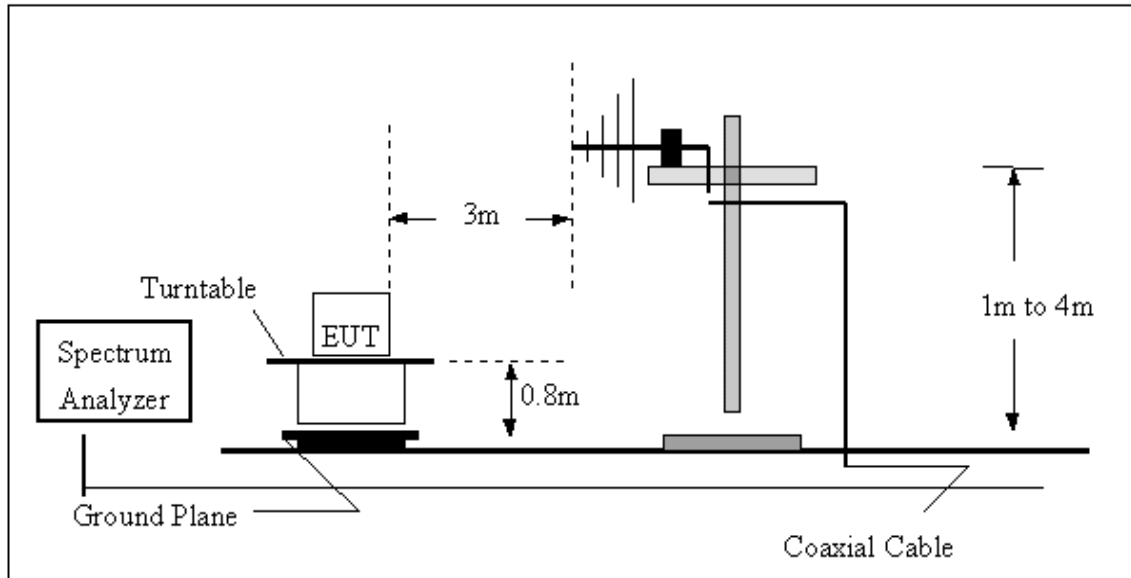
- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m meter open area test site. The table was rotated 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. performed pretest to three orthogonal axis.
- 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.

### 3.3.3 DEVIATION FROM TEST STANDARD

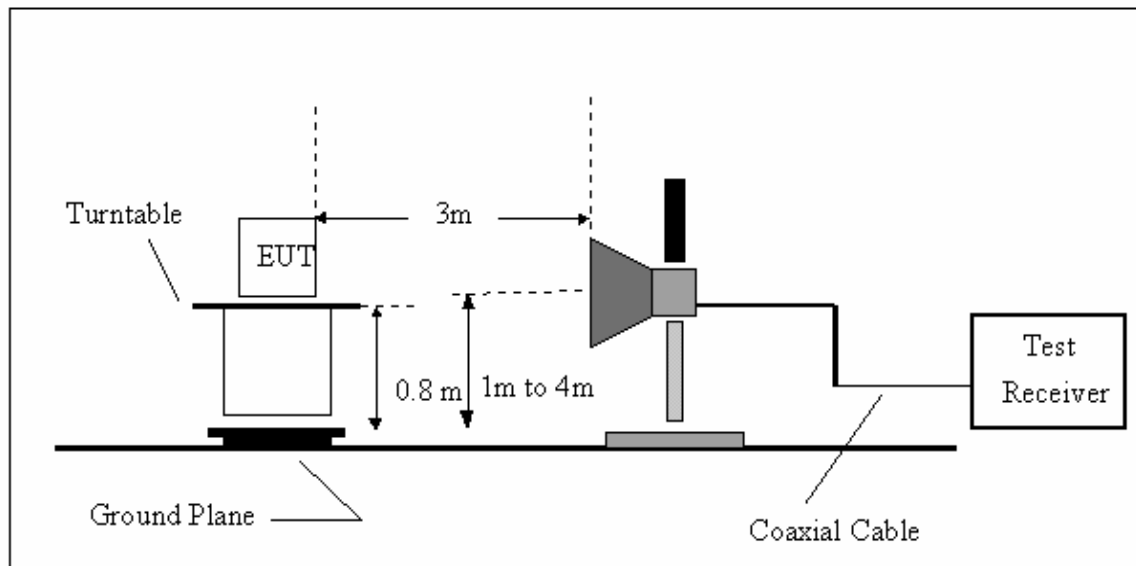
No deviation

### 3.3.4 TEST SETUP

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



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz





## 3.3.5 TEST RESULTS (BETWEEN 9KHz – 1000 MHz)

EUT :	4 Channel FM Transmitter	Model Name :	F2516
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2010-12-8
Test Mode :	88.1MHz	Polarization :	Vertical& Horizontal
Test Power :	DC 12V		

## (a) Antenna polarization: Horizontal

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
88.1000	-17.92	61.42	43.5	-4.5	48	AVERAGE
88.1000	-17.92	80.12	62.2	-5.8	68	PEAK
173.205	-14.4	49.6	35.2	-8.3	43.5	QUASIPeAK
257.4221	-11.68	51.18	39.5	-6.5	46	QUASIPeAK
351.7078	-9.25	50.28	41.03	-4.97	46	QUASIPeAK
440.1963	-7.86	46.67	38.81	-7.19	46	QUASIPeAK
616.3718	-2.28	35.15	32.87	-13.13	46	QUASIPeAK

## (b) Antenna polarization: vertical

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
88.1000	-17.92	60.82	42.9	-5.1	48	AVERAGE
88.1000	-17.92	79.62	61.7	-6.3	68	PEAK
143.8294	-13.01	44.87	31.86	-11.64	43.5	QUASIPeAK
173.8135	-14.42	53.92	39.5	-4	43.5	QUASIPeAK
258.3263	-11.72	50.22	38.5	-7.5	46	QUASIPeAK
351.7078	-9.25	48.03	38.78	-7.22	46	QUASIPeAK
440.1963	-7.86	46.57	38.71	-7.29	46	QUASIPeAK

## Remark :

- (1) '\*' means the worst case  
Measurement Level = Reading Level + Factor  
Ant Factor + Cable Loss-Amp
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Peak detector mode or QP detector mode of the emission .
- (3) Data of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.





EUT :	4 Channel FM Transmitter	Model Name :	F2516
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2010-9-11
Test Mode :	89.3MHz	Polarization :	Vertical& Horizontal
Test Power :	DC 12V		

## (a) Antenna polarization: Horizontal

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
89.300	-17.88	60.08	42.2	-5.8	48	AVERAGE
89.300	-17.88	79.28	61.4	-6.6	68	PEAK
171.9944	-17.88	84.14	66.26	22.76	43.5	QUASIPeAK
266.6089	-14.35	53.15	38.8	-4.7	43.5	QUASIPeAK
362.9844	-11.82	46.12	34.3	-11.7	46	QUASIPeAK
446.4141	-8.79	44.19	35.4	-10.6	46	QUASIPeAK
535.7073	-7.83	43.93	36.1	-9.9	46	QUASIPeAK

## (b) Antenna polarization: vertical

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
89.300	-17.88	61.18	43.3	-4.7	48	AVERAGE
89.300	-17.88	80.08	62.2	-5.8	68	PEAK
178.1324	-17.88	84.31	66.43	-5	43.5	QUASIPeAK
269.4284	-14.31	52.81	38.5	-6.6	46	QUASIPeAK
383.9318	-11.73	51.13	39.4	-18.4	46	QUASIPeAK
446.4141	-8.09	35.69	27.6	-7.98	46	QUASIPeAK
625.0778	-7.83	45.85	38.02	-12.7	46	QUASIPeAK

## Remark :

- (1) '\*' means the worst case  
Measurement Level = Reading Level + Factor  
Ant Factor + Cable Loss-Amp
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Peak detector mode or QP detector mode of the emission .
- (3) Data of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

#### 4. BANDWIDTH TEST

##### 4.1 LIMIT

(a) Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200kHz band shall lie wholly within the frequency range of 88-108 MHz

##### 4.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting : RBW= 10KHz, VBW $\geq$ RBW, Sweep time = Auto.

##### 4.3 DEVIATION FROM STANDARD

No deviation.

##### 4.4 TEST SETUP



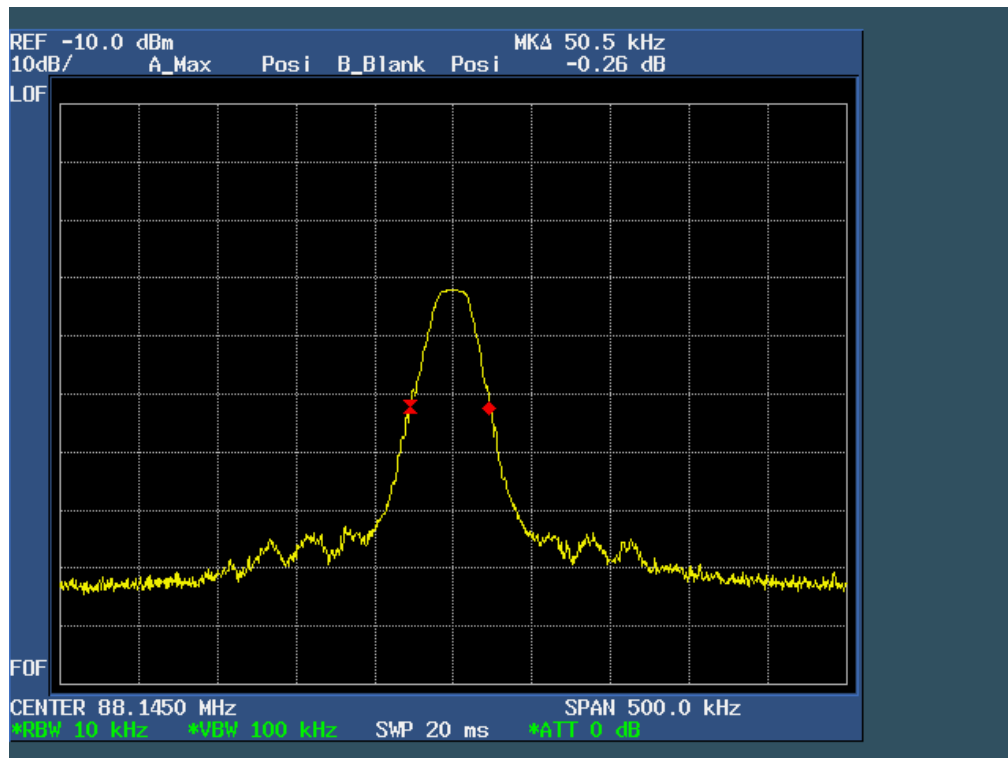


### 4.5 TEST RESULTS

EUT :	4 Channel FM Transmitter	Model Name :	F2516
Temperature :	26 °C	Relative Humidity :	53%
Pressure :	1020 hPa	Test Power :	DC 12V
Test Mode :	TX		

Test Channel	Frequency (MHz)	20 dBc Bandwidth (kHz)	Limit (kHz)
CH01	88.1	50.5	200
CH04	89.3	50.5	200

The Lowest Channel:88.1MHz



### The Highest Channel:89.3MHz

