

# EMC TEST REPORT


**Report No.** : EME-050017  
**Model No.** : AVC-T101  
**Issued Date** : Jan. 17, 2005

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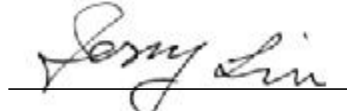
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Project Engineer



Marx Yan

Reviewed By



Jerry Liu

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**Summary of Tests**

**2.4GHz Wireless A/V System -Model: AVC-T101  
FCC ID: PNKAV-101T**

Test	Reference	Results
Power Line Conducted Emission test	15.207	Complies
Radiated Emission test	15.249(c), 15.209	Complies

## 1. General information

### 1.1 Identification of the EUT

Applicant	: ELANSAT TECHNOLOGIES INC.
Product	: 2.4GHz Wireless A/V System
Model No.	: AVC-T101
FCC ID.	: PNKAV-101T
Frequency Range	: 2414MHz to 2468MHz
Channel Number	: 4 channels
Frequency of Each Channel	: 2414MHz, 2432MHz, 2450MHz, 2468MHz
Type of Modulation	: FM
Power Supply	: 120Vac, 60Hz with adpater (YAD-090030C)
Power Cord	: N/A
Sample Received	: Jan. 5, 2005
Test Date(s)	: Jan. 11, 2005 ~ Jan. 12, 2005

### 1.2 Additional information about the EUT

The main function of the transmitting unit is sending the video and audio signals to the receiving unit by 2.4GHz RF signal with FM modulation. The receiving unit will pick up the 2.4GHz RF signal and does the FM demodulation; then put the video and audio signals to TV, or other AV devices.

According to the hardware aspect, we verified the model listed as below is series model to AVC-T101 (EUT), the difference please refer to the following table:

Model Number	Wireless Function
AVC-T101	w
AV-T101	w/o

For more detail features, please refer to User's manual as file name "Installation guide.pdf"

### 1.3 Antenna description

The EUT uses a permanently connected antenna.

Antenna Gain : 0dBi max

Antenna Type : Dipole antenna

Connector Type : N/A

### 1.4 Peripherals equipment

Peripherals	Manufacturer	Product No.	Serial No.	FCC ID
DVD Player	Royal Tek	RDP-702	P13C193100769	FCC DoC Approved
Color Video Monitor	HITACHI	CPM1404	U7C005888	FCC DoC Approved

## **2. Test specifications**

### **2.1 Test standard**

The EUT was performed according to the procedures in FCC Part 15 Subpart C Paragraph 15.249 for non-spread spectrum devices.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band were all meet limit requirement, thus we evaluate the EUT pass the specified test.

### **2.2 Operation mode**

During all of the tests, the EUT was operated in transmitting continuously.

Once the button releasing, the transmission will be stopped within 1 second.

### 2.3 Test equipment

Equipment	Brand	Frequency range	Model No.	Intertek ID No.	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	9kHz~2.75GHz	ESCS 30	EC303	04/13/2005
EMI Test Receiver	Rohde & Schwarz	20Hz~26.5GHz	ESMI	EC317	07/14/2005
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	EC353	07/13/2005
Spectrum Analyzer	Rohde & Schwarz	20Hz~40GHz	FSEK 30	EC365	10/18/2005
Horn Antenna	EMCO	1GHz~18GHz	3115	EC338	08/16/2005
Horn Antenna	SCHWARZBECK	14GHz~40GHz	BBHA 9170	EC351	07/08/2005
Bilog Antenna	SCHWARZBECK	25MHz~1.7GHz	VULB 9160	EC368	05/20/2005
Pre-Amplifier	MITEQ	100MHz~26.5GHz	919981	EC373	4/13/2005
Pre-Amplifier	MITEQ	26GHz~40GHz	828825	EC374	1/28/2005
Controller	HDGmbH	N/A	HD 100	EP317-1	N/A
Antenna Tower	HDGmbH	N/A	MA 240	EP317-2	N/A
Turn Table	HDGmbH	N/A	DS 420S	EP317-3	N/A
LISN	Rohde & Schwarz	9KHz~30MHz	ESH3-Z5	EC344	01/14/2005

Note: The above equipments are within the valid calibration period.

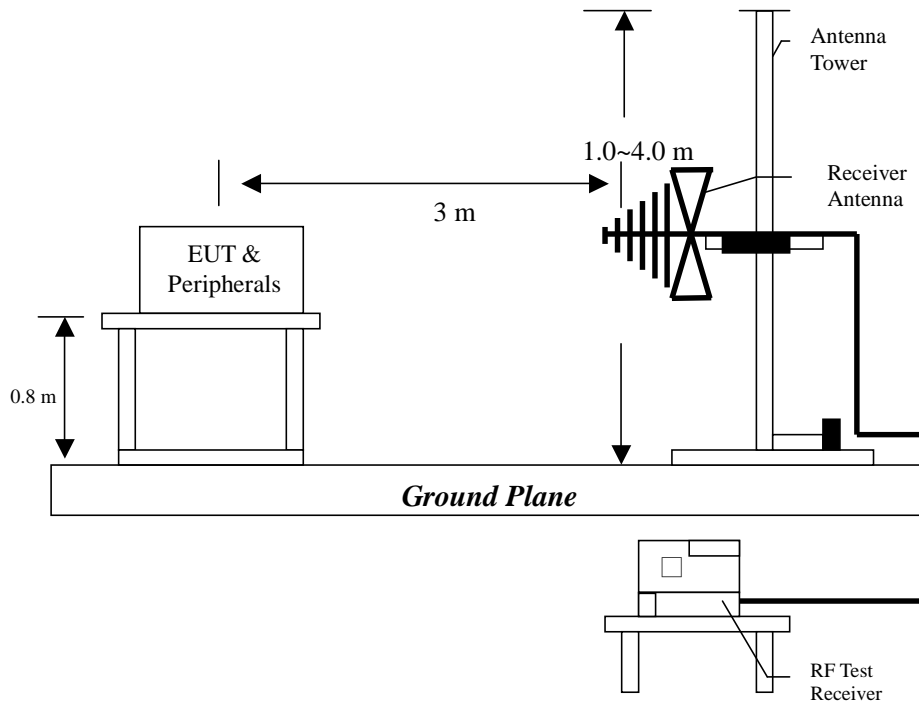
### 3. Radiated emission test FCC 15.249 (C)

#### 3.1 Operating environment

Temperature:	25	°C	(10-40°C)
Relative Humidity:	54	%	(10-90%)
Atmospheric Pressure:	1023	hPa	(860-1060hPa)

#### 3.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



Radiated emissions were investigated cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1MHz RBW/VBW) recorded also on the report. The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.



The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

The EUT configuration please refer to the “Spurious set-up photo.pdf”.

### 3.3 Emission limit

#### 3.3.1 Fundamental and harmonics emission limits

Frequency (MHz)	Field Strength of Fundamental		Field Strength of Harmonics	
	(mV/m@3m)	(dBuV/m@3m)	(uV/m@3m)	(dBuV/m@3m)
2400-2483.5	50	94	500	54

#### 3.3.2 General radiated emission limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

Frequency MHz	15.209 Limits (dB $\mu$ V/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

Uncertainty was calculated in accordance with NAMAS NIS 81.

Expanded uncertainty (k=2) of radiated emission measurement is  $\pm 4.98$  dB.

### 3.4 Radiated spurious emission test data

#### 3.4.1 Measurement results: frequencies equal to or less than 1 GHz

The test was performed on EUT under continuously transmitting mode. Frequency 2414MHz, 2432MHz and 2468MHz were verified. The worst case occurred at Tx 2414MHz.

EUT : AVC-T101  
 Worst Case : Tx at 2414MHz

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
154.200	QP	V	14.76	2.00	16.76	43.50	-26.74	116.36	345.41
282.200	QP	V	14.07	2.00	16.07	46.00	-29.93	127.10	233.16
530.500	QP	V	19.36	2.00	21.36	46.00	-24.64	110.28	17.17
672.100	QP	V	21.36	2.50	23.86	46.00	-22.14	102.34	243.39
784.700	QP	V	23.61	3.80	27.41	46.00	-18.59	141.41	232.23
906.900	QP	V	25.09	3.80	28.89	46.00	-17.11	136.79	94.74
156.100	QP	H	14.76	1.50	16.26	43.50	-27.24	143.17	242.48
315.200	QP	H	14.74	2.30	17.04	46.00	-28.96	133.21	160.09
515.000	QP	H	18.80	2.20	21.00	46.00	-25.00	110.34	355.24
594.500	QP	H	20.86	1.80	22.66	46.00	-23.34	130.42	274.25
740.000	QP	H	23.39	3.00	26.39	46.00	-19.61	136.67	288.03
866.100	QP	H	24.42	4.80	29.22	46.00	-16.78	105.00	33.78

Remark:

1. Corrected Level = Reading Level + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss

**3.4.2 Measurement results: frequency above 1GHz**

**3.4.2.1 Measurement results: Fundamental emission**

EUT : AVC-T101

Test Condition : Tx at 2414MHz

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
2414.000	PK	V	39.55	29.46	103.97	93.88	114.00	-20.12	100.00	183.00
2414.000	AV	V	39.55	29.46	102.99	92.90	94.00	-1.10	100.00	183.00
2414.000	PK	H	39.55	29.46	102.07	91.98	114.00	-22.02	146.00	133.00
2414.000	AV	H	39.55	29.46	101.68	91.59	94.00	-2.41	146.00	133.00

Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss

EUT : AVC-T101

Test Condition : Tx at 2432MHz

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
2434.000	PK	V	39.55	29.46	105.32	95.23	114.00	-18.77	130.00	29.00
2434.000	AV	V	39.55	29.46	103.02	92.93	94.00	-1.07	130.00	29.00
2434.000	PK	H	39.55	29.46	103.65	93.56	114.00	-20.44	171.00	311.00
2434.000	AV	H	39.55	29.46	102.63	92.54	94.00	-1.46	171.00	311.00

Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss

EUT : AVC-T101

Test Condition : Tx at 2468MHz

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
2468.000	PK	V	39.55	29.46	104.63	94.54	114.00	-19.46	168.00	343.00
2468.000	AV	V	39.55	29.46	102.98	92.89	94.00	-1.11	168.00	343.00
2468.000	PK	H	39.55	29.46	101.65	91.56	114.00	-22.44	170.00	138.00
2468.000	AV	H	39.55	29.46	100.54	90.45	94.00	-3.55	170.00	138.00

Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss

**3.4.2.2 Measurement results: Harmonics emission**

EUT : AVC-T101

Test Condition : Tx at 2414MHz

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
7242.000	PK	V	39.25	39.05	51.27	51.07	74.00	-22.93	100.00	132.00
7242.000	AV	V	39.25	39.05	48.65	48.45	54.00	-5.55	100.00	132.00
7242.000	PK	H	39.25	39.05	51.88	51.68	74.00	-22.32	100.00	235.00
7242.000	AV	H	39.25	39.05	49.30	49.10	54.00	-4.90	100.00	235.00

Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is:

For PK:

1GHz-3GHz: 20dBuV

3GHz-14GHz: 27dBuV

14GHz-26.5GHz: 39dBuV

For AV:

1GHz-3GHz: 10dBuV

3GHz-14GHz: 16dBuV

14GHz-26.5GHz: 28dBuV

EUT : AVC-T101  
 Test Condition : Tx at 2432MHz

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
7296.000	PK	V	39.25	39.05	51.53	51.33	74.00	-22.67	107.00	130.00
7296.000	AV	V	39.25	39.05	47.90	47.70	54.00	-6.30	107.00	130.00
7296.000	PK	H	39.25	39.05	52.82	52.62	74.00	-21.38	108.00	235.00
7296.000	AV	H	39.25	39.05	49.62	49.42	54.00	-4.58	108.00	235.00

Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is:

For PK:

- 1GHz-3GHz: 20dBuV
- 3GHz-14GHz: 27dBuV
- 14GHz-26.5GHz: 39dBuV

For AV:

- 1GHz-3GHz: 10dBuV
- 3GHz-14GHz: 16dBuV
- 14GHz-26.5GHz: 28dBuV

EUT : AVC-T101  
 Test Condition : Tx at 2468MHz

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
7404.000	PK	V	39.25	39.05	50.88	50.68	74.00	-23.32	116.00	123.00
7404.000	AV	V	39.25	39.05	47.49	47.29	54.00	-6.71	116.00	123.00
7404.000	PK	H	39.25	39.05	53.08	52.88	74.00	-21.12	100.00	239.00
7404.000	AV	H	39.25	39.05	50.39	50.19	54.00	-3.81	100.00	239.00

Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is:

For PK:

1GHz-3GHz: 20dBuV  
 3GHz-14GHz: 27dBuV  
 14GHz-26.5GHz: 39dBuV

For AV:

1GHz-3GHz: 10dBuV  
 3GHz-14GHz: 16dBuV  
 14GHz-26.5GHz: 28dBuV

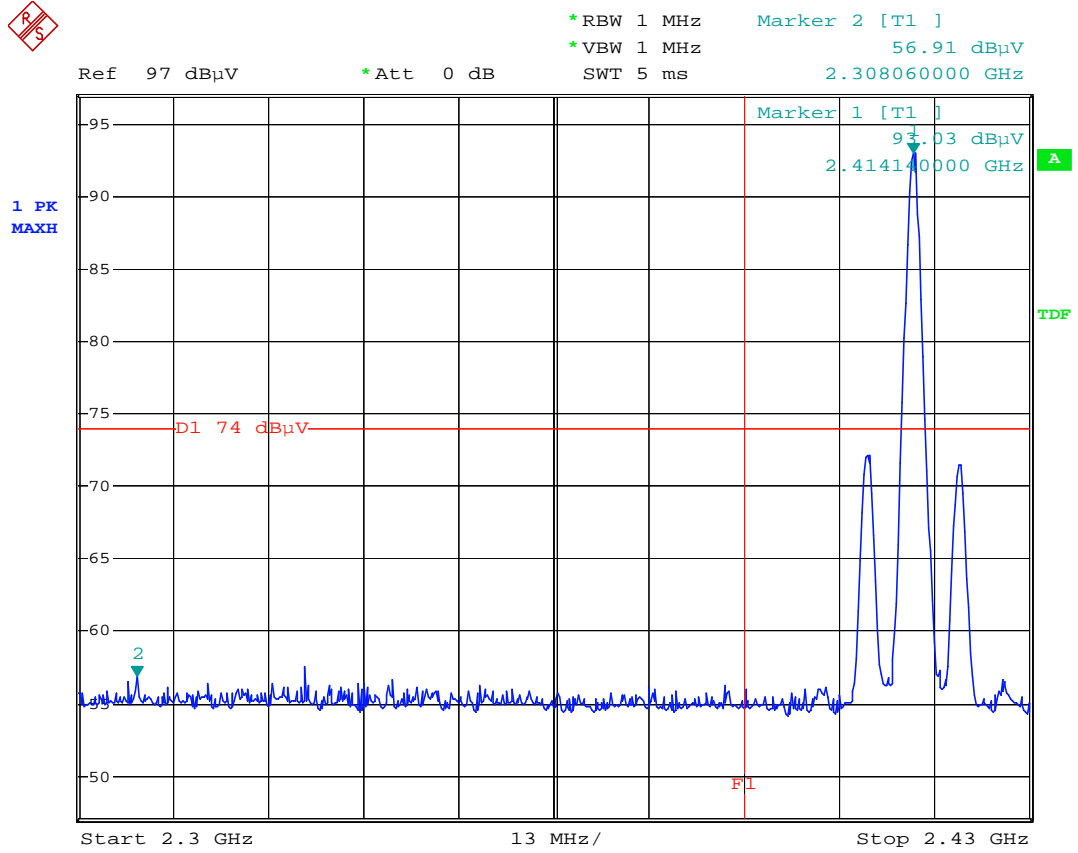


#### **4. Radiated emission on the band edge FCC 15.249(C)**

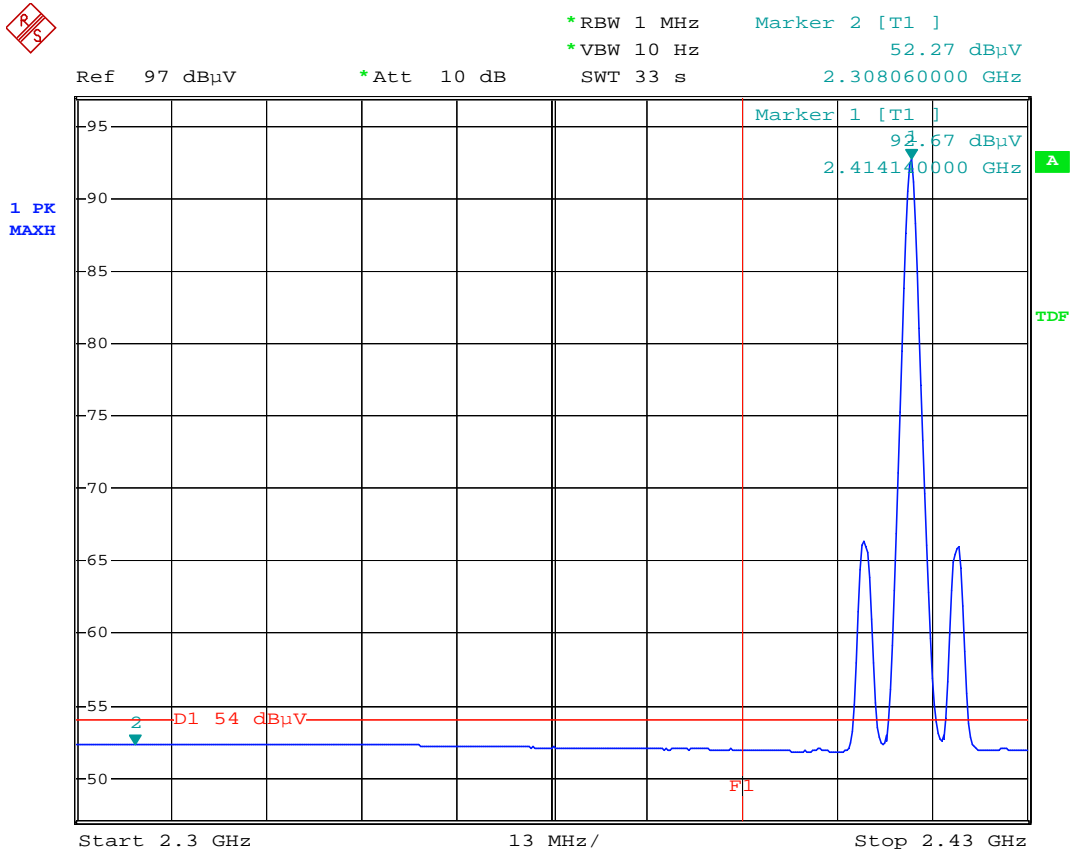
Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental (2414~2468MHz) or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Please see the plot below.

## Test Mode: Tx at 2414MHz

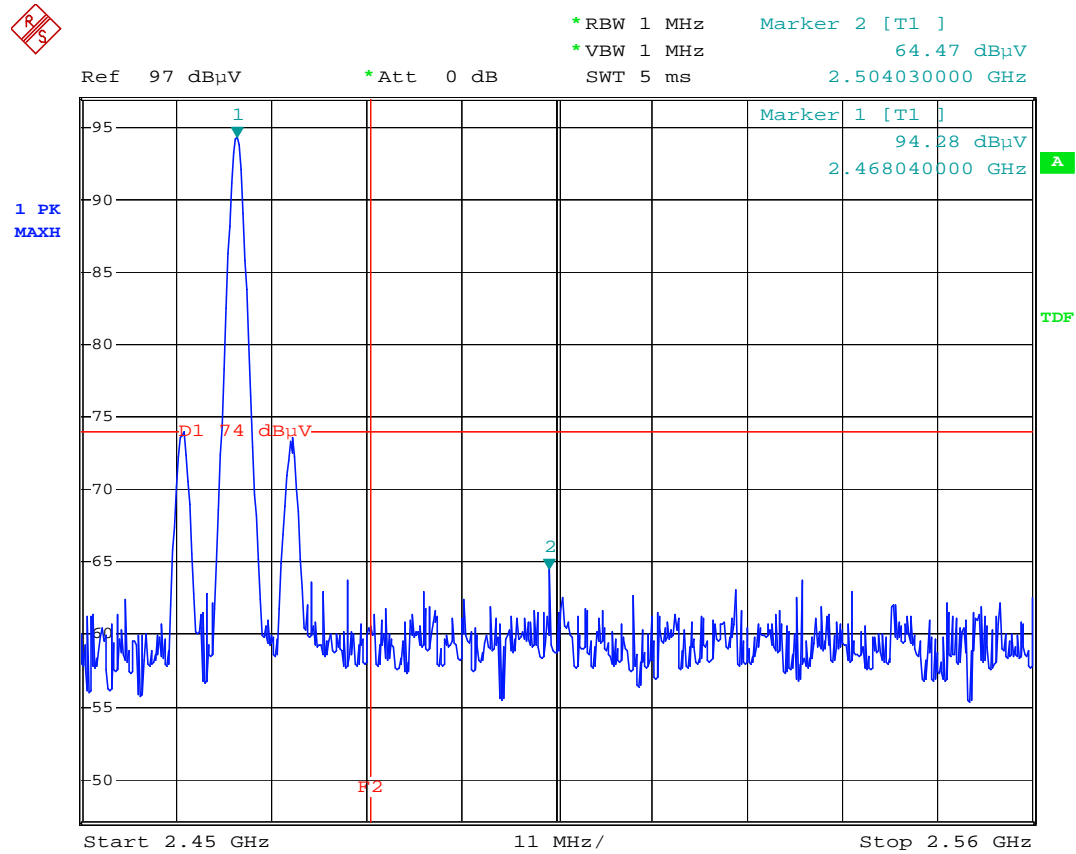


Comment: Band-edge Test at CH1  
 Comment: Peak Detetor F1=2390MHz  
 Date: 11.JAN.2005 22:20:27

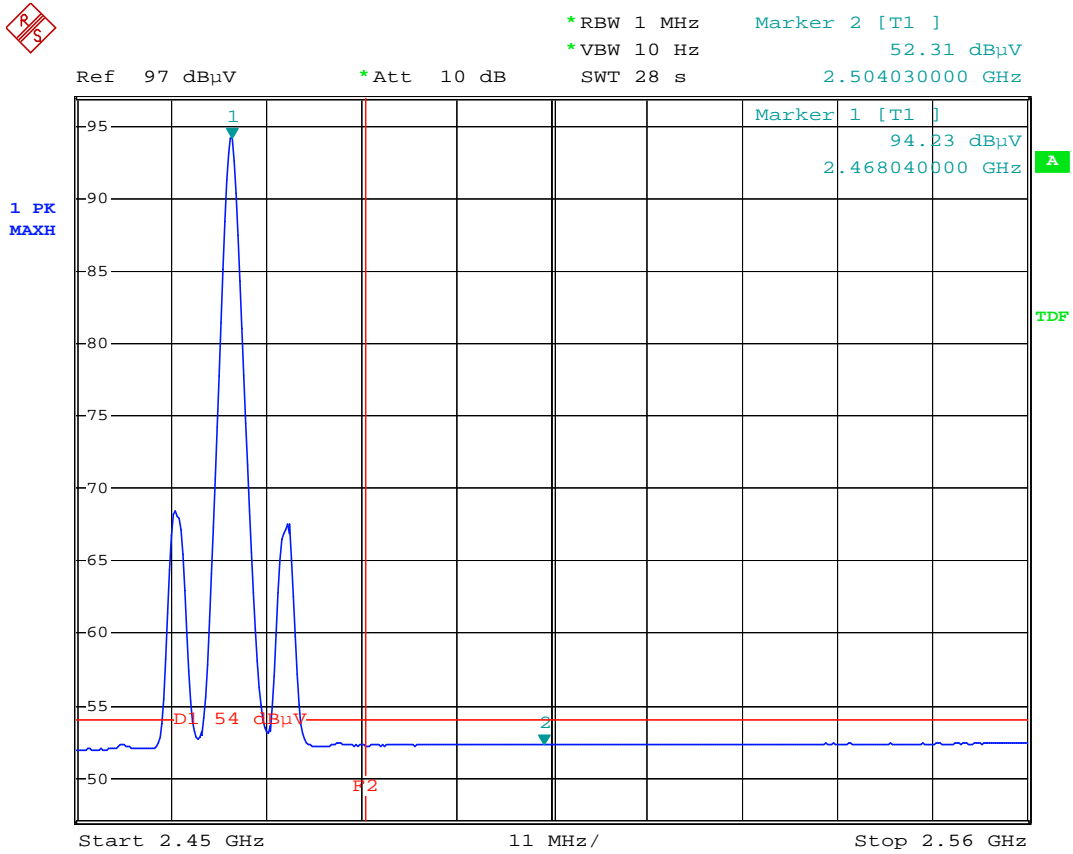


Comment: Band-edge Test at CH1  
 Comment: Avg. Detetor Fl=2390MHz  
 Date: 11.JAN.2005 22:23:28

## Test Mode: Tx at 2468MHz



Comment: Band-edge Test at CH4  
 Comment: Peak Detetor F2=2483.5MHz  
 Date: 11.JAN.2005 22:39:53



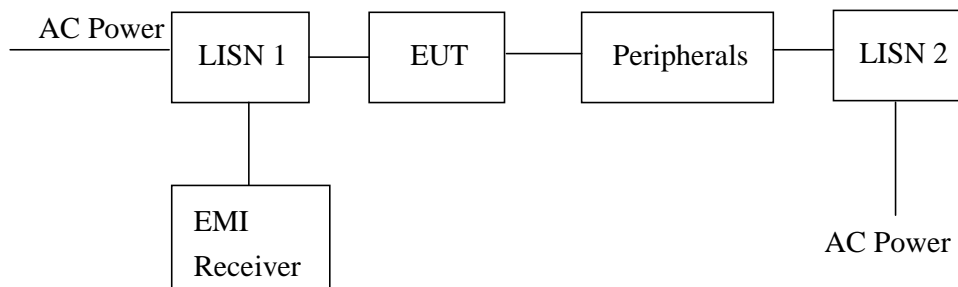
Comment: Band-edge Test at CH4  
 Comment: Avg. Detetor F2=2483.5MHz  
 Date: 11.JAN.2005 22:41:48

## 5. Conducted emission test FCC 15.207

### 5.1 Operating environment

Temperature:	25	°C	(10-40°C)
Relative Humidity:	58	%	(10-90%)
Atmospheric Pressure:	1023	hPa	(860-1061hPa)

### 5.2 Test setup & procedure



The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.

Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/2003 on conducted measurement.

The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9kHz.

The EUT configuration please refer to the “Conducted set-up photo.pdf”.

**5.3 Emission limit**

Freq. (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56*	56 – 46*
0.50~5.00	56	46
5.00~30.0	60	50

\*Decreases with the logarithm of the frequency.

**5.4 Uncertainty of Conducted Emission**

Expanded uncertainty (k=2) of conducted emission measurement is  $\pm 2.6$  dB.

## 5.5 Power Line Conducted Emission test data

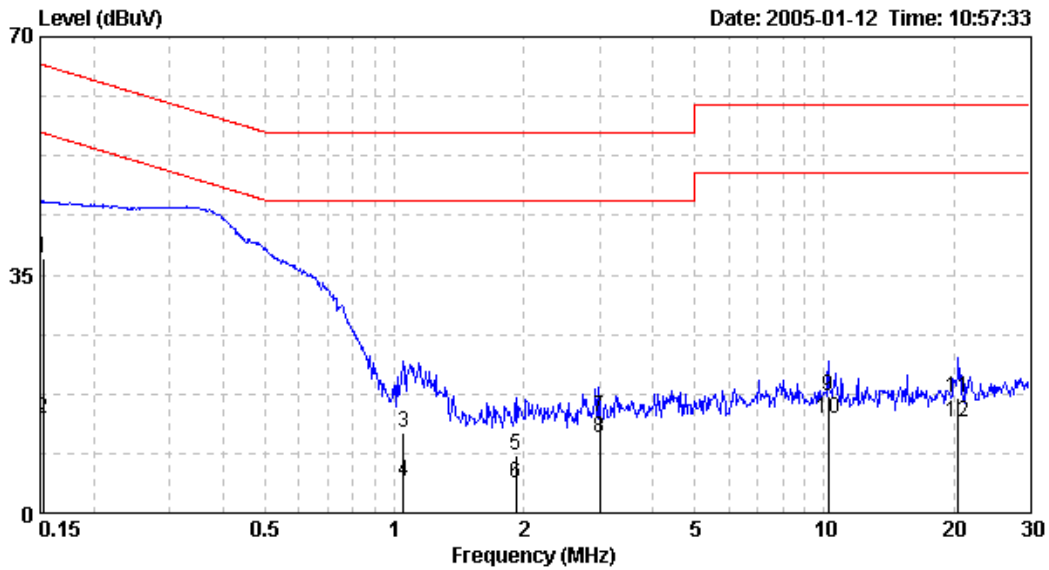
The test was performed on EUT under continuously transmitting mode. Frequency 2414MHz, 2432MHz and 2468MHz were verified. The worst case occurred at Tx 2414MHz.

Phase : Line  
 EUT : AVC-T101  
 Worst Case : Tx at 2414MHz

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB)	
						Qp	Av
0.15	0.10	37.41	65.87	13.79	55.87	-28.46	-42.08
1.05	0.10	11.79	56.00	4.62	46.00	-44.21	-41.38
1.92	0.11	8.38	56.00	4.33	46.00	-47.62	-41.67
3.00	0.18	14.01	56.00	11.06	46.00	-41.99	-34.94
10.24	0.52	17.22	60.00	13.78	50.00	-42.78	-36.22
20.48	0.96	17.02	60.00	13.33	50.00	-42.98	-36.67

Remark:

1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)





Phase : Neutral  
 EUT : AVC-T101  
 Worst Case : Tx at 2414MHz

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB)	
						Qp	Av
0.15	0.10	36.33	66.00	12.59	56.00	-29.67	-43.41
0.46	0.10	25.63	56.73	11.33	46.73	-31.10	-35.40
1.05	0.10	8.35	56.00	4.19	46.00	-47.65	-41.81
2.79	0.16	13.07	56.00	10.28	46.00	-42.93	-35.72
10.24	0.31	16.87	60.00	13.35	50.00	-43.13	-36.65
20.48	0.75	16.20	60.00	12.57	50.00	-43.80	-37.43

**Remark:**

1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)

