



**CONFORMANCE TEST REPORT  
FOR  
FCC 47 CFR, Part 15 Subpart B & Subpart C**

**Report No.: 07-04-MAS-102-02**

Client: **TRANS ELECTRIC CO., LTD.**  
Product: **2.4 GHz Wireless Audio/Video Sender**  
Model: **TR-2470(TRANS),15-125R(RadioShack),15-126R(RadioShack)**  
FCC ID: **BY4TR2470IR**  
Manufacturer/supplier: **TRANS ELECTRIC CO., LTD.**

Date test item received: **2007/04/16**  
Date test campaign completed: **2007/05/04**  
Date of issue: **2007/05/07**

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*Internal photos 6 pages*

*Setup photos 2 pages*

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Manufacturer : TRANS ELECTRIC CO., LTD.  
Address : 765, Sec.2, Chungsan Rd., Huatang, Changhua, Taiwan, R.O.C.  
EUT : 2.4 GHz Wireless Audio/Video Sender  
Trade name : TRANS 、 RadioShack  
Model No. : TR-2470(TRANS),15-125R(RadioShack),15-126R(RadioShack)  
Power Source : Adapter Model No.: KA12D120030033U  
Input: 120Vac, 60Hz, 75mA  
Output: 12Vdc, 300mA  
Regulations applied : FCC 47 CFR, Part 15 Subpart B & Subpart C (2006)

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## 1. GENERAL INFORMATION

### 1.1 Product Description

- a) Type of EUT : 2.4 GHz Wireless Audio/Video Sender
- b) Model No. : TR-2470(TRANS),15-125R(RadioShack),15-126R(RadioShack)
- c) Serial No. : ----
- d) FCC ID : BY4TR2470IR
- e) Working Frequency : 433.960 MHz

### 1.2 Characteristics of Device:

The EUT is a 2.4GHz Wireless A/V Sender. It will transmit the 433.94 MHz control signal to the transmitter and receive 2.4 GHz audio and video signal from the same transmitter. There are four channels to receive: Channel 1: 2411 MHz, Channel 2: 2433 MHz, Channel 3: 2453 MHz, Channel 4: 2473 MHz.

Model different description:

- ① TR-2470: for TRANS
- ② 15-125R: for RadioShack, single package only.
- ③ 15-126R: for RadioShack, complete package with 15-126T.

### 1.3 Test Methodology

Both Conducted and radiated testing were performed according to the procedures in chapter 13 of ANSI C63.4 (2003).

The equipment under test was operated continuously in its normal operating mode for the purpose of the measurements. In order to secure the continuous operation of the device under test, the circuit rewired by the manufacturer to affect its intended operation.

The receiving antenna was varied from 1 to 4 meters and the wooden turntable was rotated through 360 degrees to obtain the highest reading on the field strength meter or on the display of the spectrum analyzer. And also, each emission was to be maximized by changing the orientation of the equipment transmitter under test.

### 1.4 Test Facility

The semi-anechoic chamber and conducted measurement facility used to collect the radiated and conducted data are located inside the Building at No.8, Lane 29, Wen-ming Road, Lo-shan Tsun, Kweishan Hsiang, Taoyuan, Taiwan, R.O.C.

This site has been accreditation as a FCC filing site.

## 2. DEFINITION AND LIMITS

### 2.1 Definition

Intentional radiator:

A device that intentionally generates and emits radio frequency energy by radiation or induction.

### 2.2 Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42-16.423	399.9-410	4.5-5.25
0.495 - 0.505 **	16.69475 - 16.69525	608-614	5.35-5.46
2.1735 - 2.1905	16.80425 - 16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475 - 156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

Remark “\*\*” : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

## 2.3 Limitation

### (1) Conducted Emission Limits :

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the conducted limit is the following:

Frequency MHz	Quasi Peak dB $\mu$ V	Average dB $\mu$ V
0.15 - 0.5	66-56	56-46
0.5 - 5.0	56	46
5.0 - 30.0	60	50

### (2) Radiated Emission Limits :

According to 15.231(e) ,Periodic operation in the band 40.66-40.70 MHz and above 70 MHz, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Frequency Band (MHz)	Field strength of Fundamental (uV/m)	Field strength of Spurious (uV/m)
40.66-40.70	1000	100
70-130	500	50
130-174	*500-1500	*50-150
174-260	1500	150
260-470	*1500-5000	*150-500
Above 470	5000	500

\* Linear interpolations.

According to 15.205 (b), the field strength of emissions appearing within the Restricted Bands shield not exceed.the general radiated limits in 15.209, as following table:

Frequency (MHz)	Field Strength uV/meter	Field Strength dB $\mu$ V/meter	Measurement Distance (meters)
30 - 88	100	40.0	3
88 - 216	150	43.5	3
216 - 960	200	46.0	3
Above 960	500	54.0	3

As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

**(3) Limit of transmission time**

In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

**2.4 Labeling Requirement**

The device shall bear the following statement in a conspicuous location on the device :

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

**2.5 User Information**

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

To comply with the FCC RF exposure compliance requirement, this device and its antenna must not be co-located or operating to conjunction with any other antenna or transmitter.

### 3. SYSTEM TEST CONFIGURATION

#### 3.1 Devices for Tested System

Device	Manufacture	Model No.	S/N No.	Cable Description
2.4 GHz Wireless Audio/Video Sender *	TRANS ELECTRIC CO., LTD.	TR-2470(TRANS), 15-125R (RadioShack), 15-126R (RadioShack)	----	1.8m Unshielded Adaptor
IR Transmitter *	TRANS ELECTRIC CO., LTD.	----	----	2.6m Unshielded Signal Line
DVD Player	PIONEER	DV-566K	----	1.8m Unshielded Power Line 1.5m Unshielded Signal Line (AV cable) 1.5m Unshielded Signal Line (S-Video cable)
LCD TV	Sharp	LC-20AXCT	----	1.8m Unshielded Power Line 1.5m Unshielded Signal Line (AV cable) 1.5m Unshielded Signal Line (S-Video cable)
Remote Control	N/A	N/A	----	----

Remark “\*” means equipment under test.

## 4. RADIATED EMISSION MEASUREMENT

### 4.1 Applicable Standard

For periodic operation intentional radiator, the radiated emission shall comply with § 15.231(b).

### 4.2 Measurement Procedure

#### A. Preliminary Measurement For Portable Devices.

For portable devices, the following procedure was performed to determine the maximum emission axis of EUT:

1. With the receiving antenna is H polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
2. With the receiving antenna is V polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
3. Compare the results derived from above two steps. So, the axis of maximum emission from EUT was determined and the configuration was used to perform the final measurement.

#### B. Final Measurement

1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively. Turn on EUT and make sure that it is in continuous operating function.
2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a semi-anechoic chamber to determine the accurate frequencies of higher emissions and then each selected frequency is precisely measured. As the same purpose, for emission measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.
3. For emission measured below and above 1 GHz, set the spectrum analyzer on a 120 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.
4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ° to 360 ° with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading. A RF test receiver is also used to confirm emissions measured.

Figure 1 : Frequencies measured below 1 GHz configuration

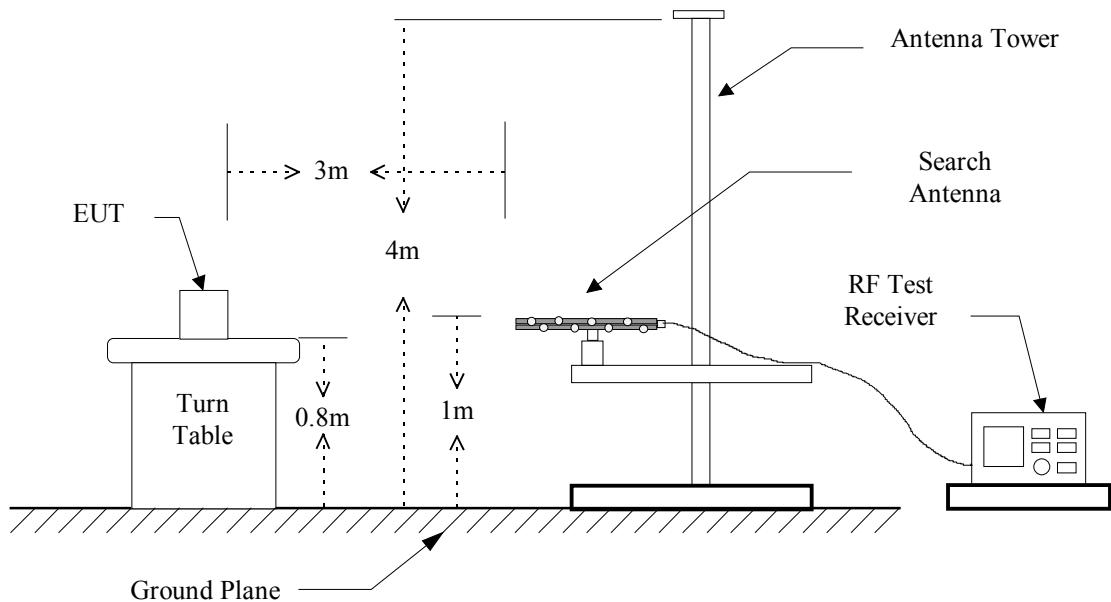
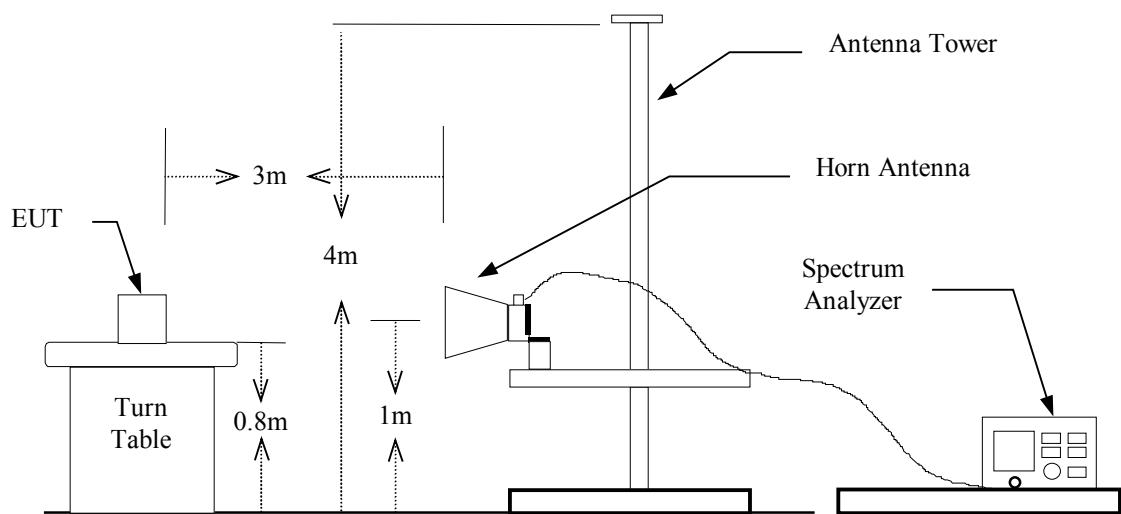


Figure 2 : Frequencies measured above 1 GHz configuration



## 4.3 Test Data

### 4.3.1 Fundamental and Harmonic

Operated mode : 433MHz Transmitting  
 Test Date : May 04, 2007 Temperature : 20 °C Humidity : 60%

Frequency (MHz)	Ant Pol H / V	Reading (dBuV) Peak	Reading (dBuV) QP	Correct Factor (dB)	Duty Factor (dB)	Result @3m (dBuV/m) Peak QP AVG			Limit @3m (dBuV/m) Peak QP AVG		
<b>Fundamental</b>											
433.960	H	77.9	----	20.1	-20.0	98.0	----	78.0	100.8	----	80.8
433.960	V	72.4	----	20.1	-20.0	92.5	----	72.5	100.8	----	80.8
<b>Harmonic</b>											
867.920	H	39.6	----	25.0	-20.0	64.6	----	44.6	80.8	----	60.8
867.920	V	35.1	----	25.0	-20.0	60.1	----	40.1	80.8	----	60.8
*1301.880	H	74.3	----	-12.3	-20.0	62.0	----	42.0	74.0	----	54.0
*1301.880	V	75.8	----	-12.3	-20.0	63.5	----	43.5	74.0	----	54.0
1735.840	H	77.1	----	-11.0	-20.0	66.1	----	46.1	80.8	----	60.8
1735.840	V	76.3	----	-11.0	-20.0	65.3	----	45.3	80.8	----	60.8
2169.800	H	66.2	----	-8.7	-20.0	57.5	----	37.5	80.8	----	60.8
2169.800	V	76.0	----	-8.7	-20.0	67.3	----	47.3	80.8	----	60.8
2603.760	H	59.0	----	-6.7	-20.0	52.3	----	32.3	80.8	----	60.8
2603.760	V	62.0	----	-6.7	-20.0	55.3	----	35.3	80.8	----	60.8
3037.720	H	64.7	----	-4.4	-20.0	60.3	----	40.3	80.8	----	60.8
3037.720	V	61.9	----	-4.4	-20.0	57.5	----	37.5	80.8	----	60.8
3471.680	H	59.0	----	-1.2	-20.0	57.8	----	37.8	80.8	----	60.8
3471.680	V	55.7	----	-1.2	-20.0	54.5	----	34.5	80.8	----	60.8
*3905.640	H	57.4	----	0	-20.0	57.4	----	37.4	74.0	----	54.0
*3905.640	V	58.4	----	0	-20.0	58.4	----	38.4	74.0	----	54.0
*4339.600	H	----	----	1.8	-20.0	----	----	74.0	----	54.0	54.0
*4339.600	V	52.7	----	1.8	-20.0	54.5	----	34.5	74.0	----	54.0

**Note:**

1. Peak Result = Peak Reading + Correct Factor
2. AVG Result = Peak Result + Duty Factor
3. If the result of peak value is under the limit of average, the average value doesn't need to be measured.
4. "\*" means the frequency is in the Restricted Bands.

## 4.3.2 Other Emission

4.3.2.1 Operated mode : 433 MHz Transmitting**A. below 1GHz**

EUT :	Model :	Status : TX
Condition : Horizontal	Date : 2007/5/4	Temp. : 20°C      Humi. : 60%

	Freq (MHz)	QP Level (dBuV)	Factor (dB/m)	QP Result (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dB)	Ant Height (m)	Table Degree
1	30.000	9.2	13.1	22.3	40.0	-17.7	1.1	343
2	47.495	7.7	14.3	21.0	40.0	-19.0	1.2	25
3	237.996	7.8	14.4	22.2	46.0	-23.8	1.1	75
4	360.461	4.3	18.3	22.6	46.0	-23.4	1.7	135
5	482.926	7.0	21.4	28.4	46.0	-17.6	1.1	45
6	685.090	2.0	25.4	27.4	46.0	-18.6	1.2	330

EUT :	Model :	Status : TX
Condition : Vertical	Date : 2007/5/4	Temp. : 20°C      Humi. : 60%

	Freq (MHz)	QP Level (dBuV)	Factor (dB/m)	QP Result (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dB)	Ant Height (m)	Table Degree
1	35.832	25.5	13.0	38.5	40.0	-1.5	1.1	343
2	101.924	8.9	11.5	20.4	43.5	-23.1	1.2	25
3	111.643	10.3	12.8	23.1	43.5	-20.4	1.1	135
4	381.844	6.0	18.9	24.9	46.0	-21.1	1.3	45
5	482.926	7.7	21.4	29.1	46.0	-16.9	1.4	135
6	634.549	8.1	24.2	32.3	46.0	-13.7	1.1	75

**B. above 1GHz**

Frequency (MHz)	Ant Pol H / V	Reading (dBuV) Peak	Correct Factor (dB)	Duty Factor (dB)	Result @3m (dBuV/m) Peak	Result @3m (dBuV/m) AVG	Limit @3m (dBuV/m) Peak	Limit @3m (dBuV/m) AVG
1933.333	H	67.4	-8.7	-20.0	58.7	38.7	80.8	60.8
1933.333	V	64.5	-8.7	-20.0	55.8	35.8	80.8	60.8
*3911.058	H	53.0	0	-20.0	53.0	33.0	74.0	54.0
*3911.058	V	55.2	0	-20.0	55.2	35.2	74.0	54.0

Note:

1. Place of Measurement: Measuring site of the ETC.
2. If the data table appeared symbol of "\*\*\*" means the value was too low to be measured.
3. The estimated measurement uncertainty of the result measurement is  
 $\pm 4.6\text{dB}$  ( $30\text{MHz} \leq f < 300\text{MHz}$ ).  
 $\pm 4.4\text{dB}$  ( $300\text{MHz} \leq f < 1000\text{MHz}$ ).  
 $\pm 4.1\text{dB}$  ( $1\text{GHz} \leq f \leq 18\text{GHz}$ ).
4. “\*” means the frequency is in the Restricted Bands.

4.3.2.2 Operated mode : 2.4GHz Receiver (Channel 1)**A. below 1GHz**

EUT :	Model :	Status : RX CH01		
Condition : Horizontal	Date : 2007/5/4	Temp. : 20°C	Humi. : 60%	

	Freq (MHz)	QP Level (dBuV)	Factor (dB/m)	QP Result (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dB)	Ant Height (m)	Table Degree
1	30.000	9.7	13.1	22.8	40.0	-17.2	1.7	40
2	195.230	6.5	13.1	19.6	43.5	-23.9	1.8	45
3	214.669	6.3	13.5	19.8	43.5	-23.7	1.7	37
4	245.772	6.2	14.6	20.8	46.0	-25.2	1.1	25
5	255.491	6.0	14.9	20.9	46.0	-25.1	1.1	225
6	265.210	5.8	15.2	21.0	46.0	-25.0	1.7	343

EUT :	Model :	Status : RX CH01		
Condition : Vertical	Date : 2007/5/4	Temp. : 20°C	Humi. : 60%	

	Freq (MHz)	QP Level (dBuV)	Factor (dB/m)	QP Result (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dB)	Ant Height (m)	Table Degree
1	30.000	15.3	13.1	28.4	40.0	-11.6	1.1	25
2	45.551	7.2	13.2	20.4	40.0	-19.6	1.2	40
3	61.102	10.0	12.5	22.5	40.0	-17.5	1.4	275
4	107.756	5.9	12.3	18.2	43.5	-25.3	1.1	25
5	288.537	2.0	16.0	18.0	46.0	-28.0	1.1	45
6	444.048	1.9	20.5	22.4	46.0	-23.6	1.2	275

**B. above 1GHz**

Frequency (MHz)	Ant Pol H / V	Reading (dBuV) Peak	Correct Factor (dB)	Duty Factor (dB)	Result @3m (dBuV/m) Peak	Limit @3m (dBuV/m) Peak	Margins ( dB )
Radiated emission frequencies above 1 GHz to 4.5 GHz were too low to be measured.							

Note:

1. Place of Measurement: Measuring site of the ETC.
2. If the data table appeared symbol of "\*\*\*\*" means the value was too low to be measured.
3. The estimated measurement uncertainty of the result measurement is  
 $\pm 4.6\text{dB}$  ( $30\text{MHz} \leq f < 300\text{MHz}$ ).  
 $\pm 4.4\text{dB}$  ( $300\text{MHz} \leq f < 1000\text{MHz}$ ).  
 $\pm 4.1\text{dB}$  ( $1\text{GHz} \leq f \leq 18\text{GHz}$ ).

4.3.2.3 Operated mode : 2.4GHz Receiver (Channel 2)**A. below 1GHz**

EUT :	Model :	Status : RX CH02		
Condition : Horizontal	Date : 2007/5/4	Temp. : 20°C	Humi. : 60%	

	Freq (MHz)	QP Level (dBuV)	Factor (dB/m)	QP Result (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dB)	Ant Height (m)	Table Degree
1	30.000	8.7	13.1	21.8	40.0	-18.2	1.7	25
2	119.419	2.8	13.6	16.4	43.5	-27.1	1.2	45
3	214.669	5.8	13.5	19.3	43.5	-24.2	1.5	75
4	255.491	4.0	14.9	18.9	46.0	-27.1	1.4	135
5	274.930	3.7	15.4	19.1	46.0	-26.9	1.1	75
6	360.461	3.1	18.3	21.4	46.0	-24.6	1.2	25

EUT :	Model :	Status : RX CH02		
Condition : Vertical	Date : 2007/5/4	Temp. : 20°C	Humi. : 60%	

	Freq (MHz)	QP Level (dBuV)	Factor (dB/m)	QP Result (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dB)	Ant Height (m)	Table Degree
1	30.000	14.7	13.1	27.8	40.0	-12.2	1.7	25
2	41.663	14.4	13.1	27.5	40.0	-12.5	1.2	75
3	61.102	9.5	12.5	22.0	40.0	-18.0	1.1	135
4	109.699	8.7	12.6	21.3	43.5	-22.2	1.1	243
5	376.012	3.0	18.8	21.8	46.0	-24.2	1.1	277
6	653.988	2.4	24.6	27.0	46.0	-19.0	1.2	30

**B. above 1GHz**

Frequency (MHz)	Ant Pol H / V	Reading (dBuV) Peak	Correct Factor (dB)	Duty Factor (dB)	Result @3m (dBuV/m) Peak	Limit @3m (dBuV/m) Peak	Margins ( dB )
Radiated emission frequencies above 1 GHz to 4.5 GHz were too low to be measured.							

Note:

1. Place of Measurement: Measuring site of the ETC.
2. If the data table appeared symbol of "\*\*\*\*" means the value was too low to be measured.
3. The estimated measurement uncertainty of the result measurement is  
 $\pm 4.6\text{dB}$  ( $30\text{MHz} \leq f < 300\text{MHz}$ ).  
 $\pm 4.4\text{dB}$  ( $300\text{MHz} \leq f < 1000\text{MHz}$ ).  
 $\pm 4.1\text{dB}$  ( $1\text{GHz} \leq f \leq 18\text{GHz}$ ).

4.3.2.4 Operated mode : 2.4GHz Receiver (Channel 4)**A. below 1GHz**

EUT :	Model :	Status : RX CH04		
Condition : Horizontal	Date : 2007/5/4	Temp. : 20°C	Humi. : 60%	

	Freq (MHz)	QP Level (dBuV)	Factor (dB/m)	QP Result (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dB)	Ant Height (m)	Table Degree
1	30.000	8.4	13.1	21.5	40.0	-18.5	1.7	25
2	41.663	10.5	13.1	23.6	40.0	-16.4	1.2	45
3	54.327	4.3	13.2	17.5	40.0	-22.5	1.1	77
4	99.980	4.8	11.2	16.0	43.5	-27.5	1.3	18
5	245.772	6.0	14.6	20.6	46.0	-25.4	1.1	27
6	455.711	2.8	20.8	23.6	46.0	-22.4	1.3	30

EUT :	Model :	Status : RX CH04		
Condition : Vertical	Date : 2007/5/4	Temp. : 20°C	Humi. : 60%	

	Freq (MHz)	QP Level (dBuV)	Factor (dB/m)	QP Result (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dB)	Ant Height (m)	Table Degree
1	35.832	18.0	13.0	31.0	40.0	-9.0	1.7	30
2	61.102	9.5	12.5	22.0	40.0	-18.0	1.3	27
3	80.541	8.4	9.6	18.0	40.0	-22.0	1.1	345
4	107.756	6.1	12.3	18.4	43.5	-25.1	1.3	27
5	150.521	2.2	14.8	17.0	43.5	-26.5	1.4	45
6	280.762	2.5	15.7	18.2	46.0	-27.8	1.1	77

**B. above 1GHz**

Frequency (MHz)	Ant Pol H / V	Reading (dBuV) Peak	Correct Factor (dB)	Duty Factor (dB)	Result @3m Peak	Result @3m AVG	Limit @3m Peak	Limit @3m AVG	Margins ( dB )
Radiated emission frequencies above 1 GHz to 4.5 GHz were too low to be measured.									

Note:

1. Place of Measurement: Measuring site of the ETC.
2. If the data table appeared symbol of "\*\*\*\*" means the value was too low to be measured.
3. The estimated measurement uncertainty of the result measurement is  
 $\pm 4.6\text{dB}$  ( $30\text{MHz} \leq f < 300\text{MHz}$ ).  
 $\pm 4.4\text{dB}$  ( $300\text{MHz} \leq f < 1000\text{MHz}$ ).  
 $\pm 4.1\text{dB}$  ( $1\text{GHz} \leq f \leq 18\text{GHz}$ ).

## 4.4 Field Strength Calculation

### (a) Field Strength:

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$\text{RESULT} = \text{READING} + \text{CORR. FACTOR}$$

where CORR. FACTOR = Antenna FACTOR + Cable FACTOR

### (b) Duty Factor:

$$20\log \frac{1 \times 9.166(\text{ms}) + 1 \times 0.700(\text{ms})}{100(\text{ms})} = -20.0 \text{ dB}$$

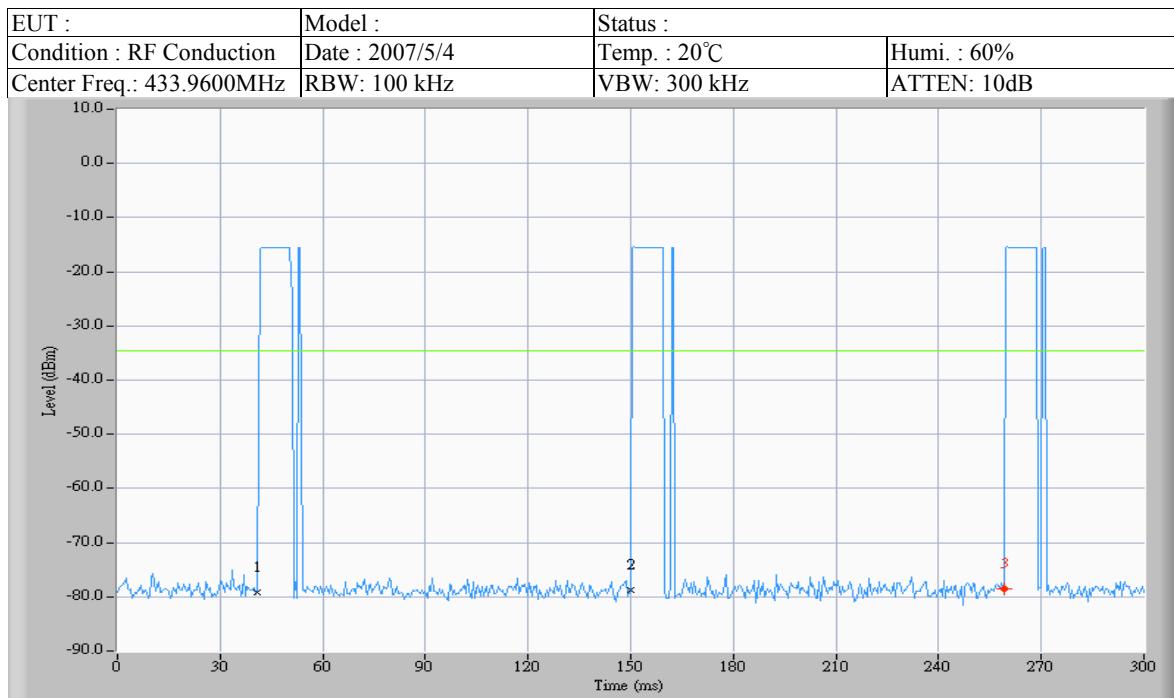
The plotted graph of Duty Factor please see page 17 ~ 18

## 4.5 Radiated Test Equipment

The following instrument are used for radiated emissions measurement :

Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
EMI Receiver	R&S	ESIB 7	100328	May 17, 2007
BiLog Antenna	Schaffner	CBL 6112B	2927	Jun. 11, 2007
Horn Antenna	EMCO	3115	9107-3729	Jun. 06, 2007
PRE-Amplifier	Agilent	8449B	3008A01648	Sep. 17, 2007
Spectrum Analyzer	R&S	FSU46	13040904-001	Oct. 31, 2007
Spectrum Analyzer	Agilent	8564EC	4123A00585	Sep. 22, 2007

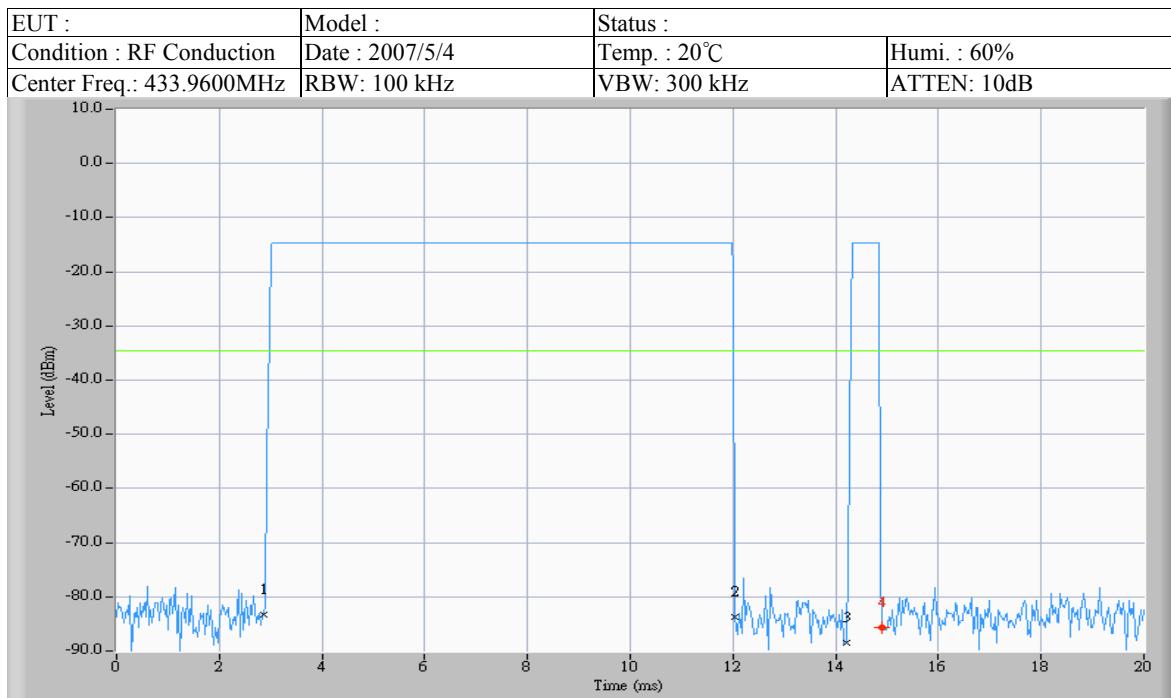
Note: The standards used to perform this calibration are traceable to NML/ROC, NIST/USA and NPL.



Test Request: (-34.66dBm)

Mkr	Time (ms)	Level (dBm)
1	41.000	-79.2
2	150.000	-78.7
3	259.000	-78.5

		$\Delta$ Time (ms)	$\Delta$ Level (dB)
1	Mkr 2 - Mkr 1	109.000	0.5
2	Mkr 3 - Mkr 2	109.000	0.2



Mkr	Time (ms)	Level (dBm)
1	2.867	-84.3
2	12.033	-83.8
3	14.200	-88.5
4	14.900	-85.7

		$\Delta$ Time (ms)	$\Delta$ Level (dB)
1	Mkr 2 - Mkr 1	9.166	-0.5
2	Mkr 4 - Mkr 3	0.700	2.8

#### 4.6 Measuring Instrument Setup

Measuring instrument setup in measured frequency band when specified detector function is used :

Frequency Band (MHz)	Instrument	Function	Resolution Bandwidth	Video Bandwidth
30 to 1000	EMI Test Receiver	Peak	120 kHz	300 kHz
1000 to 4500	EMI Test Receiver	Peak	1 MHz	1 MHz

## 5. BANDWIDTH OF EMISSION

### 5.1 Applicable Standard Plot Graphic of Bandwidth

Per FCC rule §15.231(c), the permitted emission bandwidth is no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz.

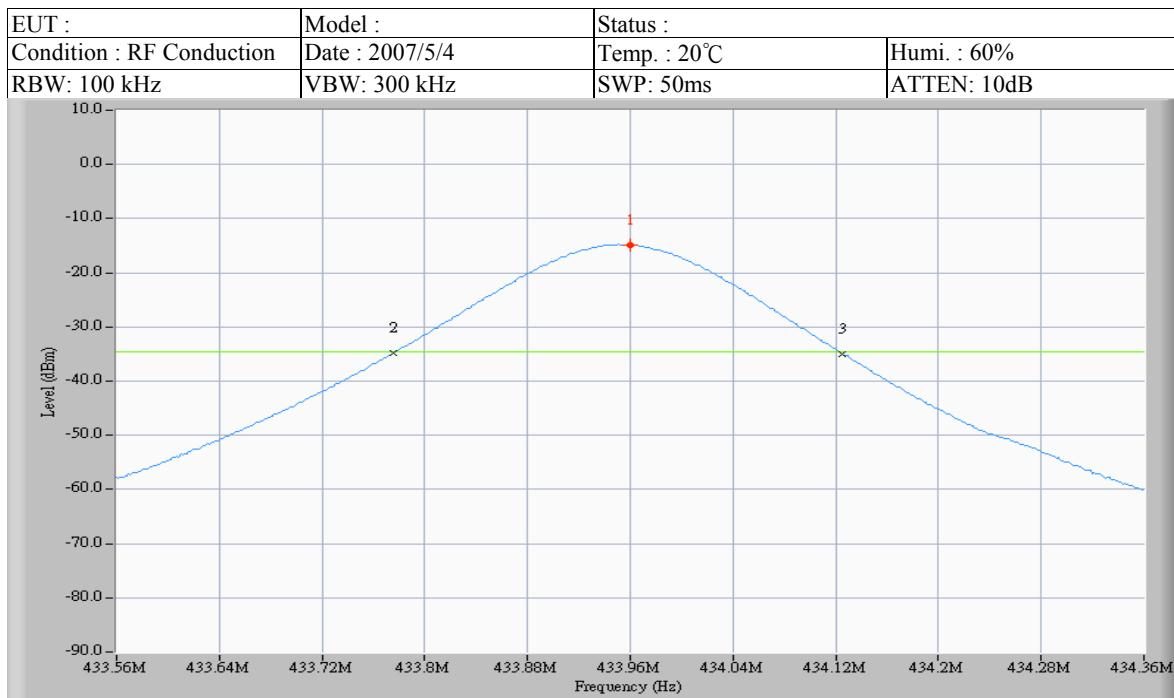
### 5.2 Test Equipment

Equipment	Manufacturer	Model No.	Next Cal. Date
Spectrum Analyzer	Agilent	8564EC	09/22/2007

### 5.3 Test Result

Test Date : May 04, 2007    Temperature : 20 °C    Humidity : 60%

Center Frequency	433.960 MHz
FCC Limit	$433.960 \text{ MHz} \times 0.25\% = 1084.9 \text{ kHz}$
Bandwidth of Emission	349 kHz
Chart	Page 21
Result	PASS



Test Request: (-34.66dBm)

Mkr	Frequency (MHz)	Level (dBm)
1	433.960	-14.8
2	433.776	-34.8
3	434.125	-35.0

		△Frequency (MHz)	△Level (dB)
1	Mkr 3 - Mkr 2	0.349	-0.2

## 6. CONDUCTED EMISSION MEASUREMENT

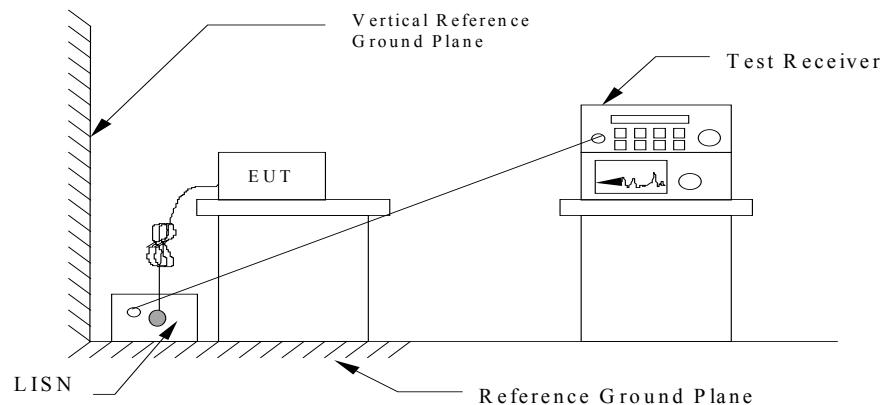
### 6.1 Standard Applicable

For unintentional and intentional device, Line Conducted Emission Limits are in accordance to §15.107(a) and §15.207(a) respectively. Both Limits are identical specification.

### 6.2 Measurement Procedure

1. Setup the configuration per figure 3.
2. A preliminary scan with a spectrum monitor is performed to identify the frequency of emission that has the highest amplitude relative to the limit by operating the EUT in selected modes of operation, typical cable positions, and with a typical system configuration.
3. Record the 6 highest emissions relative to the limit.
4. Measure each frequency obtained from step 3 by a test receiver set on quasi peak detector function, and then record the accuracy frequency and emission level. If all emissions measured in the specified band are attenuated more than 20 dB from the limit, this step would be ignored, and the peak detector function would be used.
5. Confirm the highest three emissions with variation of the EUT cable configuration and record the final data.
6. Repeat all above procedures on measuring each operation mode of EUT.

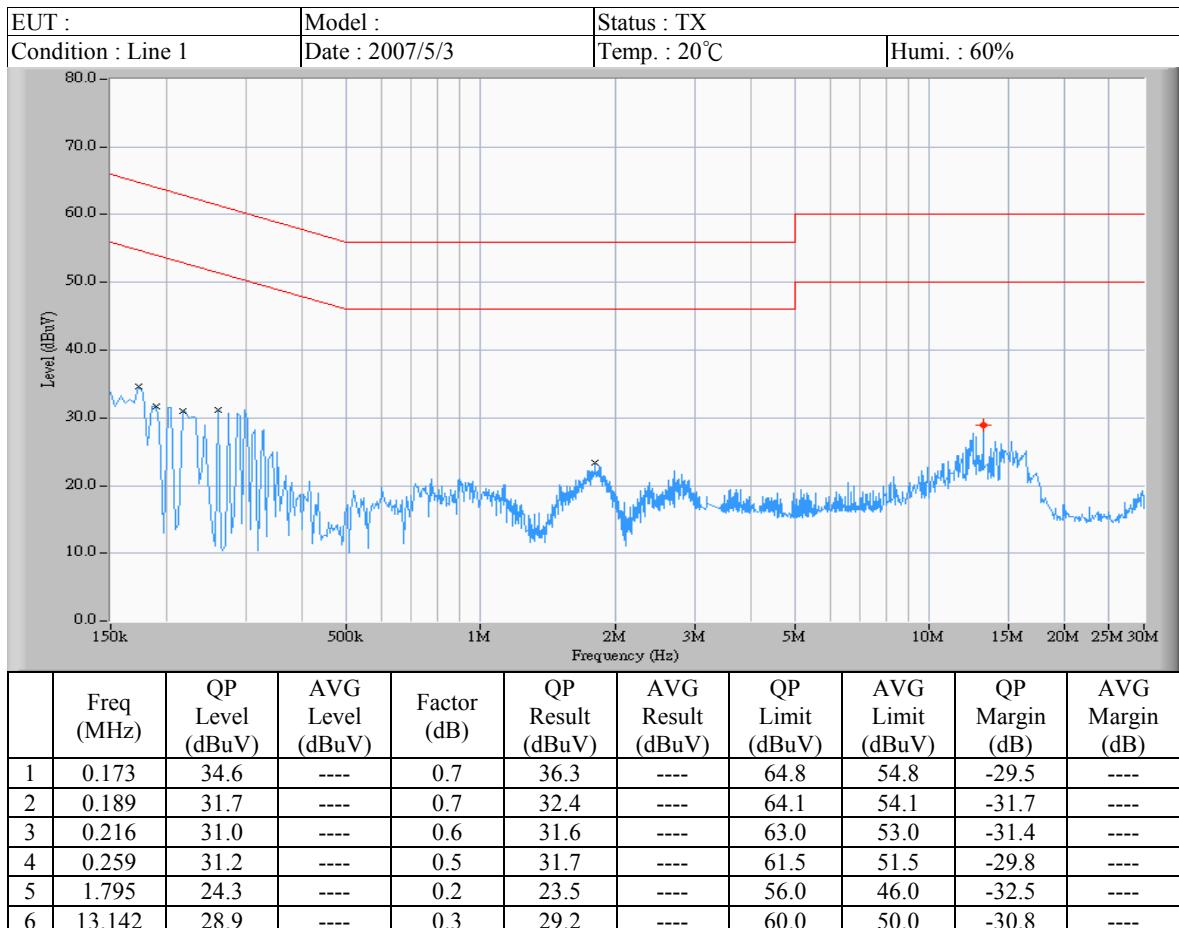
Figure 3 : Conducted emissions measurement configuration



## 6.3 Conducted Emission Data

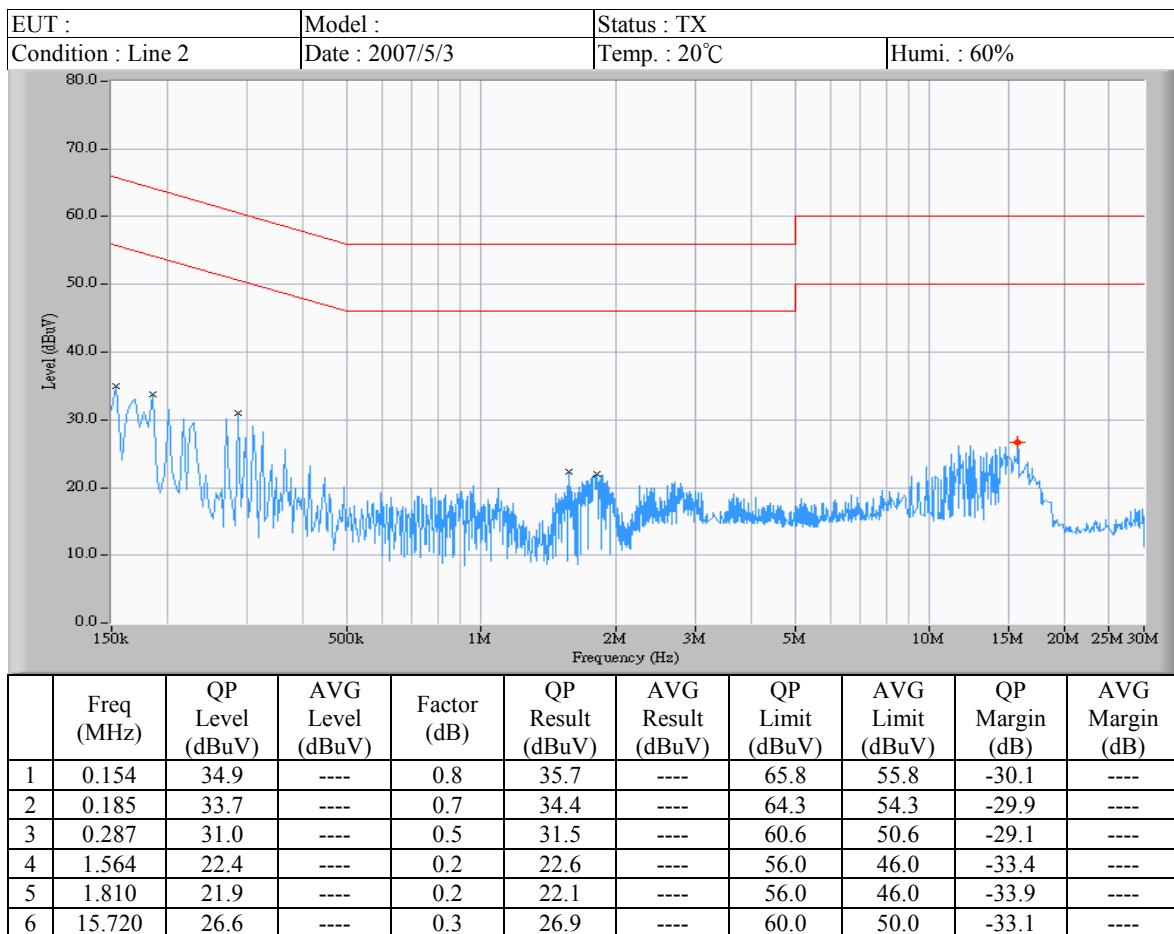
### 6.3.1

#### Operation Mode: 433 MHz Transmitting



Note:

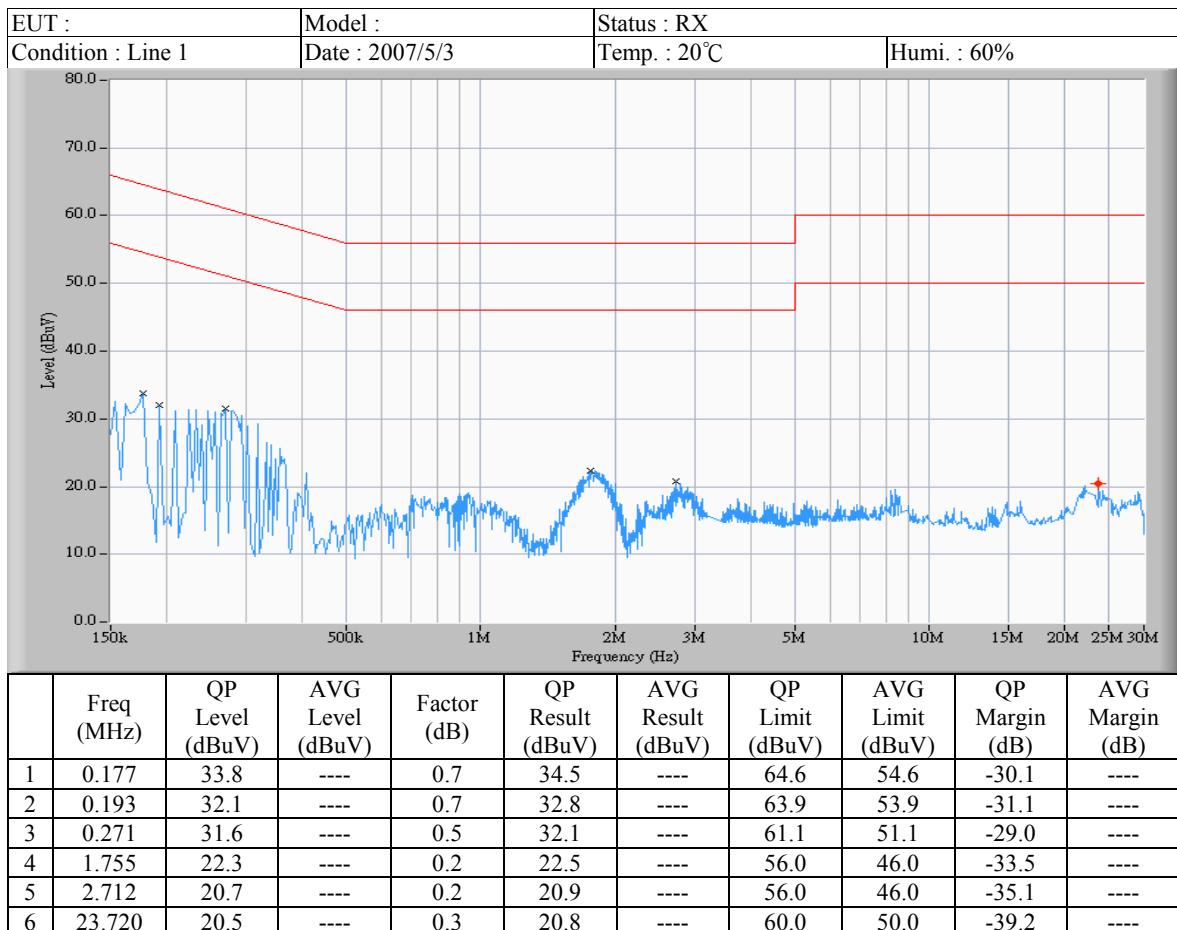
1. "\*\*\*\*" means the value was too low to be measured.
2. If the data table appeared symbol of "----" means the Q.P. value is under the limit of AVG. so, the AVG. value doesn't need to be measured.
3. "#" means the noise was too low, so record the peak value.
4. The estimated measurement uncertainty of the result measurement is  $\pm 2.5$ dB.



Note:

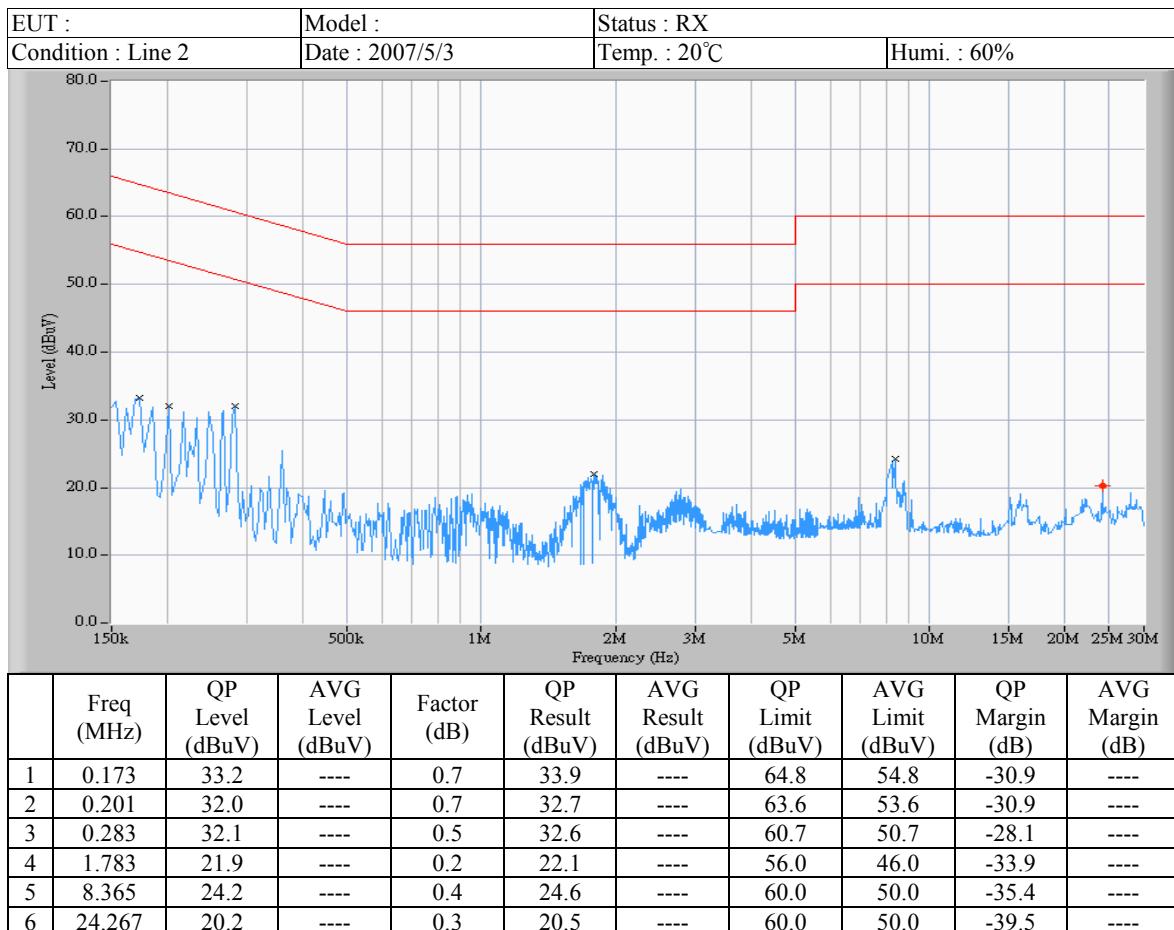
1. “\*\*\*” means the value was too low to be measured.
2. If the data table appeared symbol of “----” means the Q.P. value is under the limit of AVG. so, the AVG. value doesn't need to be measured.
3. “#” means the noise was too low, so record the peak value.
4. The estimated measurement uncertainty of the result measurement is  $\pm 2.5$ dB.

## 6.3.2

Operation Mode: 2.4GHz Receiver

Note:

1. "\*\*\*\*" means the value was too low to be measured.
2. If the data table appeared symbol of "----" means the Q.P. value is under the limit of AVG. so, the AVG. value doesn't need to be measured.
3. "#" means the noise was too low, so record the peak value.
4. The estimated measurement uncertainty of the result measurement is  $\pm 2.5$ dB.



Note:

1. “\*\*\*” means the value was too low to be measured.
2. If the data table appeared symbol of “----” means the Q.P. value is under the limit of AVG. so, the AVG. value doesn't need to be measured.
3. “#” means the noise was too low, so record the peak value.
4. The estimated measurement uncertainty of the result measurement is  $\pm 2.5$ dB.

## 6.4 Result Data Calculation

The result data is calculated by adding the LISN Factor to the measured reading. The basic equation with a sample calculation is as follows:

$$\text{RESULT} = \text{READING} + \text{LISN FACTOR (Included Cable Loss)}$$

## 6.5 Conducted Measurement Equipment

The following test equipment are used during the conducted test.

Equipment	Manufacturer	Model No.	Next Cal. Due
RF Test Receiver	Rohde and Schwarz	ESCS30	07/16/2007
LISN	EMCO	37100/2M	02/12/2008

## 7. LIMIT OF TRANSMISSION TIME

### 7.1 Applicable Standard

According to 15.231(e) , devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

### 7.2 Test Equipment

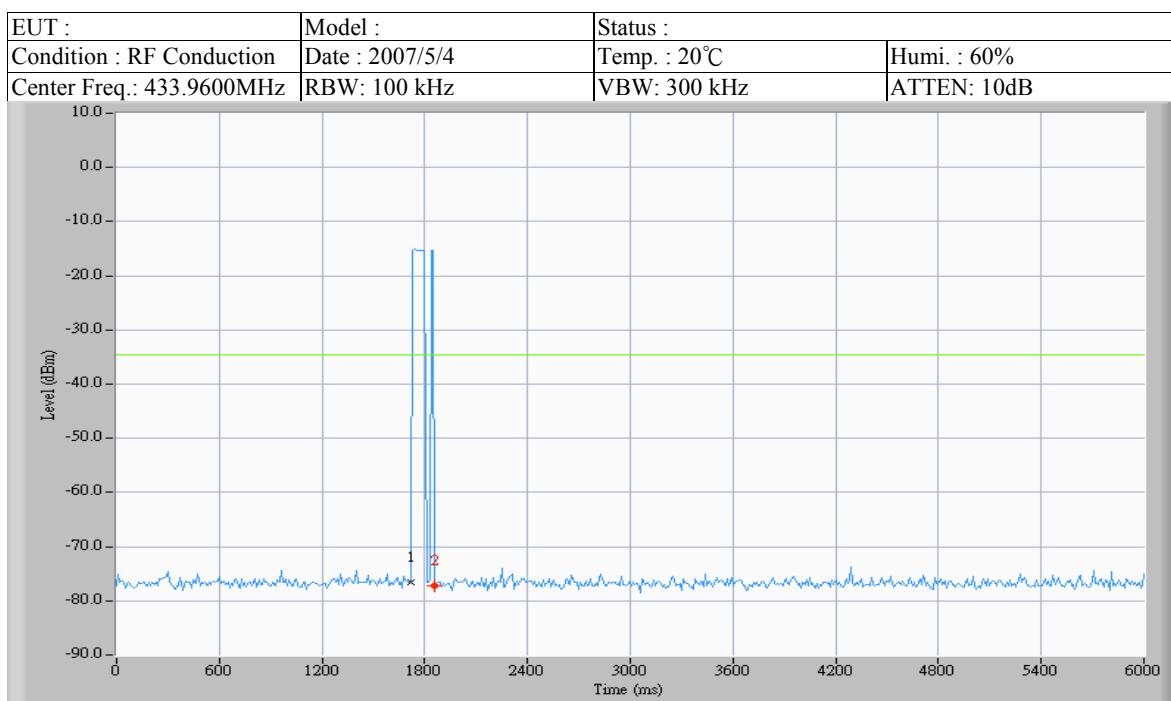
Equipment	Manufacturer	Model No.	Next Cal. Date
Spectrum Analyzer	Agilent	8564EC	09/22/2007

### 7.3 Test Result

Test Date : May 04, 2007    Temperature : 20 °C    Humidity : 60%

This transmitter is operated by manual and active time is 0.14 second after being released.

*Note : Please refer to page 29 for chart*



Test Request: (-34.66dBm)

Mkr	Time (ms)	Level (dBm)
1	1720.000	-76.5
2	1860.000	-77.3

		△Time (ms)	△Level (dB)
1	Mkr 2 - Mkr 1	140.000	-0.8